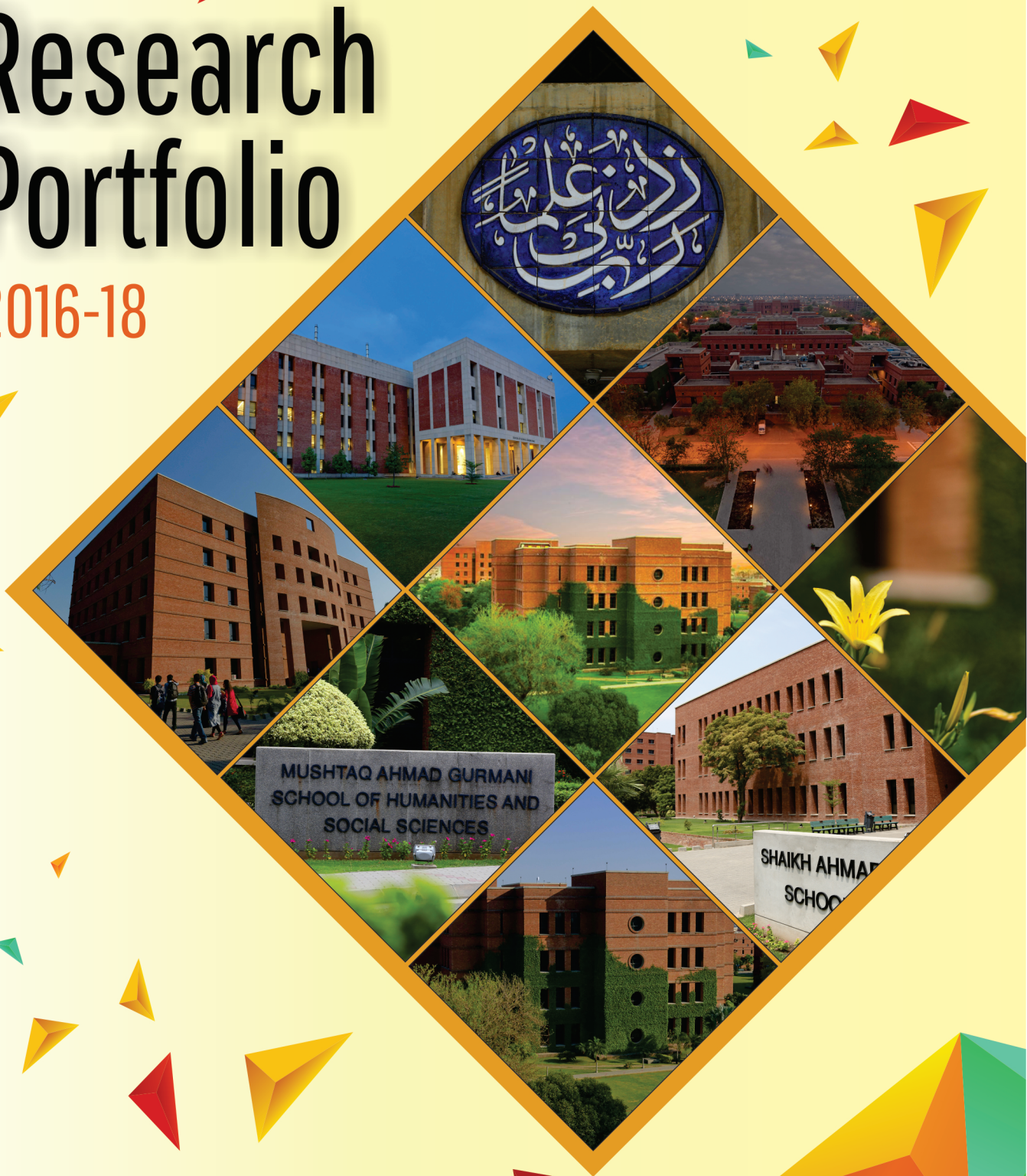
Office of Sponsored Programmes and Research (OSPR)

Annual Report

Research Portfolio

2016-18



LUMS | Office of Sponsored Programmes & Research

Office of Sponsored Programmes and Research (OSPR)

The Office of Sponsored Programmes and Research (OSPR) is actively pursuing its mandate to promote research culture at LUMS and is acting as a bridge between the LUMS faculty and external funding agencies and managing internally sponsored research activities at LUMS. The aim of OSPR is to ensure that all submitted proposals conform to sponsor guidelines and LUMS policies, and if funded, the projects comply with sponsor requirements and applicable LUMS policies and procedures. Sponsored research includes, but is not limited to, externally funded research proposals; unrestricted grants; travel grants; sponsored conferences, workshops, seminars; consulting assignments; service activities; contracts; agreements and arrangements related to sponsored and externally funded activities. Moreover, the OSPR also manages internal grants, which are provided by LUMS including the Faculty Initiative Fund (FIF), Faculty Travel Grant (FTG) and Start-up Grants.

Recently OSPR has set up a Technology Transfer Wing (TTW) to provide help in filing copyright and patent applications. Through its TTW, formal support mechanisms are established to provide legal, administrative and financial support required in the patent and commercialisation process to the LUMS faculty in order to ensure that their focus remains on the research and innovation aspect, leaving the legal and administrative issues for the TTW team.

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Message from the Vice Chancellor

The range of research activities at LUMS is broad and deep. Cutting edge research at LUMS continues to power ahead with a focus on quality and impact. LUMS faculty members and students are actively involved in numerous fields of research. All members of the LUMS community are engaged in adding value to the already existing knowledge base. LUMS is proud to house and hone researchers that include faculty members, postdoctoral fellows, graduate and undergraduate students. By collaborating with colleagues across the University, at affiliated institutions, and at other research institutions, LUMS research contributes at the highest levels of institutional excellence. This report presents a comprehensive analysis of research activity at LUMS that includes the impact of support provided by the institution itself through PhD fellowships, travel support, start-up grants and small faculty research grants.

Additionally, the report covers the entire ambit of externally funded research and consultancies, showcasing the tremendous progress made by faculty at LUMS in attracting both local and internationally competitive grants. The availability of the research publications and grants dashboards at LUMS provides everybody involved with research a real time view into the research activity of an individual, Departments, Schools and the entire University. The dashboard has been invaluable in providing an unbiased snapshot of research activity at LUMS.

While the research output is dominated by the work of the science and engineering school, it is heartening to see significant research output in the areas of business studies, economics, humanities and law. The establishment of interdisciplinary research centres is catalysing joint publications by researchers from diverse fields. The Office of Sponsored Programmes and Research at LUMS is also leading efforts of the University to work with entrepreneurs and start-ups, commercialising new ideas. The results to date are promising and as the entrepreneurial culture takes root, it is envisioned that these will lead to significant employment generation as well as having an economic impact on the region.

Prof. Dr. S. Sohail H. Naqvi
Vice Chancellor
LUMS

Message from the Director

I am extremely delighted to present to you the LUMS Research Portfolio 2016-18, a compilation of the funded research endeavours of the faculty at Lahore University of Management Sciences (LUMS) in the past two years.

LUMS aims to provide academic leadership across the spectrum of Social Sciences, Humanities, Law, Business, Natural Sciences, Technology and Engineering through impactful research and by developing strategic partnerships around the world. LUMS researchers collaborate with many leading local, national, and international organisations to further exploration and advance the frontiers of human knowledge and improve societal well-being. The University strives for the highest levels of quality in research, education and for significant and lasting impact in pursuing its mission of service to the nation and humanity. In order to achieve these objectives LUMS provides a creative and supportive environment for its students and faculty to engage in pioneering academic as well as research activities.

From January 2016 to June 2018, LUMS faculty have won 245 externally funded grants (including research grants, conference travel, and consultancy services) of PKR 1,539 million. Apart from that, 119 faculty members have won 288 research grants worth PKR 155 million from the LUMS internal funding sources. During this period, LUMS won a competitive grant to establish the National Incubation Centre to establish and enhance the start-up and entrepreneurial echo system. Recently, LUMS also won a competitive grant to establish the National Centre in Big Data & Cloud Computing. Our faculty members also won best paper awards at prestigious platforms. One such award was won by a team of faculty and students led by Dr. Ihsan Ayyub Qazi; their paper was selected as the best among all papers published during 2017 in the ACM SIGCOMM Computer Communications Review (CCR) journal for their seminal work on Facebook's Free Basics Platform. A number of LUMS faculty members have also been part of the National Research Productivity Awards of 2016 and 2017 in the areas of Physics, Chemistry, Biology, Mathematics and Electrical Engineering.

The objective of presenting this report is to highlight the excellent accomplishments and innovative achievements of the LUMS faculty who have made LUMS a regional centre of excellence today, evident from its international rankings.

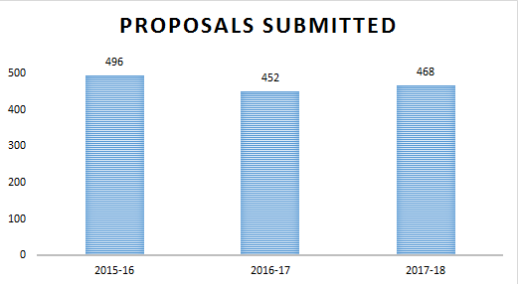
Looking forward to your feedback.

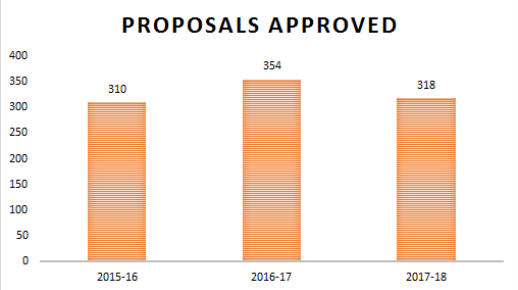
Dr. Shafay Shamail,
Director,
Office of Sponsored Programmes and Research (OSPR)
LUMS

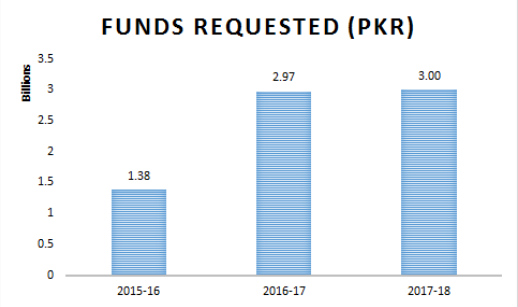
Research Statistics

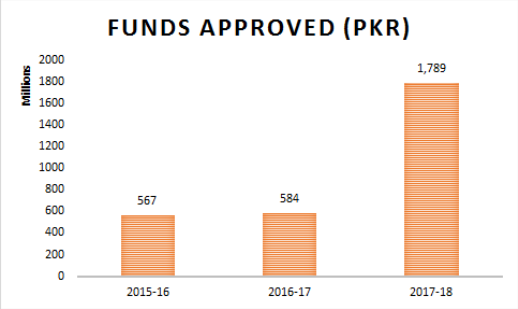
Submissions & Grants

LUMS is one of the nation's top research universities, not only generating important new knowledge in the fields of medicine, technology, business, science and beyond, but also applying this knowledge to improve the lives of individuals and communities at home and around the world. As a result of constant focus on research support, around 4% increase has been observed in the faculty research proposals seeking funding in the last fiscal year 2017-18.



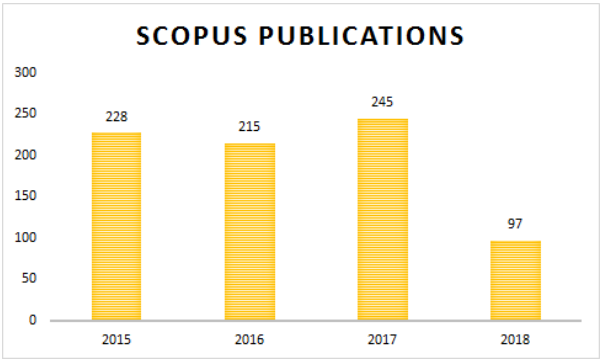






Publications

At LUMS, the biggest challenges of the day are being addressed to create a better world. The range of research activities at LUMS is broad and profound. The graph below is a reflection of the increase in the total unique publications authored by the LUMS Faculty in the last three (3) calendar years (2015 to 2018). The research publications experienced a growth of 14%, demonstrating a healthy trend during the last calendar year (2017) which is a reflection of extensive research endeavours by the LUMS faculty over the years.



Note: This data is extracted from Scopus Publications for 2018 from January till June 30, 2018

Research Accomplishments

LUMS Chemistry Faculty Awarded the Prestigious Charles Wallace Fellowship


Dr. Muhammad Zaheer

Dr. Muhammad Zaheer, Assistant Professor, Department of Chemistry and Chemical Engineering, Syed Babar Ali School of Science and Engineering (SBASSE), LUMS has been awarded the prestigious Charles Wallace Fellowship for an academic visit to the University of Cambridge, United Kingdom. These fellowships, offered by The Charles Wallace Pakistan Trust in collaboration with the British Council, aim to enable mid-career academics to widen their professional knowledge, skills and international linkages.

LUMS Professors Win Google Faculty Research Award


Dr. Zafar Ayyub Qazi

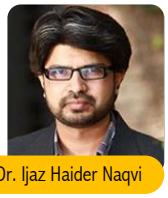
Dr. Ihsan Ayyub Qazi, Chair and Associate Professor, Computer Science, Syed Babar Ali School of Science and Engineering (SBASSE), LUMS, and Dr. Zafar Ayyub Qazi, Assistant Professor, Computer Science at SBASSE, LUMS, have won the highly prestigious and competitive Google Faculty Research Award for their proposal on designing technologies for making the Web faster for the next billion Internet users in developing countries.

LUMS Computer Science Chair's Research to be presented at ACM SIGCOMM CCR

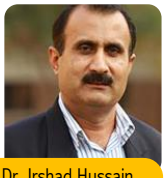

Dr. Ihsan Ayyub Qazi

Chair and Associate Professor of Computer Science at Syed Babar Ali School of Science and Engineering (SBASSE), LUMS, Dr. Ihsan Ayyub Qazi's research has been selected as one of the two best papers by the ACM SIGCOMM Computer Communications Review (CCR) Editorial Board. In recognition of this award, the research will be presented at the ACM SIGCOMM 2018 Conference in Budapest, Hungary later this year.

SBASSE Faculty Receives Research Productivity Awards


Dr. Ijaz Haider Naqvi

Every year the Ministry of Science and Technology in collaboration with Pakistan Council for Science and Technology (PCST) grants the Research Productivity Award (RPA) to active scientists on the basis of their publications in international journals, patents, books, PhD student supervision and external research grants. For the year 2016-17, four faculty members namely, Dr. Ijaz Haider Naqvi, Dr. Naveed Ul Hassan, Dr. Muhammad Zaheer and Dr. Irshad Hussain from Syed Babar Ali School of Science and Engineering (SBASSE) have been awarded the Research Productivity Awards in different fields.


Dr. Irshad Hussain

Clinical and Translational Imaging Lab Launched at SBASSE


Dr. Naveed Ul Hassan

The Syed Babar Ali School of Science and Engineering (SBASSE) at LUMS launched the Clinical and Translational Imaging Lab in June 2018. This is in line with the University's mission to achieve the highest academic standards and provide state-of-the-art teaching and research facilities to its faculty and students. Dr. Hassan Mohy-ud-Din is the Director of Clinical and Translational Medicine Lab, SBASSE.

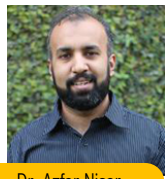

Dr. Hassan Mohy-ud-Din

MGSHSS Faculty to Visit the University of Oxford for Interdisciplinary Research

Dr. Waqar Zaidi

Dr. Waqar Zaidi, Assistant Professor of History at the Department of Humanities and Social Sciences, Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS), began a new collaborative interdisciplinary research project on the international governance of Artificial Intelligence at the Future of Humanity Institute, University of Oxford in July 2018. Dr. Zaidi's current research interests include early Cold War discourses on atomic energy and the atomic bomb and internationalist movements in the early Cold War period.

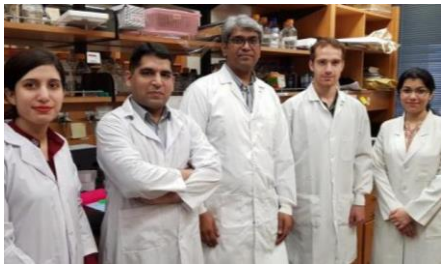
SDSB Faculty's Research Article Accepted for Publication in Gender & Society



Dr. Azfar Nisar

Suleman Dawood School of Business (SDSB) faculty, Muhammad Azfar Nisar's research article, '(un)becoming a man: Legal consciousness of the third gender in Pakistan' has been accepted for publication in Gender & Society (ABDC A*). This is Dr. Nasir's third A/A* publication since joining SDSB and fourth overall.

SBASSE Faculty's Paper Published In Nature Publishing Group's Scientific Report



"Identification and characterization of SSE15206, a microtubule depolymerizing agent that overcomes multidrug resistance" has been accepted for publication in Nature Publishing Group's *Scientific Reports*. This is a collaborative research work between Dr. Rahman Shah Zaib Saleem, Department of Chemistry and Chemical Engineering's laboratory and Dr. Amir Faisal's laboratory at the Department of Biology at Syed Babar Ali School of Science and Engineering (SBASSE), LUMS.

Dr. Rasul Bakhsh Rais's Book Wins Two Prestigious KLF Awards

Imagining Pakistan: Modernism, State and the Politics of Islamic Revival (Lexington Books, 2017) by Dr. Rasul Bakhsh Rais, Professor of Political Science at the Department of Humanities and Social Sciences, Mushtaq Ahmad Gurmani School of Humanities and Social Sciences recently won two prestigious awards at the 9th Karachi Literature Festival (KLF) in February 2018. The book won the KLF Non-Fiction Best Book Award 2018 and the KLF Best Book German Peace Award 2018.

SBASSE Faculty Receives 25 Research Grants by HEC

The Lahore University of Management Sciences (LUMS), in its commitment to excellence in teaching and top quality research, participated in the Higher Education Commission (HEC), Pakistan's call for research proposals under the National Research Productivity for University (NRPU) 2016 initiative. LUMS won 25 research grants placing the University at 3rd position in the Punjab and 1st in Lahore in terms of the number of grants won. This is definitely no small feat.

SBASSE Team Wins First-Runner-up Trophy at National Engineering Robotics Contest at NUST

A team from the Department of Electrical Engineering at the Syed Babar Ali School of Science and Engineering (SBASSE), LUMS won the First Runner-up trophy in the Indigenous Category at the 2018 National Engineering Robotics Contest held at the National University of Sciences and Technology (NUST)'s College of Electrical and Mechanical Engineering, Rawalpindi in July 2018 for its project titled, 'Alfie'.

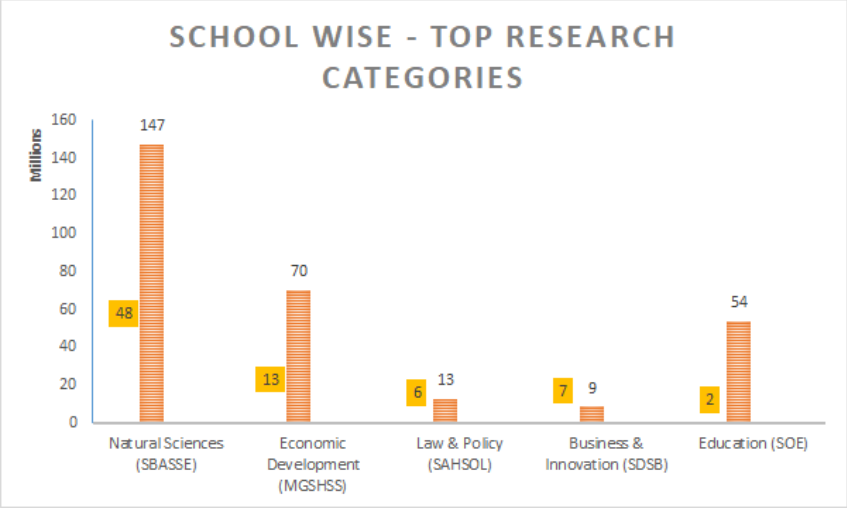
Sponsors

1. AF Ferguson & Co.
2. Afiniti Software Solutions
3. Aga Khan Cultural Service - Pakistan (AKCS-P)
4. American Bar Association (ABA)
5. American Business Forum (ABF)
6. Asif Riaz
7. Baluchistan University of Information Technology and Engineering and Management Sciences (BUITEMS)
8. British Asian Trust
9. Carleton University
10. Centre for Economic Research in Pakistan (CERP)
11. Centre for Global Development
12. Central Park Medical College
13. Cloud BPO (Pvt.) Ltd.
14. Consortium for Development Policy Research (CDPR)
15. Cooperation in Science and Technology (COST)
16. Department for International Development (DFID)
17. Department of Tourism, Sports, Culture, Archaeology & Youth Affairs
18. Development Alternatives Incorporated - Pakistan (DAI)
19. Digital Retail
20. EBE Group
21. Economic and Social Research Council (ESRC)
22. EdVenture Partners
23. Engineering and Physical Sciences Research Council (EPSRC)
24. Engineering Consultancy Services Punjab (ECSP)
25. European Union
26. Facebook
27. Fatima Group
28. Ferozsons Laboratories
29. German Pakistani Research Cooperation Program (DAAD)
30. Global Change Impact Studies Centre
31. Google
32. Government of KPK
33. GST LLP
34. HAFO Construction and Production Company
35. HaidermotaBNR & Co
36. Health and Nutrition Innovation Fund (HANIF)
37. Higher Education Commission (HEC)
38. Huawei
39. Human Frontier Science Program
40. Ignite (formerly National ICT R&D Fund Company)
41. IMU (International Math Union)
42. Indus Consortium
43. Indus Hospital
44. Innovations for Poverty Action
45. International Foundation for Science (IFS)
46. International Growth Centre (IGC)
47. International Institute for Management Development (IMD)
48. International Labour Organization
49. Jaffer Brothers (Pvt.) Ltd.
50. Karandaaz
51. LEAD Pakistan
52. Microtech Industries (Pvt.) Ltd.
53. Mott MacDonald

54. National Engineering and Scientific Commission (NESCOM)
55. National University of Sciences and Technology (NUST)
56. Nusrat Jahan College, Rabwah
57. Packages (Pvt.) Ltd
58. Pakistan Air Force (PAF)
59. Pakistan Centre for Philanthropy (PCP)
60. Pakistan Institute of Corporate Governance (PIGC)
61. Pakistan Science Foundation (PSF)
62. PeaceTech Lab
63. Planning and Development Department, Government of Punjab
64. Primary & Secondary Healthcare Department
65. Public Sector Organisation
66. Punjab Economic Research Institute (PERI)
67. Punjab Skills Development Fund (PSDF)
68. Reengineering With Research (RWR) (Pvt.) Ltd.
69. Seasons Group
70. Shirakat
71. Social Sciences and Humanities Research Council of Canada (SSHRC)
72. Sony
73. Sozo Group of Companies
74. Tetra Pak
75. US Agency for International Development (USAID)
76. University of Engineering and Technology (UET), Peshawar
77. United Nations Educational, Scientific and Cultural Organization (UNESCO)
78. United Nations International Children's Emergency Fund (UNICEF)
79. United Nations Office on Drugs and Crime
80. United Nations University (UNU)
81. United States Institute of Peace (USIP)
82. University of East Anglia
83. University of Edinburgh
84. University of Oxford
85. University of Southampton
86. Williams College
87. World Bank
88. Zeus Consulting

Categories

1. Arts & Heritage
2. Water
3. Trade
4. Telecommunication
5. Technology
6. Sciences
7. Robotics
8. Political Sciences
9. Operations Management
10. Law & Policy
11. Health
12. GIS
13. Environment
14. Energy
15. Education
16. Economic Development
17. Development Management
18. Computer Vision
19. Business & Innovation
20. Behavioural Studies
21. Agriculture
22. Culture & Religion
23. Social Sciences



Research carried out at LUMS is classified into aforementioned 23 distinguished categories. The graph above depicts top research categories in respective schools. SBASSE owns the highest projects in the category Natural Sciences i.e., 48 research proposals worth PKR 147 million. 13 proposals worth PKR 70 million are related to Economic Development, 6 proposals worth PKR 13 million pertain to the category, Law & Policy, 7 proposals worth PKR 9 million fall in the Business & Innovation category and 2 proposals worth PKR 54 million are related to Education in MGSHSS, SAHSOL, SDSB and SOE respectively. These statistics are calculated for the past 2 years i.e. 2016-2018. We can observe a significantly high percentage of research being done in the field of Natural Sciences.

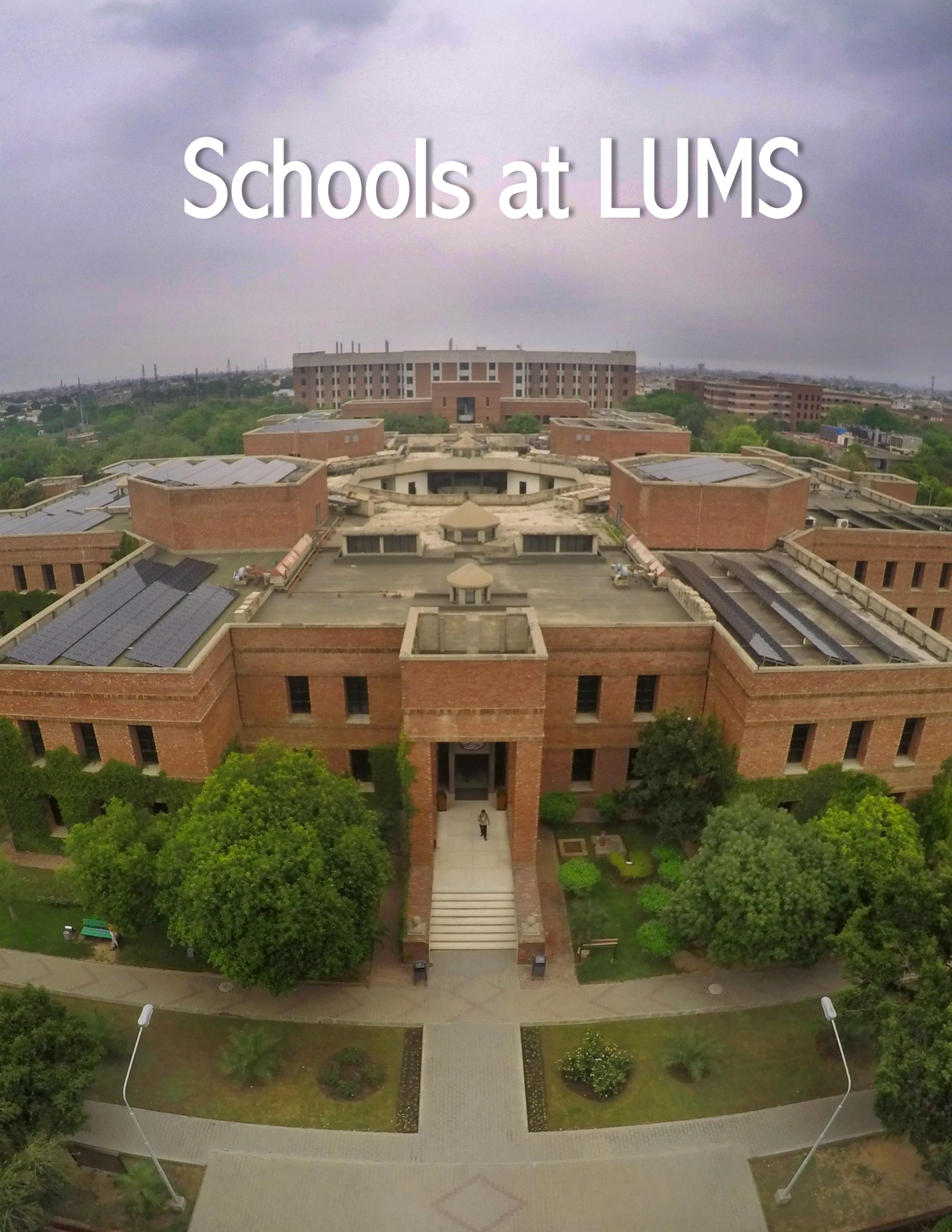
About LUMS

The Lahore University of Management Sciences (LUMS) is a world-class academic institution with a proud history of achievement, and ambitious plans for the future. The idea of establishing the university took root in the mind of Syed Babar Ali, Pro Chancellor, LUMS who is the guiding spirit behind the university. With his resilient efforts and patronage of the business community, academia and representatives of the government, he started the establishment of what was to become one of the leading universities of South Asia. The Lahore University of Management Sciences was granted the University Charter in 1985 and is a leading academic institution with a history of excellence and achievements and a vision of carrying out quality research work and to train its students to excel in their personal and professional lives.

The University initially started off with one school and successfully expanded to four schools: Suleman Dawood School of Business (SDSB), Syed Babar Ali School of Science and Engineering (SBASSE), Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS) and Shaikh Ahmad Hassan School of Law (SAHSOL). The Syed Ahsan Ali and Syed Maratib School of Education (SOE) joins as the fifth school at LUMS.

LUMS offers 17 programmes at the undergraduate level, 9 programmes at graduate level and 7 PhD programmes. It has always endeavoured to provide first class education to students while encouraging research and intellectual growth concurrently. As a result, it has played a key role in setting high standards of academic excellence and producing high calibre professionals.

Schools at LUMS



Suleman Dawood School of Business (SDSB)

Established in 1986, the **Suleman Dawood School of Business (SDSB)** was the first school at Lahore University of Management Sciences. Its unique pedagogies, such as the case method of teaching and the meticulous personal and professional development of students prepare them to become successful entrepreneurs and global leaders. With more than 2,000 graduates now, SDSB is currently ranked as one the leading business schools in the region and is recognised for its excellent teaching methods and research-oriented environment.

The School offers a variety of programmes including an intensive full-time MBA, a weekend Executive MBA, a course-based PhD Management and Bachelors programmes with majors in Accounting and Finance, and Management Science.

Research at SDSB

The School is involved in several research areas related to management. The following research centres are a part of SDSB:

Case Research Centre (CRC)

The Case Research Centre (CRC) plays a coordinating and editorial role in the development of well-researched case studies written by the SDSB faculty. It has a collection of over 700 Pakistan specific cases/industry notes drawn from real life issues in organisations experienced first-hand by the faculty as the result of their research or consultation activities. The CRC disseminates the scholarly output of LUMS faculty through its international case research journal, "Asian Journal of Management Cases" and also offers the contextually and academically rich teaching material to business schools and the corporate sector worldwide.

Social Enterprise Development Centre (SEDC)

The Social Enterprise Development Centre (SEDC) serves as a scholarship-based research centre working towards the capacity building of the social sector in Pakistan. The Centre works to promote genuine research, praxis and public policy dialogue to promote gender equality. The Centre has led initiatives in governance, maternal health, education, microfinance and women's entrepreneurship to name a few. Over the years, SEDC has published over 200 case studies and technical notes, several numerous casebooks, policy briefs and other publications. Having successfully developed a network of more than 500 social sector organisations across the country, the Centre also assists development partners to form linkages, collaborate and work on policy initiatives.

Strategic Sectors Research Centre (SSRC)

The Strategic Sectors Research Centre (SSRC) is a new initiative in institutionalising research and knowledge generation at SDSB. It focuses on strategic sectors including development (education management, health management, and entrepreneurship) and economic sectors (energy and water management, agribusiness, textiles, food, banking, sports goods and pharmaceuticals).

Rausing Executive Development Centre (REDC)

The Rausing Executive Development Centre (REDC) imparts executive education with the excellence and rigour that is directed at making every executive's experience a valuable one. It is modelled on the structure of some of the leading executive education centres from around the globe. It offers over 70 programmes every year inclusive of open enrolment and customised programmes backed by in-depth research and a solid grasp on the needs of modern businesses.

Centre for Governance and Public Management (CGPM)

The Centre for Governance and Public Management (CGPM) has the mandate to impart undergraduate and postgraduate education in the area of Public Management/Policy, and to carry out related research and training activities. CGPM's strategic objectives are to be the preferred choice for Public Policy Management education and training and to undertake academic and professional usable research in Public Policy areas with a special focus on education, health, energy and agriculture.

Centre for Islamic Finance

The vision of the centre for Islamic finance is the creation and dissemination of indigenous knowledge in the domain of Islamic finance to help resolve the challenges facing this sector. Their mission is to establish Islamic finance education and research infrastructure to meet the growing human resource and knowledge requirements of the industry. They are involved in a number of activities including executive programmes, research, academics, and local and international collaborations.

Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)

The **Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)** (formerly School of Arts and Sciences) is the largest school at LUMS with a maximum share of the student body. It has made a great contribution towards the country's repertoire of superior multidisciplinary education in humanities, social sciences and liberal arts.

Exposure to studies at the MGSHSS has led many students to develop a deep interest in the social sciences and several have opted to pursue their PhDs in liberal arts. Some graduates have gone on to serve as faculty members at LUMS and other credible universities in different parts of the world after completing their doctoral degrees.

At present, the School offers several undergraduate programmes such as BSc Economics, BSc (Honours) Economics and Political Science, BSc (Honours) Political Science, B.Sc. (Honours) Anthropology & Sociology, BA (Honours) English, BA (Honours) History and BSc (Honours) Economics and Mathematics. The School also offers a competitive MS programme in Economics. The curriculum has been carefully designed and developed over the years by the faculty at LUMS, in conjunction with feedback from distinguished faculty from international universities.

Research at MGSHSS

The following are the research centres at MGSHSS:

Gurmani Centre for Languages and Literature (GCLL)

The Gurmani Centre for Languages and Literature (GCLL) was initiated by the Gurmani Foundation in 2010, for the advancement of national and regional languages including Arabic, Persian, Urdu and several other languages. The Centre is part of the Department of Humanities and Social Sciences (HSS) and promotes languages and their literature through teaching, research/publication and its outreach programme.

Saida Waheed Gender Initiative (SWGI)

Established in 2015, the Saida Waheed Gender Initiative leverages research, teaching, and praxis related to gender. Foregrounding gender as a contested category of analysis and action, the Initiative approaches gender as a set of relations and processes that include women, men, and members of the third gender. The Initiative promotes interdisciplinary inquiry that is attentive to the construction and operation of gender across different spatial and temporal contexts.

Syed Babar Ali School of Science and Engineering (SBASSE)

The Syed Babar Ali School of Science and Engineering (SBASSE) is known for its world-class science and engineering students, faculty and its high quality industrially relevant research. Established in 2008, SBASSE is the first private research school for science and engineering in Pakistan.

SBASSE offers a four-year undergraduate programme of Bachelor of Science (BS) degree in Biology, Chemistry, Computer Science, Electrical Engineering, Mathematics and Physics. New majors offered this year are the BS Chemical Engineering and BS in Economics and Mathematics at SBASSE. In addition, it offers MS and PhD programmes in Biology, Chemistry, Computer Science, Electrical Engineering, Mathematics and Physics.

Research at SBASSE

With the "no boundaries spirit" of the School, the faculty at SBASSE is involved in multidisciplinary research, working on various interfaces between biology, chemistry, physics, mathematics and engineering. The following are the research centres at SBASSE:

Centre for Water, Informatics and Technology (WIT)

The Centre for Water Informatics and Technology (WIT) was established in 2015. WIT aims to serve as a hub with a disciplinary focus on hydro-informatics and systems analysis but touching multidisciplinary research themes in water by engaging faculty and students from all departments of SBASSE; and by forging collaborations among the different schools within LUMS to provide the much needed, interdisciplinary perspective to water issues, under the guidance of a world-class advisory group.

Centre for High Performance Computing (CHPC)

The Centre for High Performance Computing (CHPC) provides scientific computing facilities for the LUMS research community. The goals of the Centre are to engender and facilitate science and engineering research efforts; assist researchers with specialised computational needs and provide research and development exposure to our students.

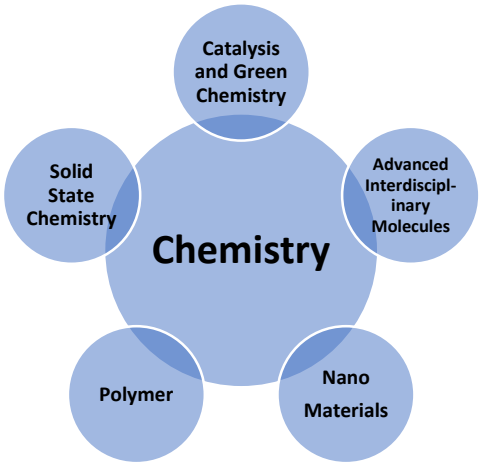
Centre for Advanced Studies in Mathematics (CASM)

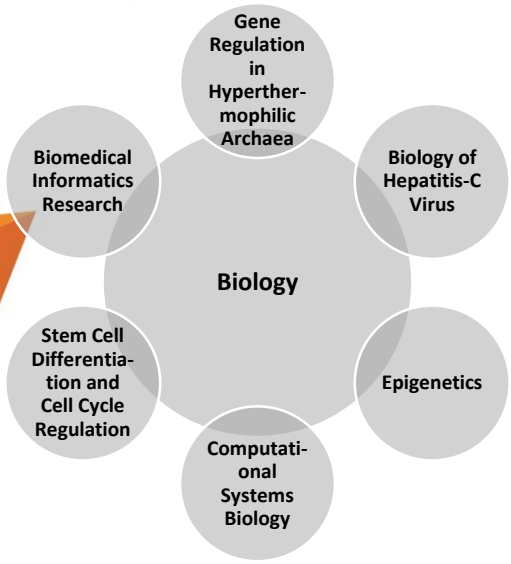
The Centre for Advanced Studies in Mathematics (CASM) runs workshops, conferences and seminars on selected topics in Mathematics with applications every year. It also attracts research scholars from overseas and Pakistan to interact with faculty.

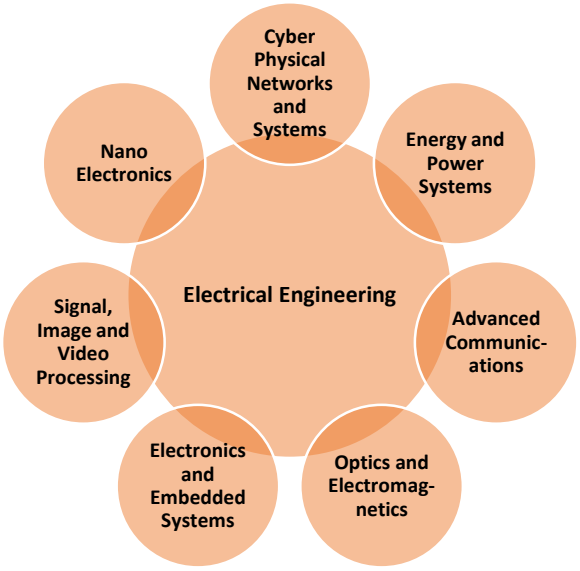
Technology for People Initiative (TPI)

Technology for People Initiative (TPI) is an applied research centre at LUMS. It is focused on designing innovative, low-cost, practical technology solutions for problems in the public sector. Formally founded in 2012 and housed at SBASSE, LUMS, TPI brings together a host of talent in interdisciplinary faculty, fellows and students to work on practical problems having widespread impact.

The School has a number of research clusters, groups and labs in the following areas:




Biology
Gene Regulation in Hyperther-mophilic Archaea
Biology of Hepatitis-C Virus
Epigenetics
Computati-onal Systems Biology
Stem Cell Differentia-tion and Cell Cycle Regulation
Biomedical Informatics Research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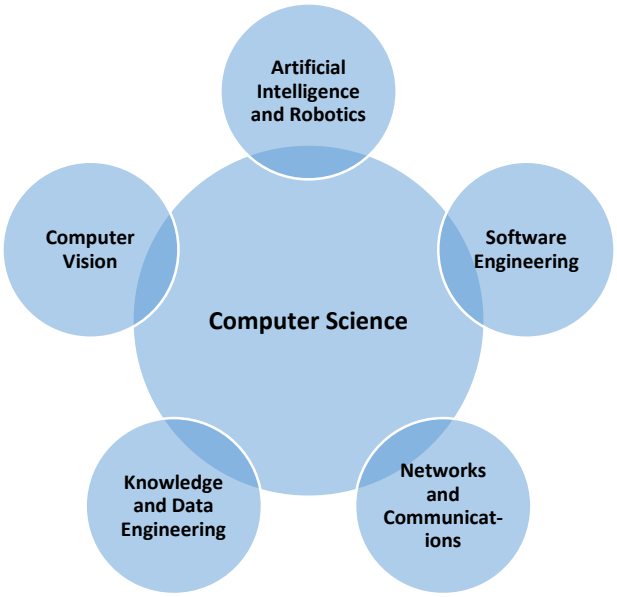
Energy and Power Systems
Advanced Communic-ations
Optics and Electromag-netics
Electronics and Embedded Systems
Signal, Image and Video Processing
Nano Electronics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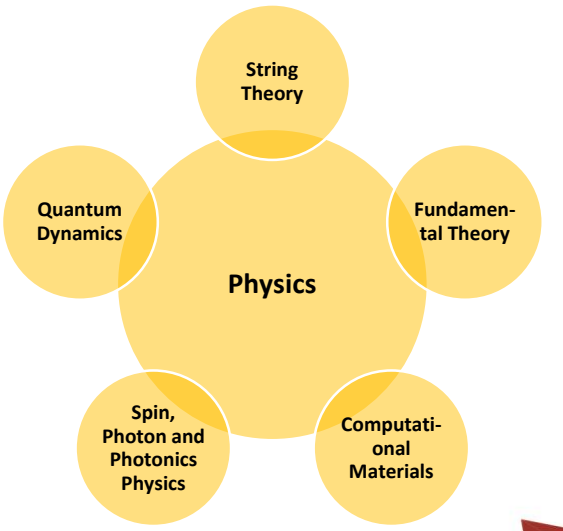
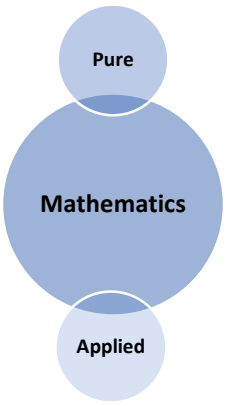
Artificial Intelligence and Robotics
Software Engineering
Networks and Communicat-ions
Knowledge and Data Engineering
Computer Vision


Physics
String Theory
Fundamen-tal Theory
Computati-onal Materials
Spin, Photon and Photonics Physics
Quantum Dynamics


Mathematics
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Shaikh Ahmad Hassan School of Law (SAHSOL)

The **Shaikh Ahmad Hassan School of Law (SAHSOL)** evolved out of the Department of Law and Policy, which has been functioning since 2004, offers a 5-year joint BA-LL.B undergraduate programme, which is accredited by the Pakistan Bar Council. This unique five-year programme provides rigorous interdisciplinary exposure to Law and its related disciplines. The first two pre LL.B years lay down foundation principles in social sciences. Students undergo extensive academic training in core and specialized subjects in Law over the next three years. Other advanced degrees will be offered as SAHSOL evolves further.

The School plays a productive and significant role in catalysing reform in the legal system, in promoting both corporate and social responsibility, strengthening the legal profession and judicial institutions for the promotion of justice and the rule of law.

The housing of such a law and policy programme at LUMS is a vital step towards the creation of a centre of excellence where academics working in the increasingly inter-related areas of economics, finance, politics and law can collectively take on the challenges being posed by the transformation of the Pakistani economic and legal system.

Research at SAHSOL

Continuous and on-going research is a fundamental value and corner stone of the Law and Policy Programme initiative as apart from other impacts, such research directly translates into better teaching. Also, Law is a dynamic subject with very frequent changes of text, approach and issues. The introduction of the research dimension is, therefore, a vital contribution by the Law and Policy Programme to the broader society.

Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)

The LUMS Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE) was launched, as the fifth school at Lahore University of Management Sciences, in January 2017. At a time when Pakistan is experiencing rapid changes in the education sector, the School will play a vital role in producing education leaders, policymakers, and related specialists who are strongly rooted in research thinking. It will also provide a collaborative platform to relevant stakeholders to help strengthen existing efforts for educational development in Pakistan. SOE envisions growth of its programmes in education policy analysis, education and entrepreneurship, and education and technology in conjunction with other schools at LUMS. To this end, the flagship SOE MPhil Education Leadership and Management (ELM) programme was officially launched in 2017. In July 2018, SOE was issued a No-Objection Certificate by the Higher Education Commission, Pakistan (HEC) for its inaugural MPhil programme. The MPhil ELM is a competitive two-year programme which will enable students to think critically and innovatively about the educational landscape in Pakistan in areas such as policy reform, change management, technology, curriculum, assessment, and the politics of education. The cornerstone of its graduate programme will be the semester-long Practicum, a targeted research exercise that places students within education organisations partnered with the School. Similar to cutting edge models adopted for medical training, the School's Practicum will prepare students to address challenges in Pakistan's education sector by developing research-based solutions to problems encountered in the field.

Research at SOE

The Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE) is spearheading several research initiatives in development which contribute towards the diagnosis of the education crisis in Pakistan by focusing on learning from and influencing the policy and practice of education. The following are the research initiatives of SOE:

Professional Development Initiative (PDI)

The SOE Professional Development Initiative (PDI) was set up with the intention of integrating the notion of Life Long Learning (LLL) as part of career development and professional development. The vision and mission of PDI is well immersed into that of the SOE with a strong focus on ongoing learning, needs based solutions, customised interventions, facilitative approaches and on-going engagement with learners and educators to identify and fill in the gaps. This revenue generating stream of SOE will offer professional development opportunities (certificate programmes, short-term courses, training-based research) and provide a platform to think strategically about how training fits into overall education reform.

Teaching and Learning Initiative (TLI)

A foundational component of SOE, which collaborates with a diverse group of local “lab schools” to further understand high-level operational and strategic decision making, the pedagogical methods of teachers, and to create space for design and evaluation of experimental interventions in collaboration with schools and teachers. It is envisioned as a vibrant focal point in exposing the MPhil and undergraduate students to field work and hands-on learning in the educational sector. Under faculty leadership, and with a strong partnerships ethos, SOE actively engaged with organisations across public, private, non-profit, and donor sectors of education in Pakistan. SOE’s linkages with the government sector feature the Punjab School Education Department (SED), Programme Monitoring and Implementation Unit (PMIU), Bhakkar as a Partner District, a Parliamentarians Advisory Caucus, and a project of 500 million rupees with KP government. As of June 2018, the SOE Teaching and Learning Initiative (TLI) has secured formal partnerships with a diverse set of a total of 20 lab schools and other educational organisations.

Data Analytics Initiative (DAI)

Directly aligned with the vision of LUMS and SOE to further academic research in the country, the initiative will offer opportunities for students and faculty to engage with various types of Pakistan education data in research, teaching, and training exercises. The SOE has signed an agreement with Government of Punjab to host and curate relevant data from Punjab School Education Department, Punjab Examination Commission, Directorate of Staff Development, Board of Intermediate and Secondary Education exam results.

Centre for Education Entrepreneurship, and Technology

The initiative aims to use a steering committee of technology entrepreneurs and Schools of Business and Science and Engineering faculty to think about education innovation.

Institutional Bodies

Office of Sponsored Programmes and Research (OSPR)

The Office of Sponsored Programmes and Research (OSPR) focuses on sponsored research and programmes. It is responsible for managing all sponsored research related activities of academic and research units and act as a bridge between LUMS faculty and national/international donors. This includes, but is not limited to, externally funded research proposals; unrestricted grants; travel grants; sponsored conferences/workshops/seminars; consulting assignments; chair funds; instructional and service activities; contracts; agreements and arrangements related to sponsored and externally funded activities. Moreover, OSPR also manages internal grants, which are provided by LUMS including the Faculty Initiative Fund (FIF), Faculty Travel Grant (FTG) and Start-up Grants. OSPR has set up a support mechanism to provide help in filing copyright and patent applications through its Technology Transfer Wing (TTW) so that formal support mechanisms are established to provide legal, administrative and financial support required in the patent and commercialization process to LUMS faculty in order to ensure that their focus remains on the research and innovation aspect, leaving the legal and administrative hurdles for the TTW team.

Institutional Review Board (IRB)

Institutional Review Board (IRB) is responsible for overseeing all projects that involve the use of human and animal subjects. All issues related to bio-safety are also under the review of the IRB. More information can be viewed at the following link:
http://lums.edu.pk/osp/page.php/institutional-review-board-irb-osp

University Research Council (URC)

The University Research Council (URC) is a standing committee of the University Faculty Council (FC) that promotes and advocates the research environment in LUMS. It is involved in developing policies and acting as an advisory group to the Vice Chancellor and Deans in matters related to research.

URC Charter

The purpose of the Research Council is to identify and recommend those baseline policies that will be applicable to research endeavours of the faculty. It addresses the following:

1. To advocate for and to promote a research culture at LUMS
2. To develop standardised policies and guidelines to promote quality research
3. To serve as an advisory group to the Vice Chancellor and other members of the administration including Deans
4. To act as a University Standing Committee in reviewing and recommending new research policies and changes in existing ones
5. To prepare a brief, written report on the year's activities of the Council at the end of each academic year and to submit copies of the reports to the Vice Chancellor of the University and to the Faculty Council

Terms of Reference for the Operations of the Research Council

The following are the Terms of Reference for the URC:

- Members are decided by the University Faculty Council (FC) in consultation with the convener
- Faculty is asked for choice of membership and based on the faculty's feedback, the convener selects members and sends recommendations to the Vice Chancellor for final nominations
- Vice Chancellor finalises the membership of URC based on recommendations of the URC convener
- 50 percent of the URC members are rotated every year using the same formula
- The URC convener is elected through voting by members
- The Convener is elected from the house after every 2 years
- The quorum of URC Meetings consist of a minimum of 60 percent of the total members
- Decisions are based on consensus among all present members. If disagreement persists between members, the issue is moved to the next meeting for debate and efforts are then made to build consensus. Issues that remain unresolved are then decided upon by the Council through a resolution method
- URC meets at least once a quarter every year and more meetings are scheduled when required

Research Council Members List 2017-18

The following is the list of the Research Council members for 2017-18, who were appointed on July 1, 2017 to June 30, 2018.

1. Dr. Amir Faisal (Department of Biology, SBASSE) – Convener
2. Dr. Abid Aman Burki (Department of Economics, MGSHSS)
3. Dr. Ali Usman Qasmi (Department of Humanities & Social Sciences, MGSHSS)
4. Dr. Azmat Hussain (Department of Mathematics, SBASSE)
5. Dr. Muhammad Azfar Nisar (Suleman Dawood School of Business, SDSB)
6. Dr. Ghazal Mir Zulfiqar (Suleman Dawood School of Business, SDSB)
7. Dr. Rahman Shah Zaib Saleem (Department of Chemistry and Chemical Engineering, SBASSE)
8. Dr. Adam Zaman Chaudhry (Department of Physics, SBASSE)
9. Dr. Syeedda Anjum Ara Alvi (Department of Humanities & Social Sciences, MGSHSS)
10. Dr. Muhammad Shehryar Shahid (Suleman Dawood School of Business, SDSB)
11. Dr. Suleman Shahid (Department of Computer Science, SBASSE)
12. Dr. Nida Yasmeen Kirmani (Department of Humanities & Social Sciences, MGSHSS)
13. Dr. Sadaf Aziz (SAHSOL)
14. Dr. Momin Ayub Uppal (Department of Electrical Engineering, SBASSE)
15. Dr. Muhammad Azeem (SAHSOL)
16. Dr. Zartash Afzal Uzmi (Department of Electrical Engineering, SBASSE)
17. Dr. Shafay Shamail - Ex-Officio (Department of Computer Science, SBASSE) – Director OSPR

Research Council Members List 2016-17

The following is the list of the Research Council members for 2016-17, who were appointed on July 1, 2016 till June 30, 2017:

1. Dr. Abid Aman Burki (Department of Economics, MGSHSS) - Convener
2. Dr. Ali Qasmi (Department of Economics , MGSHSS)
3. Dr. Azmat Hussain (Department of Mathematics , SBASSE)
4. Dr. Choudhry Tanveer Shehzad (Suleman Dawood School of Business, SDSB)
5. Dr. Ghazal Mir Zulfiqar (Suleman Dawood School of Business, SDSB)
6. Dr. Hassan Javid (Department of Humanities & Social Sciences, MGSHSS)
7. Dr. Husnain Fateh Ahmed (Department of Humanities & Social Sciences, MGSHSS)
8. Dr. Muhammad Sabieh Anwar (Department of Physics, SBASSE)
9. Dr. Muhammad Saeed (Department of Chemistry and Chemical Engineering, SBASSE)
10. Dr. Muhammad Shehryar Shahid (Suleman Dawood School of Business, SDSB)
11. Dr. Rahman Shah Zaib Saleem (Department of Chemistry and Chemical Engineering, SBASSE)
12. Dr. Suleman Shahid (Department of Computer Science, SBASSE)
13. Dr. Zubair Abbasi (SAHSOL)
14. Dr. Shafay Shamail – Ex-Officio (Department of Computer Science, SBASSE) – Director OSPR

More information can be viewed on the following link: http://lums.edu.pk/osp/page.php/research-council-osp

LUMS Funding Sources

LUMS provides extensive funding opportunities to pursue research at LUMS. These opportunities also help faculty members to prepare for and seek larger international grants.

Faculty Initiative Fund (FIF)

The LUMS Faculty Initiative Fund (FIF) is an internal funding mechanism that awards competitive grants of between PKR 500,000 to PKR 1,000,000 to the LUMS faculty. These grants are intended to help faculty members develop innovative projects and benefit from new research initiative opportunities in order to enhance the research endeavours of the University. All full-time and research faculty members at LUMS are eligible to apply for this grant. Proposals are submitted individually or by a group of faculty within or across schools to the Office of Sponsored Programmes and Research (OSPR).

Faculty Travel Grant (FTG)

The Faculty Travel Grant (FTG) provided by LUMS assists in the research activities of the University's full-time regular faculty at various stages of their academic careers. The purpose of FTG is to encourage research-related international travels and collaborations by full-time LUMS faculty. Full-time, regular faculty members applying for FTG have their applications reviewed for funding by the FTG review committee.

Start-up Grant (STG)

The Start-up Grant is the first grant given to full-time regular faculty newly recruited on tenure track or as tenured faculty. This grant is awarded by the Deans of the respective schools. In case the School decides not to award a Start-up Grant to new faculty at the beginning of their stay at the University, the School may institute any scheme for the promotion of research using these funds. The mechanism for award of the Start-up Grant may be documented and forwarded to the Vice Chancellor by the Dean.

Summer Research Programme (SRP)

The Summer Research Programme (SRP) seeks to promote research activities during summer. The SRP engages undergraduate students in a meaningful research in which they have a valuable opportunity to independently carry out a funded research project. The SRP also serves as an outreach activity by LUMS to engage good high school students (FSC and A-Level) in research projects and mentor them. The duration of SRP is 8 to 10 weeks.

Overhead Account

Carrying out research related activities at LUMS requires the use of general physical and administrative facilities of LUMS for which the university needs to be compensated. Thus, LUMS charges a financial overhead (indirect cost) from the externally funded programmes at the rate of 30/130 of the total project cost, unless otherwise restricted by the sponsor. In case of consultancy projects, the overhead is calculated at the rate of 30/130 of total consultant(s) fee. While the bulk of the overhead amount is directly retained by the University and included in the total revenue earned, a portion of the funds is distributed to the relevant school to support seeding of research activities, with the remaining funds being placed with the Principal Investigator (PI) for his/her academic and research use. For funded research projects that generate overhead, the distribution of the overhead income within the University is as follows:

University takes upon payment (LUMS share) - 65%
The relevant School receives (Department share) - 20%
The PI receives (Grantee share) - 15%

In case of consultancy projects, the overhead is transferred wholly to the University. In case of research projects undertaken by a LUMS research centre, grantee share of the overhead shall be transferred to the research centre's account. Thereafter, these funds shall be placed at the disposal of the head of that research centre.

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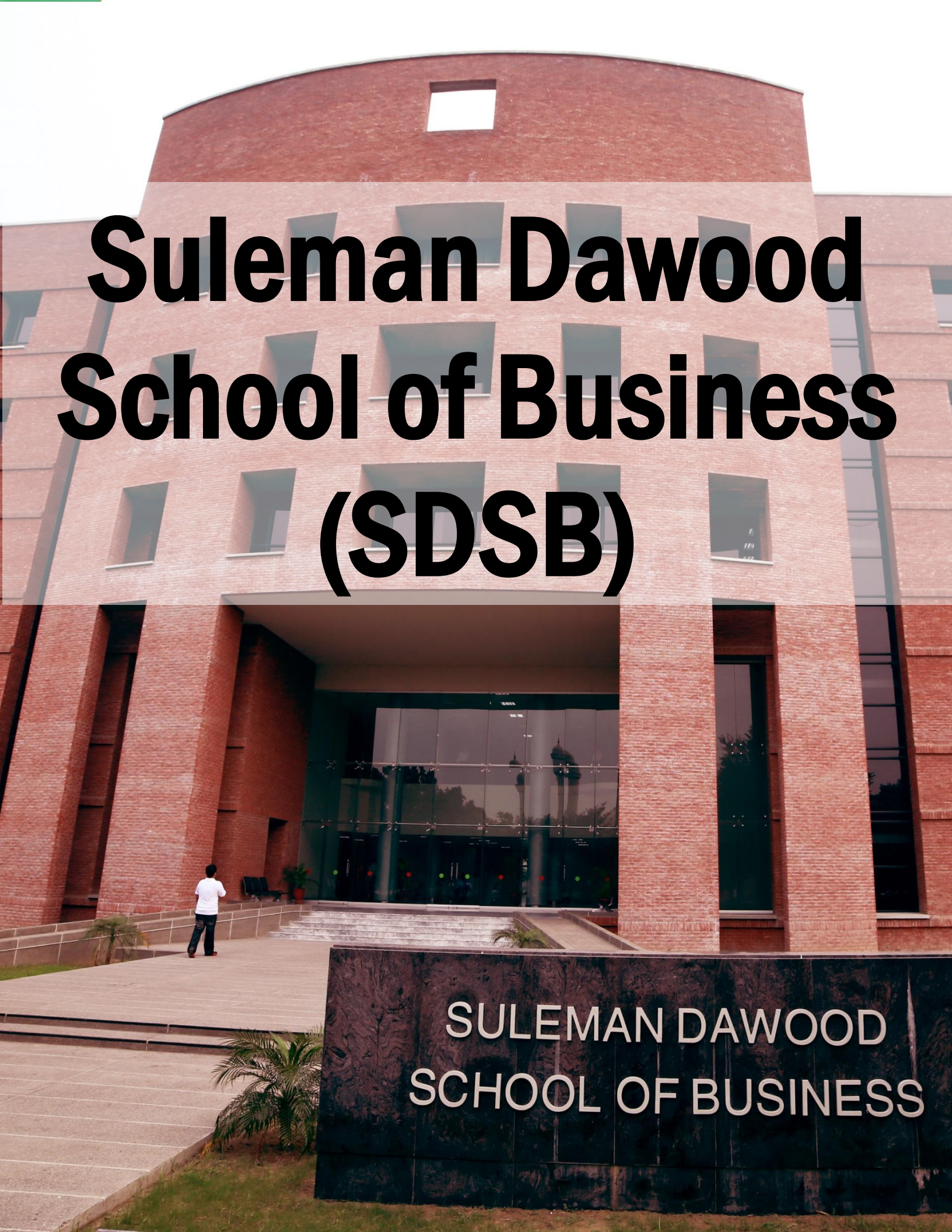
Suleman Dawood School of Business (SDSB)



Dr. Anjum Fayyaz
Suleman Dawood School of Business (SDSB)
anjum.fayyaz@lums.edu.pk
+924235608134

Profile Dr. Anjum Fayyaz has more than 24 years of teaching, training, research and consulting experience in Pakistan, India and Iran. He joined LUMS in 2009 as Director, Rausing Executive Development Centre (REDC) and is currently serving as an Assistant Professor and the Director, Strategic Sectors Research Centre (SSRC). He is also working as Team Lead for the Assessment and Strengthening Program (ASP), a USAID funded project, to build the capacity of public sector officers in the area of monitoring and evaluation of projects. Dr. Fayyaz is a PhD from Copenhagen Business School Denmark in the areas of entrepreneurship, innovation and strategy. His specialised areas of teaching include strategic business management, entrepreneurship and innovation and human resource management. He initiated and developed the concept of SME Clusters and Networks Development (CND) in Pakistan while working for United Nations Industrial Development Organization (UNIDO) for more than nine years from 2001 to 2009. He is a master trainer on UNIDO CND methodology and conducted many trainings and workshops for private and public sectors organisations while also building the capacity of industrial chambers and associations. While working for UNIDO, Dr. Fayyaz conducted trainings and executive teaching for the Institute of Quality & Technology Management Department of University of the Punjab. He designed and developed programmes on project management, human resource management and marketing management. He is an expert on industrial change management with an extensive experience on networking and trust building.

Selected Publications

- Fayyaz, A. (2015). Industrial Clusters and CSR in Developing Countries: The Role of International Donor Funding: Journal of Business Ethics

Title: Facilitate Jaffer Brothers Private Limited (JBL) in Developing Strategic Vision 2030 for P&M Division
PI: Dr. Anjum Fayyaz
Co-PI: Dr. Jawad Syed
Sponsor: Jaffer Brothers Private Limited (JBL)
Funding Amount: PKR 2,925,000
Project Initiated in: 2018
Duration: 5 Months
Category: Business & Innovation
Description: The objective of this project is to analyse gaps, develop and finalise the templates for data collection from SBUs. It further includes conducting a review session with the strategic planning cell of P&M and the top management and developing a draft strategic plan and vision 2030 document.

Dr. Arif Iqbal Rana
Suleman Dawood School of Business (SDSB)
arif@lums.edu.pk
+924235608028

Profile Dr. Arif Iqbal Rana is heading the Family Business Initiative at LUMS. Previously he had spearheaded the SME Pulse Initiative as well as the Textile Productivity Initiative. He was also the Director of the Entrepreneurship Small and Medium Enterprise Centre (ESMEC) for almost a decade. Dr. Rana has been a consultant to a few Pakistani businesses in the area of Family Business, Productivity Improvement and Inventory Management. He has also been consultant/academic advisor for a couple of universities, where he helped in developing and implementing new systems for faculty evaluation and development, in addition to upgrading the curriculum and facilities. He has taught in the MBA programme as well as several executive programmes in the areas of Operations Management, Decision Making, Supply Chain and Retail Management and Family Business. Dr. Rana has also written/supervised over fifty case studies.

Selected Publications

- Rana, A. I., & Mumtaz, M. K. (2017). Sales Force Incentives at Service Sales Corporation. Asian Journal of Management Cases, 14(2), 160-175

Title: Development of Family Constitution for the Seasons Group
PI: Dr. Arif Iqbal Rana
Sponsor: Seasons Group
Funding Amount: PKR 650,000
Project Initiated in: 2018
Duration: 1 Month
Category: Business & Innovation
Description: The Seasons Group of Companies launched National Flour and General Mills in 1968 as its first industrial venture. The Group later added National Feeds in the 1980s. In 2018, the Group has Flour Milling, Poultry and Cattle Feed, Breeder Farms, Hatcheries, Broiler Farms, Chicken Processing (MENU) and Edible Oil (Seasons) extraction units under its wings. The Group's patriarch is in his early nineties. The aim of the Project was to seek input, and develop consensus, among the second and third generation Directors on the governance structures (Family and Business) necessary for the Group, to ensure that the Group stays united and prospers in the future. The Project also included development of systems (proposed) for the induction, progression, appraisal and compensation of 3rd (and later) generation of Directors.

Dr. Bushra Naqvi
Suleman Dawood School of Business (SDSB)
bushra.naqvi@lums.edu.pk
+924235608321

Profile Dr. Bushra Naqvi is an Assistant Professor at the Suleman Dawood School of Business, where she teaches in the area of Money, Banking and Finance. Dr. Naqvi has worked as research associate and teaching assistant at the laboratory of CES Axe Finance, University of Paris – Panthéon Sorbonne from 2007 to 2011. During her stay at La Sorbonne, she worked under the supervision of Prof. Christian Bordes (Member ECB Shadow Council); and her PhD dissertation surrounds the policy choices of Asian Central Banks and assesses the impact of those policies on the behaviour of financial markets. At La Sorbonne, she has also been affiliated with many renowned Economists and Financial Analysts including Prof. Christian de Boissieu (Chief Economic and Financial Advisor to French Prime Minister), Prof. Patrick Artus (Director Research at NATIXIS Bank and member of French Economic Think Tank) and Prof. Bertrand B. Maillet (Executive Head of Research at ABM AMRO, Paris Subsidiary). Dr. Naqvi has presented her research work at several international peer reviewed conferences including the *25th Congress of European Economic Association* (Glasgow, UK), *27th International Symposium of Money Banking and Finance* (Bordeaux, France*), 3rd Singapore Economic Review Conference* (Singapore), and *3rd Euro-African Conference in Finance and Economics* (Paris, France). She has also published a few articles in national and international journals including *The Lahore Journal of Economics* and *International Journal of Business and Social Sciences*.

Selected Publications

- Naqvi, B., Rizvi, S. K. A., Mirza, N., & Reddy, K. (2018). Religion Based Investing and Illusion of Islamic Alpha and Beta. Pacific-Basin Finance Journal
- Naqvi, B., Rizvi, S. K. A., Uqaili, H. A., & Chaudhry, S. M. (2017). What Enables Islamic Banks to Contribute in Global Financial Reintermediation? Pacific-Basin Finance Journal
- Naqvi, B., Mirza, N., Azeem Naqvi, W., & Rizvi, S. K. A. (2017). Portfolio Optimisation with Higher Moments of Risk at the Pakistan Stock Exchange. Economic Research-Ekonomska Istraživanja, 30(1), 1594-1610

Title: Socio-Cultural Norms Influence on Women Entrepreneurship
PI: Dr. Bushra Naqvi
Co-PI: Dr. Misbah Tanveer Chaudhry, Dr. Enrico Marelli (University of Brescia, Italy)
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 790,000
Project Initiated in: 2017
Duration: 12 Months
Category: Business & Innovation
Description: The primary focus of this project is on home based or micro entrepreneurs in Pakistan and other developing countries. This project intends to integrate primary and secondary sources into measurable results and analyse which socio-cultural factors theoretically and empirically affect women participation in entrepreneurial activities. This research will highlight an important and less discussed aspect of women entrepreneurship, that is, the role of society and culture in promoting or dampening women entrepreneurial prospects in a country.

Dr. Choudhry Tanveer Shehzad
Suleman Dawood School of Business (SDSB)
tanveer.shehzad@lums.edu.pk
+924235608036

Profile Dr. Choudhry Tanveer Shehzad holds a PhD from University of Groningen, the Netherlands and is a Certified Financial Risk Manager from GARP (USA). He has specialised in the area of Banking and Finance. His current research topics include banking and financial crises, empirical analysis of corporate finance theories, market concentration and competition, supervision and regulation of banks, credit ratings and stock market perception of financial reform. He has published in reputed journals like *Journal of Banking and Finance*, *Applied Economics* and *North American Journal of Economics and Finance* and has presented his research at a number of international conferences in recent years. Additionally, he is a referee for international journals like the *Journal of Banking and Finance*, *Applied Economics* and *European Journal of Political Economy*. Before joining LUMS, he was working at the State Bank of Pakistan as Deputy Director.

Selected Publications

- Shehzad, C. T., & De Haan, J. (2013). Was the 2007 Crisis Really a Global Banking Crisis? North American Journal of Economics and Finance, 24(1), 113-124
- Shehzad, C. T., de Haan, J., & Scholtens, B. (2013). The Relationship between Size, Growth and Profitability of Commercial Banks. Applied Economics, 45(13), 1751-1765
- Forssbæck, J., & Shehzad, C. T. (2015). The Conditional Effects of Market Power on Bank Risk-Cross-Country Evidence. Review of Finance, 19(5), 1997-2038
- Shehzad, C. T., & De Haan, J. (2015). Supervisory Powers and Bank Risk Taking. Journal of International Financial Markets, Institutions and Money, 39, 15-24

Title: Penny Wise, Pound Foolish? Capital Budgeting Decisions in Listed Companies on Pakistan Stock Exchange (PSX)
PI: Dr. Choudhry Tanveer Shehzad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 925,000
Project Initiated in: 2017
Duration: 12 Months
Category: Economic Development
Description: The main objective of this Project is to determine the important factors that affect the choice of the capital budgeting techniques employed by the companies in Pakistan and how are those capital budgeting techniques employed. This study empirically examines if there is a significant effect of the firm size, growth opportunities, less debt, manufacturing industry classification and ownership structure on the choice of capital budgeting method employed. This study further aims to build on the calculation methodologies of these capital budgeting techniques and the computation of the cost of capital by these firms in Pakistan. Capital budgeting methods aid the Corporate Boards and Management in large scale investment decision making. It includes the comparison and analysis of various proposals before making a commitment of resources to the Project.

Dr. Fahad Mehmood
Suleman Dawood School of Business (SDSB)
fahad.mehmood@lums.edu.pk
+924235608000

Profile Dr. Fahad Mehmood is an Assistant Professor at the Suleman Dawood School of Business. Dr. Mehmood obtained his PhD and MS degree in Industrial Engineering & Management from Politecnico di Torino, Italy in 2015 and 2011 respectively. He is a PhD scholarship winner of a joint collaboration between the Politecnico di Torino and Telecom, Italia, and was an Industrial PhD researcher for 3 years for Telecom, Italia between 2012 and 2014. He received his Bachelor's degree in Mechanical Engineering from National University of Sciences & Technology (NUST) in 2009. Dr. Mehmood's research interests include Logistics & Supply Chain, Project Management and Soft Operations Research. He has presented his research at the *44th Annual Conference of the Italian Operational Research Society*, Como, as well as the *7th International Conference on Interdisciplinary in Engineering*, Romania.

Selected Publications

- Kazmi, H., Mehmood, F., Lodeweyckx, S., & Driesen, J. (2018) - Gigawatt-hour Scale Savings on a Budget of Zero: Deep Reinforcement Learning Based Optimal Control of Hot Water Systems. Energy, 144, 159-168
- Zheng, S., Wang, A., Mehmood, F., and Mohmand, Y. T., (2018) - An Improved Path Optimum Algorithm for Container Relocation Problems in Port Terminals Worldwide. Journal of Coastal Research, Volume 34, Issue 3: pp. 752 – 765
- Pärn, E.A., Riaz, Z., Mehmood, F., Lai, J. Engineering-out Hazards: Digitizing the Management of Working Safely in Confined Spaces. Facilities (Forthcoming)

Title: Evaluating Potential of Automatic Demand Response in Unstable Electric Grids Using Intelligent Control
PI: Dr. Fahad Mehmood
Co-PI: Dr. Hussain Syed Kazmi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 700,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: The fundamental objective of this Project is to calculate the financial impact of a battery-inverter system on a household once electricity losses are factored in addition to the recurring investment cost. Under this Project, grid load shedding data will be recorded in the form of outages (i.e. a binary signal of availability) as well as system frequency (deviations from standard frequency signal excess or shortage of supply). Furthermore, a real battery inverter system will be analysed to establish its real efficiency (and deterioration over time). Later, an intelligent controller based on reinforcement learning will be employed to simulate automatic demand responses on the gathered system data.

Dr. Farrah Arif
Suleman Dawood School of Business (SDSB)
farrah@lums.edu.pk
+924235608039

Profile Dr. Farrah Arif is an Assistant Professor of Marketing at the Suleman Dawood School of Business. As a Commonwealth Scholar, she obtained a PhD from the University of Cambridge, Judge Business School. She is also a certified Associate Fellow of the Higher Education Academy (AFHEA), UK. Dr. Asif has been teaching in business schools (Pakistan and abroad) since 1999. Currently, she teaches Consumer Behaviour and Marketing Research to MBA and Marketing Management, Business Strategy, and New Product Development to EMBA students. She has also designed and delivered executive programmes for MNCs and local companies including Telenor Pakistan, Packages Pvt. (Ltd.), Bulleh Shah Packaging Ltd. and Coffey International Ltd.

Selected Publications

- Arif, F., & Sarfraz, S. S. (2017). Pakwheels. Com - The Next Challenge. Asian Journal of Management Cases
- Shrum, L. J., Wong, N., Arif, F., Chugani, S. K., Gunz, A., Lowrey, T. M., & Sundie, J. (2013). Reconceptualising Materialism as Identity Goal Pursuits: Functions, Processes, and Consequences. Journal of Business Research, 66(8), 1179-1185

Title: Evaluating the PICG Brand Positioning and PICG Training and Education Programs - Consumer Insights Research Project
PI: Dr. Farrah Arif
Sponsor: Pakistan Institute of Corporate Governance (PICG)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 2 Months
Category: Economic Development
Description: The Pakistan Institute of Corporate Governance (PICG) aims to bring about national economic and social transformations by improving the quality of corporate governance in Pakistan. With this vision, PICG started its services offering, membership, training programmes and other related services. The research project headed by Dr. Arif will help PICG in developing and executing its three-year strategic plan, which focuses on increasing the number of members and effectiveness of its services to members and non-members.

Dr. Kamran Ali Chatha
Suleman Dawood School of Business (SDSB)
kamranali@lums.edu.pk
+924235608094

Profile Dr. Kamran Ali Chatha has research interests in the areas of Manufacturing Strategy, and Technology and Innovation Management. He was involved in a multi-country study that aimed at developing an Atlas of Science and Technology based Innovations in the Muslim World sponsored by The Royal Society and Organisation of the Islamic Countries. He has continuing interests in developing techniques for planning, formulating, implementing and evaluating manufacturing strategy in the SME sector. Dr. Chatha is the Director of the Factory Management Programme that aims to develop know-how of contemporary manufacturing management practices among industry executives.

Selected Publications

- Chatha, K. A., Butt, I., Jajja, M. S. S., & Arshad, M. (2017). Theoretical Developments in Empirical Quantitative Manufacturing Strategy Literature. International Journal of Operations & Production Management, (just-accepted), 00-00
- Bhutta, M. K. S., Egilmez, G., Chatha, K. A., & Huq, F. (2017). Survey of Lean Management Practices in Pakistani Industrial Sectors. International Journal of Services and Operations Management, 28(3), 309-334
- Chatha, K. A., & Aziz, O. (2015). GIKI MEMS Lab—Architects of Tiny Machines. Asian Journal of Management Cases, 12(1), 55-83
- Chatha, K. A., & Butt, I. (2015). Themes of Study in Manufacturing Strategy Literature. International Journal of Operations and Production Management, 35(4), 604-698
- Chatha, K. A., Butt, I., & Tariq, A. (2015). Research Methodologies and Publication Trends in Manufacturing Strategy: A Content Analysis Based Literature Review. International Journal of Operations and Production Management, 35(4), 487-546

Title: Strategic Road Map for Digitalization: An Empirical Guideline
PI: Dr. Kamran Ali Chatha
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 1,811,291
Project Initiated in: 2018
Duration: 22 Months
Category: Technology
Description: The fundamental objective of this project is to explore and understand the internal and external organisational factors which impact digitalisation and outcomes of digitalisation in firms and supply chains. The adoption and deployment of technologies in organisations implies organisational changes for their effective implementation and utilisation. The first phase of the project aims to identify a set of factors that would facilitate the adoption and implementation of digital manufacturing technologies. For this purpose, this phase will utilise a well established TOE framework that will help identify technological, organisational and environmental factors that may affect the adoption of digital manufacturing technologies. The second phase will develop a roadmap for transforming traditional manufacturing firms into digitalised ones. By making use of the dynamic capabilities and strategy literature, this phase aims to identify the particular fit of complementary capabilities and strategy which aid the transformation process. The proposed research will benefit mainly the manufacturing sector of Pakistan i.e. automobiles, engineering, textile, leather, sports goods, auto parts and others of the sort.

Dr. Jamshed Hasan Khan
Suleman Dawood School of Business (SDSB)
jamshed@lums.edu.pk
+924235608027

Profile Dr. Jamshed Hasan Khan teaches in the area of Total Quality Management, Operations Strategy, and Statistics. He has also designed and delivered numerous executive education programmes for senior executives of local and MNC companies, as well as Small and Medium Enterprises. He has also consulted on ISO 9000 implementation. He specialises in a hands-on approach in implementing TQM and has launched several quality and productivity enhancement programmes in a variety of industries in Pakistan. He has presented many research papers at various international conferences. Some of his research publications include, *Inter-firm Linkages in Pakistan's Automotive Industry*, *Total Quality Management and Effective Productivity*, and *Analysis of Cost of Poor Quality in Pakistani Industry*. His research interests include application of productivity and quality management techniques, and developing a customer focused culture in a Pakistani business environment. Prior to joining LUMS, Dr. Khan taught Operations Research and Management Sciences courses at University of Texas at Arlington. He is also a certified systems professional from USA.

Title: Course on Quantitative Method of Business for IMD - MBA 2016
PI: Dr. Jamshed Hasan Khan
Sponsor: International Institute for Management Development (IMD)
Funding Amount: PKR 1,317,108
Project Initiated in: 2016
Duration: 1 Month
Category: Education
Description: The fundamental objective of this Project is to render the teaching services of LUMS faculty members at the International Institute for Management Development (IMD). The purpose is to teach a course on "Quantitative Method of Business" to the students of MBA at IMD. The focus of this course is on the application of statistics in business situations. The course introduces the fundamental concepts and techniques of statistical inference and its applications to business situations. Regression and time series analysis are studied in detail and their applications as tools of analysis and forecasting are highlighted.

Title: Course on Quantitative Method for Business for IMD - MBA 2017
PI: Dr. Jamshed Hasan Khan
Sponsor: International Institute for Management Development (IMD)
Funding Amount: PKR 1,355,704
Project Initiated in: 2017
Duration: 4 Months
Category: Education
Description: The fundamental objective of this Project is to render the teaching services of LUMS faculty members at the International Institute for Management Development (IMD). The purpose is to teach a course on "Quantitative Method of Business" to the students of MBA at IMD. The focus of this course is on the application of statistics in business situations. The course introduces the fundamental concepts and techniques of statistical inference and its applications to business situations. Regression and time series analysis are studied in detail and their applications as tools of analysis and forecasting are highlighted.

Dr. Khawaja Zain ul Abdin
Suleman Dawood School of Business (SDSB)
zain.khawaja@lums.edu.pk
+924235608031

Profile Dr. Khawaja Zain ul Abdin is an Assistant Professor at the SDSB. He holds a PhD in Media and Communication Studies (2013) and an MA from the FSU School of Communication (2009), attaining Fulbright scholarships for both degrees. He also completed his MBA in Marketing from the Lahore School of Economics in 2007. Dr. Khawaja's research interests include the effects of social media marketing in the development sector in Pakistan.

Selected Publications

- Ashraf, R., Zahid, A., & Yousaf, S. (2016). Union Railways: Selling Advertising Rights on Trains and Stations. Asian Journal of Management Cases, 13(2), 125-147
- Khawaja, Z. U. A., Ali, K. I., & Khan, S. (2017). Using Facebook for Sexual Health Social Marketing in Conservative Asian Countries: A Systematic Examination. Journal of Health Communication, 1-13
- Vahe, M., Zain-Ul-Abdin, K., & Türel, Y. K. (2012). Social Media as a Learning Tool in Medical Education: A Situation Analysis. Virtual Professional Development and Informal Learning via Social Networks, 168

Title: SOP Formation and Research Agendas for USAID
PI: Dr. Khawaja Zain ul Abdin
Sponsor: Zeus Consulting
Funding Amount: PKR 400,000
Project Initiated in: 2016
Duration: 3 Months
Category: Law & Policy
Description: Under this Agreement, LUMS, through Dr. Khawaja, shall be responsible for carrying out a Needs Assessment for the designing and implementation of the research centre at both HBPRC and CAPRIL. LUMS shall contribute in developing the Standard Operational Procedures (SOP's) for a research centre with checklists and guidelines on major functions, and a presentation on these SOP's and guidelines to the research centre staff at both HBPRC and CAPRIL, as per the satisfaction of the Project Head.

Title: Micro-Targeting and Delivery for Family Planning and Sexual Health Advertising
PI: Dr. Khawaja Zain ul Abdin
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,000
Project Initiated in: 2018
Duration: 12 Months
Category: Health
Description: This research project seeks to diagnose issues with current family planning and sexual health efforts in conservative cultures, in particular the social marketing methodology of using television advertisements to deliver family planning messages. This project will develop and test family planning advertisements, their delivery mediums, timings, and choice of placement to match proposed tenets of the new framework. The project will attempt to improve upon social psychological, behavioural, and information technology aspects of family planning and sexual health interventions. The objective behind this research is to additively ensure that a medically, economically, and socially serious issue like the provision of family planning and sexual health information, is improved upon, and the already limited development budgets that fund such efforts are used in the most effective and efficient manner.

Dr. Mohsin Bashir
Suleman Dawood School of Business (SDSB)
mohsinb@lums.edu.pk
+924235608412

Profile Dr. Mohsin Bashir is an Assistant Professor at the SDSB. His areas of academic interest include Public Private Partnerships, Organisational Power and Politics, and Non-profit Leadership and Management. He holds a PhD in Public Administration and Policy from Arizona State University's School of Public Affairs where he was a Fulbright Scholar. He also holds degrees in Business Administration (LUMS) and Computer Science (FAST). He has also published research articles on Public Administration, teaching cases on Non-profit Management and industry reports on Corporate Citizenship. His consulting assignments have been in the areas of Monitoring and Evaluation, Decentralisation/Devolution, Responsible Business Frameworks, Organizational Effectiveness and Information and Communication Technologies; for organisations such as Nike Inc., Engro Corp., Government of the Punjab, USAID, CIDA, GIZ, SDC, various RSPs and other for-profit and non-for-profit organisations.

Selected Publications

- Bashir, M. (2016). Using Power to Achieve Network Outcomes: Why Funders Should Maintain a Hands-on Approach. International Review of Public Administration, 1-16
- Bashir, M. & Sethi, A. (2014). Note on Monitoring and Evaluation Frameworks. Teaching Case No. 30- 001-2014-2 at the LUMS Case Research Centre
- Bashir, M. & Sethi, A. (2014). Performance Management at Akhuwat. Teaching Case No. 05-762-2014-1 at the LUMS Case Research Centre
- Bashir, M. (2013). Policy Process and Public Participation in Pakistan. In E. Berman, & M. Sabharwal (Eds.), Public Administration in South Asia. Taylor & Francis

Title: Review of Rules of Business and Organisation Design for Planning and Development Department Punjab
PI: Dr. Mohsin Bashir
Sponsor: AF Ferguson & Co.
Funding Amount: PKR 554,000
Project Initiated in: 2017
Duration: 6 Months
Category: Operations Management
Description: The objective of this Project is to recommend improvements in the Operating Model (organisation, people capabilities, processes, and systems) of the Punjab Department of Planning & Development (P&D) to increase the capability of the Department to administer projects.

Title: The Role of Managerial Activity in Governance of Public Service Networks
PI: Dr. Mohsin Bashir
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 600,000
Project Initiated in: 2017
Duration: 12 Months
Category: Economic Development
Description: This project is focused on evaluating the impact of managerial activities on network governance by studying two networks i.e. the Punjab Vocational Training Council (PVTC) and the Punjab Revenue Authority (PRA). PVTC has been selected as a study setting as it is a large, decentralised, and autonomous network set up by the Government of Punjab. PRA, on the other hand, is a smaller, centralised, and autonomous tax collection authority that was established in 2012 under the Punjab Revenue Authority Act. It further aims to identify what managerial activities can be employed to positively impact the functional, as well as the structural and contextual determinants of network effectiveness. The aim of this research is to advance theory and shed light on network management in the public sector of Pakistan. It will do so by establishing a more nuanced understanding of the public sector using the examples of PRA and PVTC. This study will bridge the gap between policy research and practice, and prove highly beneficial to the country's government as it will provide empirical results on how to improve on current practices employed in the public sector.

Dr. Muhammad Shakeel Sadiq Jajja
Suleman Dawood School of Business (SDSB)
ssj@lums.edu.pk
+924235608435

Profile Dr. Shakeel Sadiq Jajja did his PhD research in the area of supply chain and innovation management. He has presented several research papers at globally esteemed research platforms. During his PhD, he won the Best Student Paper Award at the *43rd Annual Meeting of the Decision Sciences Institute (DSI)* 2012 in San Francisco USA, Emerging Economy Doctoral Student Award at the *23rd Annual Conference of Production and Operations Management Society (POMS)* in 2012 in Chicago USA, and Best Graduate Student Paper Award at the *40th Annual Meeting of Western Decision Sciences Institute* in 2011 in Portland, USA. He received a Doctoral Fellowship from the Association of Management Development Institutions in South Asia (AMDISA).

Selected Publications

- Jajja, M. S. S., & Hassan, S. Z. (2017). SIL: Value Chain and Strategic Choices. Asian Journal of Management Cases
- Chatha, K. A., Butt, I., Jajja, M. S. S., & Arshad, M. (2017). Theoretical Developments in Empirical Quantitative Manufacturing Strategy Literature. International Journal of Operations & Production Management.
- Jajja, M. S. S., Kannan, V., Brah, S. A., & Hassan, S. Z. (2017). Linkages between Firm Innovation Strategy, Suppliers, Product Innovation, and Business Performance: Insights from Resource Dependence Theory. International Journal of Operations & Production Management.
- Asif, M., Awan, M. U., Jajja, M. S. S., & Ahmad, H. (2016). Developing a Scale for Service Quality Measurement in Banks. International Journal of Services and Operations Management, 23(2), 153-168
- Jajja, M. S. S., & Hassan, S. Z. (2016). Millat Tractors Limited: Has The Time Come to Say Goodbye to Massey Ferguson? Asian Journal of Management Cases.
- Jajja, M. S. S., Jajja, M. S. S., Kannan, V. R., Kannan, V. R., Brah, S. A., Brah, S. A., ... & Hassan, S. Z. (2016). Supply Chain Strategy and the Role of Suppliers: Evidence from the Indian Sub-continent. Benchmarking: An International Journal, 23(7), 1658-1676

Title: Evaluation of Prequalification for Government of the Punjab (2017-18)
PI: Dr. Muhammad Shakeel Sadiq Jajja
Sponsor: Planning and Development Department, Government of Punjab
Funding Amount: PKR 974,400
Project Initiated in: 2017
Duration: 1 Month
Category: Political Sciences
Description: Planning and Development Department (P&D), Government of the Punjab (GoP), is mandated to pre-qualify competent and qualified national and international firms to provide consultancy services to GoP in various industrial sectors. These firms can be engaged on time to time basis by line departments, public sector companies and authorities of GoP under the Punjab Public Procurement Regulatory Authority Rules 2014. The objective of this project is to guide the P&D team to develop a comprehensive and objective evaluation criteria for the pre-qualification process. This pre-qualification process will result in a list of pre-qualified companies to be used by GoP for the fiscal year 2017-18.

Dr. Muhammad Shehryar Shahid
Suleman Dawood School of Business (SDSB)
muhammad.shehryar@lums.edu.pk
+924235608425

Profile Dr. Muhammad Shehryar Shahid is an Assistant Professor of Entrepreneurship at SDSB and is also a leading member of the Entrepreneurship Working Group at the University. Dr. Shahid received his PhD from University of Sheffield in 2011, his MBA from LUMS in 2006, his Bachelor's degree from Ghulam Ishaq Khan Institute of Engineering and Technology in 2003, and his Intermediate degree from Aitchison College in 1999. Prior to his appointment at LUMS, he served as the Head of Management and Organisation Division and the Director of Centre for Entrepreneurship and SMEs (CESME) at the University of Central Punjab from 2011 to 2013. He has taught courses like Entrepreneurship, Principles of Management, Business Model Development, Lean Launchpad and SME Management at both undergraduate and postgraduate levels. He is also an Editorial Board Member of Journal of Small Business & Entrepreneurship (JSBE) and an Editorial Advisory Board Member of *The Lahore Journal of Business (LJB).*

Selected Publications

- Shahid, M. S., Rodgers, P., & Williams, C. C. (2017). Evaluating the Participation of an Ethnic Minority Group in Informal Employment: A Product of Exit or Exclusion? Review of Social Economy
- Williams, C. C., Shahid, M. S., & Martínez, A. (2016). Determinants of the Level of Informality of Informal Micro-enterprises: Some Evidence from the City of Lahore, Pakistan. World Development, 84, 312-325
- Williams, C. C., & Shahid, M. S. (2015). Informal Entrepreneurship and Institutional Theory: Explaining the Varying Degrees of (in) Formalization of Entrepreneurs in Pakistan. Entrepreneurship & Regional Development, 28(1-2), 1-25

Title: Explaining Informal Domestic Work Practices In Pakistan through a Post-Structuralist Lens: An Empirical Analysis
PI: Dr. Muhammad Shehryar Shahid
Co-PI: Prof. Colin Williams, Cardiff University
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 560,000
Project Initiated in: 2016
Duration: 12 Months
Category: Economic Development
Description: The main objective of this Research Project is to transcend the capitalist-centric discourse on informal work, so far firmly entrenched in the literature, and lend support to the post-structuralist explanations of informal work practices, which assert that individuals often prefer to engage in non-capitalist work strategies, embedded in a complex set of cultural, political, and social rationales. This project seeks to not only explicitly unravel the reasons for Pakistani employers and employees to engage in informal work practices, but also elucidate certain implicit social constructs and the negotiated nature of work relations existing within the dynamics of informal domestic work.

Title: Informal Sector Entrepreneurship: Explaining the Motives and Degrees of (In) Formalisation of Street Vendors (Entrepreneurs) in Lahore
PI: Dr. Muhammad Shehryar Shahid
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 625,000
Project Initiated in: 2018
Duration: 12 Months
Category: Economic Development
Description: The aim of this Project is to transcend the dualistic portrayal of entrepreneurs as either completely formal or informal and bring credibility to the school of thought which aims to re-conceptualise entrepreneurs as existing on a continuum from being wholly formal to wholly informal. Given that apart from one seminal study, no known studies have evaluated the degrees of (in)formalisation of entrepreneurs or the factors influencing their degree of (in)formalisation, this project will begin to bridge that knowledge gap via an in-depth study of street entrepreneurs i.e. street hawkers in Lahore, Pakistan. This project will further bridge the gap between academic research and policy and practice, and benefit the local industry and society alike.

Dr. Syed Zahoor Hassan
Suleman Dawood School of Business (SDSB)
zahoor@lums.edu.pk
+924235608085

Profile Dr. Syed Zahoor Hassan has more than two decades of extensive experience in the higher education sector. At LUMS, he has served in many capacities besides teaching and research, including Associate Dean, Dean, Pro Vice chancellor and Vice chancellor (2002-08). During his six year tenure as VC, LUMS expanded in all dimensions (academic programmes, faculty, schools and infrastructure) and formulated its vision to become a broad-based research university. The launch of the National Outreach Programme (NOP), through which bright students from the under privileged sections of our society are groomed to join LUMS on full financial support, is a key highlight of Dr. Hassan's term as VC. Dr. Hassan's current research interests include management of technology, innovation and entrepreneurship in the global world. Besides consulting for many leading local companies and international organisations, like UNDP and World Bank, he has also served on the boards of organisations like PTCL and NTDC.

Selected Publications

- Jajja, M. S. S., Kannan, V., Brah, S. A., & Hassan, S. Z. (2017). Linkages between Firm Innovation Strategy, Suppliers, Product Innovation, and Business Performance: Insights from Resource Dependence Theory. International Journal of Operations & Production Management
- Jajja, M. S. S., & Hassan, S. Z. (2017). SIL: Value Chain and Strategic Choices. Asian Journal of Management Cases
- Jajja, M. S. S., & Hassan, S. Z. (2016). Millat Tractors Limited: Has The Time Come to Say Goodbye to Massey Ferguson? Asian Journal of Management Cases
- Jajja, M. S. S., Jajja, M. S. S., Kannan, V. R., Kannan, V. R., Brah, S. A., Brah, S. A., ... & Hassan, S. Z. (2016). Supply Chain Strategy and the Role of Suppliers: Evidence from the Indian Sub-continent. Benchmarking: An International Journal, 23(7), 1658-1676

Title: Facilitation for Formulation of Group Vision, Mission and Values (V&V)
PI: Dr. Syed Zahoor Hassan
Sponsor: Packages Pvt. (Ltd.)
Funding Amount: PKR 1,456,000
Project Initiated in: 2016
Duration: 2 Months
Category: Law & Policy
Description: The overall objective of this initiative is to engage with the top management of Group, CEOs/senior management of all the group companies to prepare an overall group vision, mission and values documents. This project entails interaction with the companies based in Lahore and Karachi to develop an agreement on the overall approach, and preparation of a rough draft that will be separately discussed and debated in each company with the help of the Group HR. The ultimate objective is to share the work done at each company, preparation of a second draft based on the work done at all companies in Lahore and Karachi, and identification of tasks for implementing the agreed V&V.

Title: Description and Critical Analysis of the Innovation and Design of the Ricult Business Model
PI: Dr. Syed Zahoor Hassan
Sponsor: Karandaaz
Funding Amount: PKR 1,791,885
Project Initiated in: 2017
Duration: 4.5 Months
Category: Agriculture
Description: This project was sponsored by Karandaaz and involved a critical analysis of the innovation and design of the business model of a social enterprise, Ricult that aimed to bring more value to small farmers through use of technology and focus on financial inclusion by using mobile wallets. It includes but is not limited to tracing the history of Ricult, history of the team that established it, documenting the Ricult Business Model, its evolution and the challenges faced while developing it, documenting the lessons learnt throughout the life span of the Model since inception, assessing the impact of the Model on the financial inclusion space and determining future prospects/goals of the Model.

Dr. Zehra Waheed
Suleman Dawood School of Business (SDSB)
zehra.waheed@lums.edu.pk
+924235608426

Profile Dr. Zehra Waheed is the coordinator of the BSc Management Science at the SDSB. Prior to SDSB, Dr. Waheed has worked at Heriot-Watt University in Scotland, in the Corporate and Institutional Banking and Textile sector in Pakistan and Retail Banking in the UK. Dr. Waheed's teaching experience spans undergraduate and postgraduate teaching in the areas of Construction Project Management, Facilities and Asset Management, Value and Risk Management and Construction Financial Management at Heriot-Watt University, Scotland. She has taught executive, undergraduate and postgraduate students at SDSB. Her primary teaching areas at SDSB and the Rausing Executive Development Centre (REDC) are Project Management and Public Procurement.

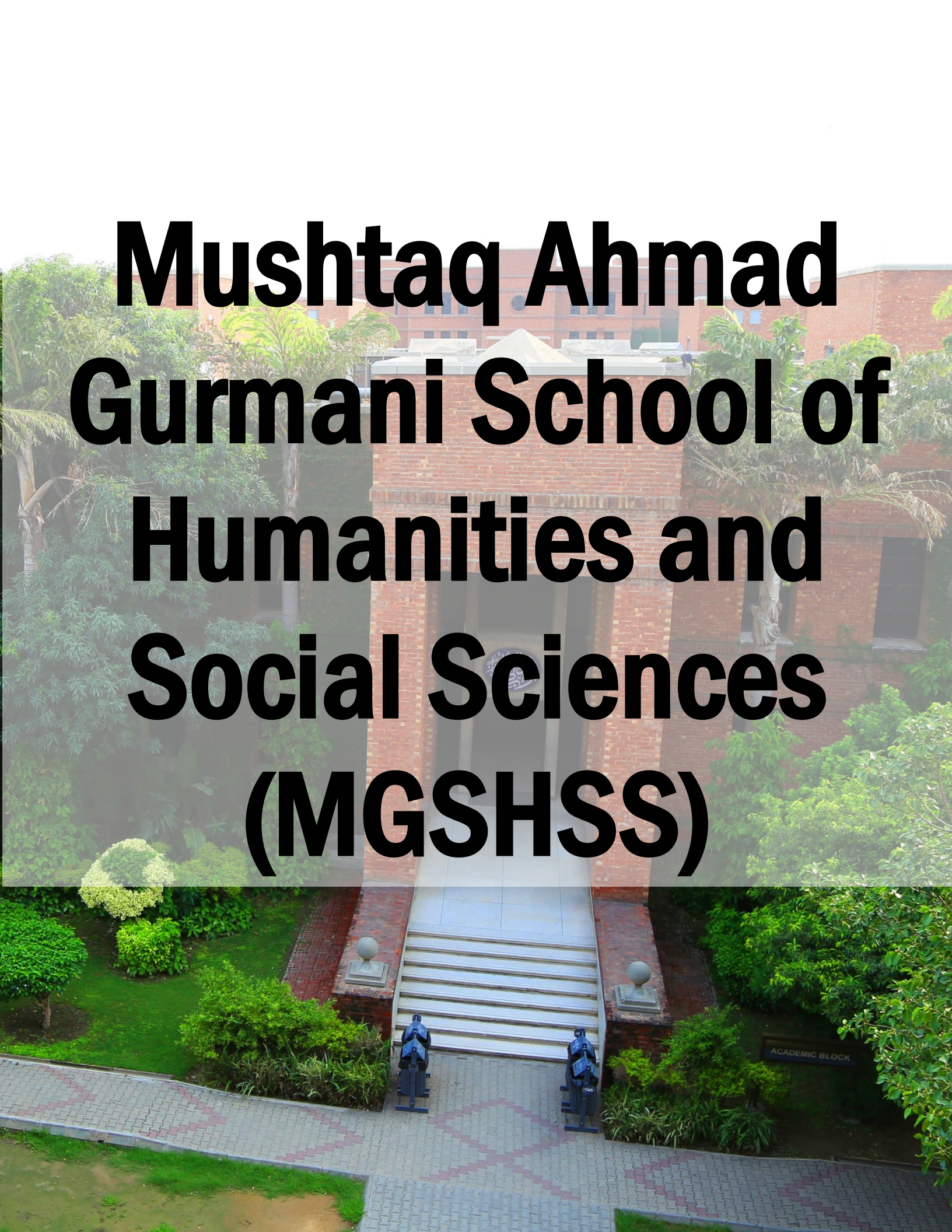
Selected Publications

- Waheed, Z. (2016). Waheed Z, 2016, Case Studies in Project, Program and Organisational Project Management, Facilities, Volume 34, Number 5/6.
- Waheed, Z. (2015). Waheed Z, 2015, Capture And Reuse of Project Knowledge in Construction, Facilities, Volume 33.
- Waheed, Z. (2016). Waheed Z, 2016, Understanding Project Management: Skills and Insights for Successful Project Delivery, Facilities, Volume 34, Number 7/8.

Title: Building Inclusive and Sustainable Urban Waste Management Systems in Large Urban Centres of the Developing World: A Case of the City of Lahore
PI: Dr. Zehra Waheed
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 675,000
Project Initiated in: 2015
Duration: 12 Months
Category: Environment
Description: This study is intended to be an exploratory case study of the city's waste landscape: A lens through which the evolution of desired systems, governance processes and organisational development (in this case, the Lahore Waste Management Company) will be viewed. It is also meant to be a vehicle of culturally interpreting the city's need for waste, its historical handling of its excrement and the various narratives that define the city's inhabitants, including the industry's approach towards waste. Whilst the results will map current waste management practice in the city, the development of its infrastructure and identify future challenges of solid waste management in Lahore, they will also unveil the implications of current practice on the sustainable development of the second largest city of the country and the role that local industry can play in waste reduction and disposal.

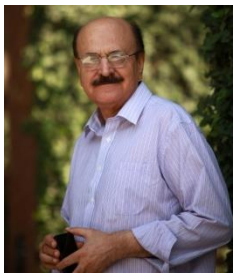
Title: Pro-Environmental Behaviour in Closed University Communities: Place-Based Behaviours And 'Green' Community Development
PI: Dr. Zehra Waheed
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 695,000
Project Initiated in: 2017
Duration: 12 Months
Category: Environment
Description: The purpose of this project is to use a naturally closed and self-reliant, inter-dependent community such as the LUMS campus to determine environmental behaviours that must be changed to improve environmental quality, examine factors causing those behaviours and evaluate interventions in being able to change behaviour and their antecedents. Together, the aim is to develop a typography of pro-environmental (or non-pro-environmental) behaviours derived from our local context. The aim of the proposed project is to model development of pro-environmental community behaviour based on identification of past behaviours, factors causing those behaviours and interventions that can change these. It further aims to investigate variables such as environmental stewardship, conservation lifestyle and environmental citizenship norms within a defined community. The results will strengthen emergent theory on community based stewardship behaviour in special emerging markets contexts and compare these with research findings from the developed world.

Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)



DEPARTMENT OF ECONOMICS

Dr. Abid Aman Burki
Department of Economics, MGSHSS
burki@lums.edu.pk
+924235608076



Profile Dr. Abid Aman Burki, Professor of Economics at the MGSHSS, has been the Director of the Centre for Management and Economic Research at LUMS from 2003 to 2010. Dr. Burki received his PhD in Economics from Kansas State University. Prior to his appointment at LUMS, he was on the Economics faculty of Quaid-i-Azam University (1985-2002) and most recently as Professor and Head of the Economics Department. He serves on several high-level committees and taskforces of the government. His research interests lie in the areas of Applied Microeconomics, Development Economics and Production Economics. He has also taught courses at Kansas State University and is a referee for numerous academic journals. He has authored or co-authored more than 70 articles, book chapters and professional reports and has supervised three PhD, 18 MPhil and 28 Master's theses.

Selected Publications

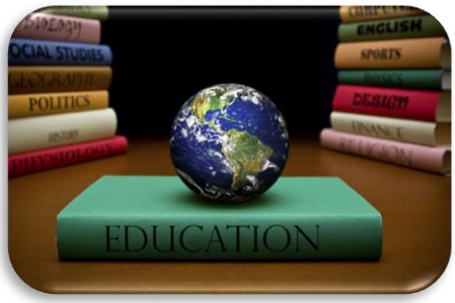
- Burki, A. A., Khan, M. A., & Malik, S. (2015). From Chronic Disease to Food Poverty: Evidence from Pakistan. Pakistan Development Review, 54(1), 17
- Burki, A. A. (2015). Group-based BDS Matching Grants and Farm-level Outcomes in Pakistan. Journal of Development Effectiveness, 7(1), 43-63
- Ahmad, S., & Burki, A. A. (2015). Banking Deregulation and Allocative Efficiency in Pakistan. Applied Economics, 1-15.
- Jung, H. M., Burki, A. A., & Khan, M. A. (2012). Supply of Dairy Products in Developing Countries. Economics Bulletin, 32(4), 3213-3223
- Burki, A. A., & Khan, M. A. (2011). Formal Participation in a Milk Supply Chain and Technical Inefficiency of Smallholder Dairy Farms in Pakistan. Pakistan Development Review, 50(1), 63-81

Title: Access to Education and Social Cohesion in Conflict-Ridden Areas (SCR): End-line Study and Review of Outcome 4 Activities
PI: Dr. Abid Aman Burki
Co-PI: Dr. Syed Muhammad Hussain, Dr. Rashid Memon
Sponsor: United Nations International Children's Emergency Fund (UNICEF)
Funding Amount: PKR 8,415,700
Project Initiated in: 2016
Duration: 6 Months
Category: Economic Development
Description: UNICEF Pakistan launched the four-year SCR Programme in 2012 in conflict-affected districts within the provinces of Baluchistan, Punjab, Khyber Pakhtunkhwa (KP) and Sindh. SCR aims to strengthen social cohesion and resilience through education in vulnerable contexts, including contexts at risk of or experiencing and recovering from instability. The programme builds on the theory of change that when delivered equitably and effectively, education can strengthen the resilience of children and communities, reduce risk of recruitment and indoctrination by armed actors, and limit the loss of human capital while sustaining longer-term opportunities for children and youth for civic engagement and entering the labour market. It aims to contribute towards individual and community capacity building which is being achieved through helping students, parents, teachers and other community members to cope with instability and promoting social cohesion among them.

Title: Rapid Assessment/Research for Identification of Contributing Factors Related To Alarmingly High Wasting Rates in Certain Districts of Punjab
PI: Dr. Abid Aman Burki
Sponsor: United Nations International Children's Emergency Fund (UNICEF)
Funding Amount: PKR 4,283,750
Project Initiated in: 2017
Duration: 6 Months
Category: Environment
Description: The fundamental objective of this project is to conduct an assessment/research study for identification of multi-sectoral contributing factors related to high rates of wasting in certain districts of Punjab. Successful execution of this project will have a positive effect on the environment and waste management system.

Title: Economic Impact of the Dairy Sector in Pakistan
PI: Dr. Abid Aman Burki
Co-PI: Dr. Mushtaq A. Khan
Sponsor: Tetra Pak
Funding Amount: PKR 2,600,000
Project Initiated in: 2017
Duration: 9 Months
Category: Economic Development
Description: The fundamental objective of this project is to conduct a study on Pakistan's Dairy Sector and obtain lessons from the past to build a resilient dairy industry with technical and financial support from Tetra Pak Pakistan. The economics of agriculture related to dairy farming, economics of corporate dairy farming, welfare analysis of imposing sales tax on packed milk, productivity growth in non-corporate dairy farms, economic outlook of corporate dairy farms, impact of low dietary intake (including dairy products) on nutritional status of children and welfare analysis of the impact of taxation on processed milk products and the dairy sector are the study areas under this project.

Title: Equitable Access to Education and Out of School Children in Sindh
PI: Dr. Abid Aman Burki
Sponsor: United Nations Educational, Scientific and Cultural Organization (UNESCO)
Funding Amount: PKR 1,776,525
Project Initiated in: 2018
Duration: 2 Months
Category: Education
Description: The main objective of this project is to undertake research activities on equitable access to education and out of school children in Sindh, which will contribute to the education sector analysis of the Sindh educational sector plan. Under this project, trends in participation in education and retention for primary, post primary and higher secondary class will be analysed. The analysis will distinguish between attendance to public and private schools. It will further analyse the trends in out of school children and children who are at risk of dropping out in Sindh province since 2010 and analyse the equity in access to education and retention in Sindh according to various conditions such as gender, geographical location, mother tongue, wealth etc. The analysis will be mainly based on statistical data.



Title: Access to Quality Health Services at Public Facilities and National and Provincial Health Budget Analysis and Financing
PI: Dr. Abid Aman Burki
Sponsor: Indus Consortium
Funding Amount: PKR 1,996,500
Project Initiated in: 2018
Duration: 4 Months
Category: Economic Development
Description: The overall objective of the project is that more women, youth and other citizens benefit from a just/fair fiscal system which is not politically captured, resulting in tackling extreme inequality and allocation/spending of more funds for essential services i.e. education, health and social protection. The Indus Consortium is a collaborative platform of three humanitarian and development organizations i.e. Laar Humanitarian Development Program (LHDP), Doaba Foundation and HELP Foundation - is a manifestation of a joint force of the people living around the Sindhu (Indus) River basin in Pakistan.

Dr. Ayesha Ali
Department of Economics, MGSHSS
ayeshaali@lums.edu.pk
+924235608235

Profile Dr. Ayesha Ali is an Assistant Professor-Tenure Track at the Department of Economics, MGSHSS. She recently obtained her PhD in Economics from the University of Toronto, Canada in 2016 after completing her MA in International Policy Studies from Stanford University, MA in Economics from University of British Columbia and Bachelor's in Economics & Finance from McGill University, Canada. Dr. Ali's current research is in the field of Development and Energy Economics with a special focus on electricity markets and electricity demand in developing countries. Her PhD dissertation examined the effect of electricity shortages on household income and employment in Pakistan. She is also working on a project examining the development policies of dynastic politicians in Pakistan. Prior to starting her PhD, she worked as an Economic Policy Consultant for the World Bank and USAID. Her research interests include Energy Economics, Consumption and Political Economy.

Selected Publications

- Ullah, H., Kamal, I., Ali, A., Arshad, N. (2018). Investor Focused Placement and Sizing of Photovoltaic Grid-Connected Systems In Pakistan, Renewable Energy
- Abbas, S., Bakar, A., Chandio, Y., Hafeez, K., Ali. A., Jadoon, T. M., Alizai, M. H. (2018). Inverted HVAC: Greenifying Older Buildings, One Room at a Time, ACM Transactions on Sensor Networks (TOSN)
- Hafeez, K., Chandio, Y., Bakar, A., Syed, A. A., Ali. A., Jadoon, T. M., Alizai, M. H. (2017). Inverting HVAC for Energy Efficient Thermal Comfort in Populous Emerging Countries. 4th ACM International Conference on Systems for Energy-Efficient Built Environments (BuildSys), Delft, The Netherlands

Title: Internet Censorship as a Trade Barrier
PI: Dr. Ayesha Ali
Co-PI: Dr. Ihsan Ayyub Qazi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 960,000
Project Initiated in: 2018
Duration: 12 Months
Category: Economic Development
Description: The main objective of this project is to develop case studies on countries where censorship is widespread to understand the economic impact of censorship, to develop and test economic models based on viewing censorship as a form of trade barrier and to analyse the impact of censorship circumvention on the local industry. Internet censorship has become increasingly pervasive with nearly 70 countries restricting internet content to their citizens. The blocking of YouTube in Pakistan, Google and Facebook in China and Iran, and Twitter in Turkey were some recent examples of censorship. Internet censorship has a substantial impact on various stakeholders in the internet ecosystem including end-users, content providers, internet service providers, advertisers, and regulators. To understand and quantitatively reason about the economic implications of internet censorship (e.g. censorship of YouTube in Pakistan), this project has proposed to model censorship as a form of a trade barrier.

Dr. Hadia Majid
Department of Economics, MGSHSS
hadia.majid@lums.edu.pk
+924235608420

Profile Dr. Hadia Majid is an Assistant Professor at the MGSHSS. A Fulbright Scholar, she holds a PhD in Development Economics from The Ohio State University, an MA in Economics from The Ohio State University, an MSc in Economics from the University of Warwick, and a BSc in Economics from LUMS. Her research interests include aspects that relate to the economic characteristics of the household, including parental decision-making and human capital acquisition. Her previous work has looked at CCT evaluations at the intra-household level, factors that affect parental investment in child education, female bargaining power in rural Pakistan, and agricultural taxation in Pakistan. On-going research includes impact evaluation of climate change on the health industry.

Selected Publications

- Majid, H., & Mukhtar, N. (2015). Pakistan-India Trade: An Analysis of the Health Sector. In India-Pakistan Trade (pp. 273-309). Springer India
- Hassan, F. S., Javaid, K., & Majid, H. (2015). Pakistan-India Bilateral Trade in Sports Goods Sector India-Pakistan Trade: Strengthening Economic Relations (pp. 245-272)
- Majid, H. Child Endowments and Parental Investments: Intra-household Allocation in Oportunidades Families in Mexico. Review of Development Economics
- Khan, M, H. Majid and A. Riaz, (2015). "Cluster-Based Industrialization and Firm Productivity in Pakistan" PSSP-IFPRI Working Paper
- Majid, H., & Memon, R. Patronage and Public Goods Provisioning in an Unequal Land. Social Indicators Research, 1-26

Title: Study on Individual Indigenous Philanthropy in Pakistan
PI: Dr. Hadia Majid
Co-PI: Dr. Husnain Fateh Ahmed
Sponsor: Pakistan Centre for Philanthropy (PCP)
Funding Amount: PKR 1,500,000
Project Initiated in: 2016
Duration: 4 Months
Category: Behavioural Sciences
Description: PCP works with a vision to increase the volume and effectiveness of indigenous philanthropy for social development in Pakistan. Instead of getting into direct service delivery mode or receiving grants, PCP seeks to promote altruistic efforts of national and international philanthropists by establishing effective linkages between the grant maker and non-profit organisations.

Title: Diagnostic Study on 'Decent Work in Rural Economy in Pakistan'
PI: Dr. Hadia Majid
Sponsor: International Labour Organization
Funding Amount: PKR 1,997,098
Project Initiated in: 2017
Duration: 3 Months
Category: Economic Development
Description: The main objective of this project is to frame the context by highlighting definitions of decent work derived primarily from ILO's own documentation while also complementing, where applicable, the work by other agencies including UN and Pakistan's Vision 2025 as well as other academic literature. Thus, this project we will not only refer to the four pillars of ILO's Decent Work Agenda: employment, rights at work, social protection and social dialogue as mentioned in the TORs, but will also incorporate 'Decent Work Indicators' as outlined in the ILO Report *Decent Work Indicators for Asia and the Pacific: A Guidebook for Policy-makers and Researchers* and use these as a benchmark to measure the presence and extent of decent work in Pakistan's rural areas.

Title: Female Labour Supply and the Escape from Poverty: New Evidence from Household Data
PI: Dr. Hadia Majid
Co-PI: Professor Andy McKay -University of Sussex
Sponsor: Economic and Social Research Council (ESRC)
External Collaboration: University of Sussex
Funding Amount: PKR 6,048,384
Project Initiated in: 2016
Duration: 24 Months
Category: Economic Development
Description: This project will utilise household survey data from 4 African and Asian countries (Bangladesh, Ethiopia, Pakistan and Rwanda) to examine in depth and on a comparable basis the evolving nature of female labour supply in low income countries over the past 2-3 decades, and to analyse how this has been associated with poverty reduction. The objective is to examine, on a comparable basis over a 20-30 year period based on household data, the changing patterns of female labour supply across low income countries (Bangladesh, Ethiopia and Rwanda), one comparable lower middle income country (Pakistan), examining several dimensions of female labour supply (such as hours and different forms of participation) and the role of female characteristics (such as education) in so doing. This project will consider the extent to which female labour supply has evolved from a buffering role to a longer term income generating role.

Dr. Imtiaz ul Haq
Department of Economics, MGSHSS
imtiaz.haq@lums.edu.pk
+924235608419

Profile Dr. Imtiaz ul Haq is an Assistant Professor of Economics at the MGHSS. He completed his PhD in Finance from the Manchester Business School, University of Manchester (UK). He also holds an MSc in Finance from the Manchester Business School and a BSc (Hons) in Economics from LUMS. His research interests are Corporate Finance, Financial Intermediaries, Private Equity Investments and Capital Markets. His doctoral research focused on investor behaviour in the mutual fund industry in the US and UK, particularly on investor fund-selection ability, investor behaviour over economic cycles and investor reactions to mutual fund name changes. More recently, Dr. Haq has looked at herding in venture capital investments and their effect on economic productivity.

Selected Publications

- Espenlaub, S., ul Haq, I., & Khurshed, A. (2017). It's All In the Name: Mutual Fund Name Changes after SEC Rule 35d-1. Journal of Banking & Finance
- Hussain, Z., Anwer, S., Hussain, F., & Haq, I. (2006). Economics of Cotton Production in Indus Basin: A Price Risk Analysis. Int. Res. J. Fin. Econ, 6, 24-30
- Hussain, Z., Awan, H., Hussain, I., & Farhan, M. Imtiaz-ul-Haq (2006), Demand for Money in Pakistan. International Research Journal of Finance and Economics, (5), 209-218

Title: Preferences for Islamic Mutual Funds: The Role of Altruism, Religiosity, and Risk Preferences
PI: Dr. Imtiaz ul Haq
Co-PI: Dr. Sheheryar Banuri
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 950,000
Project Initiated in: 2016
Duration: 12 Months
Category: Economic Development
Description: The primary objective of this research is to examine investor preferences for Islamic mutual funds. Previous studies find mixed results on the aggregate performance of the Islamic fund industry, yet no study examines heterogeneity amongst investors at the individual level. This research project aims to do so by focusing on certain factors that influence the investment decision-making process: religiosity, altruism and risk preferences. Furthermore, it will also highlight the additional cost borne by Islamic investors participating in the market.

Dr. Kashif Zaheer Malik
Department of Economics, MGSHSS
kashif.malik@lums.edu.pk
+924235608050

Profile Dr. Kashif Zaheer Malik is an Assistant Professor of Economics at LUMS. He is a Fulbright Scholar and has a Masters and PhD degree in Economics from Florida State University. His area of research ranges from Empirical Macroeconomics, Theoretical Macroeconomics and Industrial Organisation. Dr. Malik has conducted various quantitative researches in multiple areas: Trade, Industry and Microfinance. He has consulted for Barclays Bank and Coca-Cola Beverages Pakistan Limited and has also been involved with the International Growth Centre (IGC). He is currently working on a Randomised Evaluation of Micro-Venture Capital. The project aims to study the impact of introducing Sharia compliant microfinancing in collaboration with Akhuwat. Dr. Kashif has recently concluded a project that measures the Economic Impact of Coca-Cola Beverages Pakistan Limited (CCBPL). The study employs input-output model and Social Accounting Matrix to measure income and employment effects of CCBPL on the economy.

Selected Publications

- Malik, K. Z., Ajmal, H., & Zahid, M. U. (2017). Oil Price Shock and its Impact on the Macroeconomic Variables of Pakistan: A Structural Vector Autoregressive Approach. International Journal of Energy Economics and Policy, 7(5), 83-92
- Malik, K. Z., Ali, S. Z., & Khalid, A. M. (2014). Intangible Capital in a Real Business Cycle Model. Economic Modelling, 39, 32-48
- Hussain, S. T., Khan, U., Malik, K. Z., & Faheem, A. (2012). Constraints Faced By Industry in Punjab, Pakistan (No. Id: 5090)
- Malik, K. Z. (2011). Essays on Productivity, Labour Allocations and Intangible Capital. Electronic Theses, Treatises and Dissertations. Paper 5012

Title: Creating and Utilizing Comic Books to Bridge Knowledge Gaps in Child Health in Rural Okara, Punjab
PI: Dr. Kashif Zaheer Malik
Co-PI: Dr. Spenta Kaklia
Sponsor: Health and Nutrition Innovation Fund (HANIF) | Department for International Development (DFID)
Funding Amount: PKR 5,017,166
Project Initiated in: 2016
Duration: 10 Months
Category: Health
Description: The proposed project will address the four areas of childhood illness that contribute to mortality in children under the age of 5 years in Pakistan. The under-five mortality rate in Pakistan is 87 per 1,000 live births, one of the highest in the world. Dr. Zaheer's suggested innovation is to create comic books addressing the gaps in maternal knowledge in these four areas of children's health. The comics will be designed with graphics and wording that is culturally appropriate to a rural Punjabi setting. Printing half the comics with only graphics, and no written script will appeal to most of the women in the area, especially to those with limited reading ability. The overall goal of the project is to improve maternal knowledge, especially among women of child bearing age, addressing the main causes of childhood mortality in Pakistan among children less than five years of age.

Title: Equity-Based Financing for Microenterprise in Pakistan
PI: Dr. Kashif Zaheer Malik
Co-PI: Dr. Faisal Bari, Prof. Simon Quinn, Prof. Muhammad Meki
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Business and Innovation
Description: The main objectives of this research are to design a new equity-based microfinance product and to test its impact on growth of small enterprises, using a field experiment, to test the understanding of and demand for this new equity-based contract by local male and female entrepreneurs and to test for heterogeneous effects by key characteristics of the participants namely their gender, the type of enterprise, their business and managerial skills, as well as behavioural characteristics (such as time and risk preferences).

Title: Equity-Based Microfinance Contracts for Microenterprises
PI: Dr. Kashif Zaheer Malik
Co-PI: Dr. Faisal Bari
Sponsor: University of Oxford | Innovations for Poverty Action
Funding Amount: PKR 5,915,860
Project Initiated in: 2016
Duration: 30 Months
Category: Business and Innovation
Description: Under this research project, the main objective is to work with a microfinance institution to identify 900 entrepreneurs who have previously completed at least one loan cycle with Akhuwat and expressed an interest in expanding their business through the purchase of a fixed asset. Furthermore, this project aims to plan the design of the field experiment and to finalise the microfinance contract structure for the product offered to clients.

Title: Micro-Equity for Micro-Enterprises: Start-up Capital for Skilled Apprentices in Pakistan
PI: Dr. Kashif Zaheer Malik
Co-PI: Dr. Faisal Bari
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Economic Development
Description: The fundamental objective of this project is to target skilled apprentices who are interested in setting up their own business, but lack financial capital and business management expertise. The aim is to provide them with flexible form of start-up capital that aligns their incentives with those of the capital provider (the MFI, NRSP), who now has a clear motivation to consider the long-term outcomes of these microenterprises. This project designs a new equity based microfinance product and test its impact on growth of small enterprises. Using a field experiment, this project test the understanding of and demand for this new equity based contract by local male and female entrepreneurs and test for heterogeneous effects by key characteristics of the participants – namely their gender, the type of enterprise, their business and managerial skills, as well as behavioural characteristics (such as time and risk preferences).

Mr. Mohammad Usman Khan
Department of Economics, MGSHSS
usmankhan@lums.edu.pk
+924235608075

Profile Mr. Mohammad Usman Khan started his professional career in banking and investment consulting in London, UK. In the UK, he advised large institutional clients on financial matters including financial strategy, asset allocation, manager selection and corporate governance. After spending 6 years in investment industry in the UK, he moved to Pakistan where he joined Lahore University of Management Sciences (LUMS) as a faculty in the Economics Department. He has been lecturing at LUMS since 2006 and has headed the Development Policy Research Centre (DPRC) at LUMS for two years. He won research studies of over US$1,000,000 in the inception stage of the centre. His work in Bangladesh comprised of trade analysis within the SAARC region while his work in Nigeria involved working with the State Government of Kano to design a development strategy aiming improvement in key sector value chains mainly agriculture and enhance the role of the private sector. He has also worked with Indian Council for Research and International Economic Relations (ICRIER) on normalising Pakistan India trade. Mr. Khan's research interests include policy and strategy in the development sector.

Selected Publications

- Taneja, N., Khan, M. U., Dayal, I., & Bimal, S. (2017). India–Pakistan: Second Trade Perception Survey. In India-Pakistan Trade Normalisation (pp. 271-311). Springer Singapore

Title: Punjab Economic Report: 2016 - The Punjab's Socio-economic Profile
PI: Mr. Mohammad Usman Khan
Co-PI: Dr. S.M. Turab Hussain , Dr. Mushtaq A. Khan
Sponsor: Punjab Economic Research Institute (PERI)
Funding Amount: PKR 17,240,268
Project Initiated in: 2016
Duration: 5 Months
Category: Economic Development
Description: Punjab is the largest province of Pakistan holding more than half of the population of the country. Due to the largest population size, Punjab significantly influences most of the social development indicators of the country. Punjab Economic Report 2016 will provide an analytical snapshot of socio-economic status of the province with some insight of the future prospects. This project will be a basic guiding document for government departments, public sector institutions, development partners, civil society organizations and the private sector contributors for development.

Title: Drafting Evaluation Policy Punjab in Coordination with Directorate of Monitoring and Evaluation, Planning and Development Department and In Consultation with All Government Departments Engaged In Annual Development Program (ADP) Implementation
PI: Mr. Mohammad Usman Khan
Co-PI: Dr. Abid Aman Burki
Sponsor: United Nations International Children's Emergency Fund (UNICEF)
Funding Amount: PKR 5,806,600
Project Initiated in: 2017
Duration: 5 Months
Category: Law & Policy
Description: The fundamental aim of this project is to not only produce a standalone evaluation policy document, but also to suggest a robust framework that will guide the evaluations work in Punjab. The policy document will be supported with a 5-year long frame that will detail the headline activities, targets, milestones and roles and responsibilities. Moreover, strong emphasis will be placed on the human and institutional capacity building for the understanding and conduct of high-quality, equity focused evaluations as well as on results-based monitoring and evaluation, impact evaluation methodology and use of evidence for planning and policy-making.

Title: Skills Need Assessment of Export Led Sector (3-Sectors)
PI: Dr. Mohammad Usman Khan
Co-PI: Dr. Nazish Afraz, Dr. S.M. Turab Hussain
Sponsor: Punjab Skills Development Fund (PSDF)
Funding Amount: PKR 15,715,854
Project Initiated in: 2017
Duration: 11 Months
Category: Trade
Description: The main objective of this project is to identify key national export potential sectors that offer the maximum economic benefit, social inclusion, scope of innovation and sustained growth. It further aims to build credible data and analysis on the skills need and existing gaps taking not only a short-term but a medium to long-term view, especially considering CPEC and to build specific recommendations on types and varieties of courses that PSDP can facilitate to address these gaps. The ultimate purpose is to provide contours of a holistic skills policy based on the findings that PSDF can propose to the provincial government. All of these four distinct objectives are strongly correlated with each other, where one is the precondition for the other.

Title: Citizen Perception on Democracy
PI: Mr. Mohammad Usman Khan
Co-PI: Dr. S.M. Turab Hussain
Sponsor: Development Alternatives Incorporated - Pakistan (DAI)
Funding Amount: PKR 4,176,000
Project Initiated in: 2018
Duration: 2.5 Months
Category: Political Sciences
Description: The key purpose of this project is to identify some key sentiments and understanding of the citizens on elements linked to a stable democracy. The project aims to collect data on key issues that reflect how people in Pakistan think about democracy and assess the level of their awareness and will help CDIP to identify the key areas where awareness is weak and the attributes around it to develop innovative interventions that can be scaled-up by partnering with supply side institutions for consolidated democracy and the project itself can be expanded and institutionalised within a relevant supply side institution to sequentially develop attributes of democracy and measure changes in awareness and strength of democracy.

Dr. Mushtaq A. Khan
Department of Economics, MGSHSS
mushtaq@lums.edu.pk
+924235608078

Profile Dr. Mushtaq A. Khan has 16 years of teaching and research experience at Quaid-e-Azam University and Kansas State University. He was previously the Head of the Economics Department at Suleyman Demirel University, Kazakhstan. He has taught various courses including Intermediate Microeconomics, Intermediate Macroeconomics, Money, Banking and Financial Markets. His specialisations include Econometrics, Labour Economics, Microeconomics, Regulatory Economics, and International Monetary Economics.

Selected Publications

- Burki, A. A., Khan, M. A., & Malik, S. (2015). From Chronic Disease to Food Poverty: Evidence from Pakistan. Pakistan Development Review, 54(1), 17

Title: Engagement With Punjab Under CPEC: A Proposed Framework For Agriculture
PI: Dr. Mushtaq A. Khan
Sponsor: Consortium for Development Policy Research (CDPR)
Funding Amount: PKR 130,052
Project Initiated in: 2017
Duration: 12 Months
Category: Agriculture
Description: The objective of this project is to develop a framework for existing agricultural trade of Pakistan and China and look into the agricultural output (Pakistan's export portfolio and China's import portfolio) and agricultural input (Pakistan's import portfolio and China's export portfolio). The aim is to develop an opportunity canvas of Pakistan in the wake of CPEC.

Ms. Nazish Afraz
Department of Economics, MGSHSS
nazishafraz@lums.edu.pk
+924235602334

Profile Ms. Nazish Afraz is a Teaching Fellow at the Department of Economics at LUMS. She has worked in public policy research in the UK and in Pakistan. Her research interests include industrial development and trade. She has completed an MPhil in Economics from the London School of Economics and Political Science, and an MSc in Economics and Finance from the University of Bristol.

Selected Publications

- Afraz, Nazish and Hasaan Khawar (2018) "Review of Investment Policy for Khyber Pukhtunkhwa" USAID Small and Medium Enterprise Activity
- Afraz, Nazish, Nadia Mukhtar and Syed Turab Hussain (2018) "Regional Connectivity @100" The World Bank
- Afraz, Nazish and Hasaan Khawar (2017) "Small and Medium Enterprise Activity: Diagnostics for Business Enabling Environment" USAID Small and Medium Enterprise Activity
- Afraz, Nazish and Hasaan Khawar (2017) "Industrial Cooperation Under CPEC" International Growth Centre
- Afraz, Nazish (2017) "Investment Incentives for the Government of Punjab" Department of Industries, Government of Punjab
- Afraz, Nazish (2017) "Industrial Development" Chapter in The Punjab Economic Report 2017, Planning and Development Department, Government of Punjab
- Afraz, Nazish and Hasaan Khawar (2017) "Industrial Cooperation Under CPEC" International Growth Centre

Title: Regional Connectivity Policy Note
PI: Ms. Nazish Afraz
Co-PI: Dr. S.M. Turab Hussain, Dr. Nadia Mukhtar Sayed
Sponsor: World Bank
Funding Amount: PKR 5,272,747
Project Initiated in: 2018
Duration: 2 Months
Category: Economic Development
Description: The Regional Connectivity policy note is a comprehensive document prepared by a team of experts, including foreign policy analysts and economists which will articulate the case for regional economic cooperation as a source of sustained and long-term growth and stability in Pakistan as well as neighbouring markets. The note will look at the political economy of regional connectivity and build the case for regional economic cooperation. Keeping in mind the North-South connectivity, the note will look at how Pakistan can play a leadership role in opening regional markets for peace and shared prosperity. The report will focus on the horizon scan of Pakistan's bilateral relations with neighbours in the context of dynamic regional and global geo-political shifts and will assess the impact of CPEC on Pakistan's economic growth and its potential for regional stability and economic cooperation. The ultimate objective of the report is to map out the way forward on aligning strategic reforms and to achieve sustained growth.

Dr. Rashid Memon
Department of Economics, MGSHSS
rashid.memon@lums.edu.pk
+924235608418

Profile Dr. Rashid's work focuses on the causes and consequences of ethnic and gender inequality in economic outcomes. He is also interested in the economic history of the Indian sub-continent with a particular focus on land tenure arrangements and peasant rebellions.

Selected Publications

- Majid, H., & Memon, R. (2016). Group Inequality and Regional Development: Evidence from Pakistan: Evidence From Pakistan (No. 151). World Institute For Development Economic Research (UNU-WIDER)
- Majid, H., & Memon, R. (2016). Group Inequality And Regional Development

Title: UNU-WIDER Project on Disadvantaged Groups and Social Mobility
PI: Dr. Rashid Memon
Co-PI: Dr. Hadia Majid
Sponsor: United Nations University (UNU)
Funding Amount: PKR 627,930
Project Initiated in: 2016
Duration: 8 Months
Category: Behavioural Studies
Description: This research project addresses the measurement of horizontal inequalities in developing countries. It focuses on inequalities among ethnic, racial, religious, and communal groups. This project is an integral part of a larger research effort on the politics of group-based inequalities, which considers causes, correlates, and possibilities for change. The project aims to build a comprehensive picture of variation in such group-based inequalities across countries.

Title: Stereotype Bias, Discrimination, and Performance
PI: Dr. Rashid Memon
Co-PI: Dr. Sheheryar Banuri
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,000
Project Initiated in: 2017
Duration: 12 Months
Category: Behavioural Studies
Description: This project aims to examine the relationship between stereotype bias and discrimination within organisations. The purpose is to uncover the mechanism that explains the persistence of gender discrimination in light of modern policies designed to combat it. The project measures the impact of stereotype bias on workers' willingness to cooperate with team members of the disadvantaged group and the willingness of managers to promote members of the disadvantaged group.

Title: Aligning Migration Management and the Migration-Development Nexus
PI: Dr. Rashid Memon
Co-PI: Dr. Furrukh A. Khan, Dr. Ahmad Yunas Samad
Sponsor: European Union (EU)
Funding Amount: PKR 25,037,369
Project Initiated in: 2018
Duration: 60 Months
Category: Development Management
Description: This research project is part of an effort to connect the literature on migration management with that on the migration-development nexus. This project will bring a better understanding of the determinants of migration, the two-way interaction between migration and development processes, and contribute to increasing the policy coherence and effectiveness in the EU's approach to managing migration. Teams from 8 European, African and South Asian countries will collect primary data and analyse migration streams from 10 countries.

Dr. Saher Asad
Department of Economics, MGSHSS
saher.asad@lums.edu.pk
+924235608000

Profile Dr. Saher Asad has been working as an Assistant Professor of Economics at the LUMS. She received her PhD in Economics from George Washington University in 2015. In her research, she collected novel data sets in Pakistan and utilised them to study the socio-economic impacts of modern information and communication technologies (ICTs) in Pakistan.

Selected Publications

- Asad, S., Gigler, B. S., Custer, S., Bailur, S., Dodds, E., Gagieva-Petrova, E. (2014). Closing the Feedback Loop: Can Technology Amplify Citizen Voices? Closing the Feedback Loop: Can Technology Bridge the Accountability Gap?, The World Bank, Chapter 8, pp. 211-273
- Asad, S., Kumar, M., Pandey, M. (2011). Infrastructural Constraints on Agricultural Productivity. Economic Challenges to Make South Asia Free from Poverty and Deprivation, Academic Foundation, Chapter 11
- Asad, S., Habib, M., Karachiwalla, N., Kosec, K. & Leaver, C. "Mechanisms for Increasing the Accountability of Teachers and Schools in Rural KP to Improve Learning Outcomes"
- Asad, S., Fishman, R. & Jain, M. "Energy Rationing, Water Scarcity, and Impacts on Labour Force Composition: Evidence from Gujarat's `Dark Zones'

Title: Improving Accountability in Pakistan's Schools
PI: Dr. Saher Asad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 968,800
Project Initiated in: 2017
Duration: 12 Months
Category: Education
Description: Pakistan has among the lowest learning levels globally. A major constraint is low teacher and head teacher effort. The government of Khyber Pakhtunkhwa (KP) has two accountability systems that should motivate teacher and head teacher effort. Teachers undergo annual teacher performance evaluations whereby scores are linked to promotions. Head teachers experience school inspections by district officers who report findings to higher-ups. In practice, neither system motivates effort. The purpose of this project is to reform both systems for primary schools. School inspections will be made regular, structured, and meaningful (i.e. measure outcomes known to be associated with student learning). Teacher performance evaluations will be carried out by an independent third party, cover the full academic year, and measure teaching specific outcomes. The aim of the research project is to improve teacher effort and student learning outcomes by uncovering how best to design public sector performance measurement and accountability schemes and disseminating these findings to stakeholders in Pakistan.

Dr. Syed Ali Hasanain
Department of Economics, MGSHSS
hasanain@lums.edu.pk
+924235608464

Profile Dr. Ali Hasanain is a 2014-2016 Oxford-Princeton Global Leaders Fellow, and an Assistant Professor of Economics at Lahore University of Management Sciences, as well as a member of EGAP. His recent research focuses on how Information and Communications Technology (ICT) can be applied in underdeveloped countries to improve governance and market outcomes. He has also studied how individuals' personal characteristics mediate the success of this process. Dr. Ali also serves on the Government of Punjab's Economic Advisory Committee. He received his PhD in Economics from George Mason University in 2010.

Selected Publications

- Callen, M., Gulzar, S., Hasanain, A., Khan, M. Y., Rezaee, A. (2018). Data and Policy Decisions: Experimental Evidence from Pakistan
- Hasanain, A., Khan, M. Y., Rezaee, A. (2017). No Bulls: Crowdsourcing Away Asymmetric Information In The Market For Artificial Insemination In Pakistan
- Bursztyn, L., Callen, M., Ferman, B., Gulzar, S., Hasanain, A., Yuchtman, N. (2016). Political Identity: Experimental Evidence On Anti-Americanism In Pakistan
- Callen, M., Gulzar, S., Hasanain, A., Khan, M. Y., Rezaee, A. (2015). Personalities and Public Sector Performance: Evidence from a Health Experiment in Pakistan

Title: The Effectiveness of Targeted Subsidy Provision in Pakistan
PI: Dr. Syed Ali Hasanain
Sponsor: Centre for Global Development
Funding Amount: PKR 3,161,250
Project Initiated in: 2017
Duration: 6 Months
Category: Economic Development
Description: Pakistan has a substantial experience of the use of targeted subsidies and transfers through a variety of programmes and for many purposes, including supporting displaced populations, post-disaster reconstruction and providing transfers to poor female-headed households. Unlike many other countries, it has capabilities in all three essential areas needed for such programmes to work effectively: Unique Identification - through the national ID provider NADRA; Targeting - the NSER, a nationwide survey at regular intervals; and Payments through the BISP programme. Using desk research methods (relying on the interpretation of existing documentation, especially third-party evaluations, and reviewing international experiences), the project will document the case for targeted subsidies using digital identification and payments, describe the inefficiencies of untargeted subsidies and to evaluate the potential basis for targeting.

Title: Pakistan at One Hundred Initiative
PI: Dr. Syed Ali Hasanain
Sponsor: World Bank
Funding Amount: PKR 27,576,617
Project Initiated in: 2018
Duration: 11 Months
Category: Economic Development
Description: Pakistan is undergoing rapid environmental and social challenges, unprecedented investments are being made in infrastructure, the population is growing and urbanising rapidly. The fundamental objective of this project is to engender more vibrant policy debate in the country on what the future should hold for Pakistan. The World Bank is developing studies on themes relevant to Pakistan's growth and development over the next 30 years. These themes include environmental sustainability, human development and labour productivity, inclusivity of growth, structural transformation, governance, regional connectivity and increasing investment. These studies will be compiled and published in a World Bank Report in Autumn of this year, and LUMS faculty are serving as external reviewers of this work.

Dr. Syed M. Hasan
Department of Economics, MGSHSS
syed.hasan@lums.edu.pk
+924235608463

Profile Dr. Syed Hasan is an Assistant Professor at the Department of Economics, LUMS. His research interests are diverse but primarily he focuses on sustainability and development. A review of research done by him shows a balance across crosscutting themes; improving productivity and hence comparative advantage of firms while also emphasising conservation of natural resources, such as water and estimating determinants of household carbon emissions. He has published in several high ranking international journals. Dr. Syed Hasan previously worked with the government as a civil servant. He is a Fulbright alumnus and has a PhD in Economics from the Ohio State University.

Selected Publications

- Hasan, S., Faggian, A., Klaiber, H. A., & Sheldon, I. (2016). Agglomeration economies or selection? An analysis of Taiwanese science parks. International Regional Science Review
- Klaiber, H. A., Gopalakrishnan, S., & Hasan, S. (2016). Missing the Forest for the Trees: Balancing Shale Exploration and Conservation Goals through Policy. Conservation Letters
- Hasan, S., & Sheldon, I. (2013). Credit Constraints, Technology Choice and Exports–A Firm Level Study for Latin American Countries (No. 182501). International Agricultural Trade Research Consortium

Title: Smart Urbanism in Lahore - Developing Real Time Optimal Solutions and Estimating Economic Cost of Congestion
PI: Dr. Syed M. Hasan
Co-PI: Dr. Suleman Shahid
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Economic Development
Description: The core focus of the project is to quantify the impact of traffic congestion in economic values and extrapolate figures to forecast future costs. Utilising the data repository of Punjab Safe Cities Authority (PSCA), this project will determine the cost imposed due to congestion, stemming from opportunity cost of wasted time, cost of fuel and social cost due to environmental degradation. The primary goal is to utilise this data for evaluation and policy planning aimed at developing smart, sustainable and resilient urbanism in Pakistan. The second part of the project will focus on creating an ICT based traffic management system. Utilising real time data, an optimising algorithm will be developed to increase the operational efficiency of road networks. The real time traffic information generated shall be provided through a commuter friendly mobile app and a traffic data analysis dashboard to be used by the system administrator, PSCA. Moreover, other non-price strategies shall be explored to target commuters and road users that cannot benefit from the ICT based solutions.

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Dr. Ali Khan
Department of Humanities & Social Sciences, MGSHSS
akhan@lums.edu.pk
+924235608060

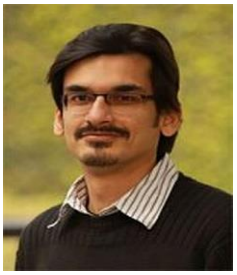
Profile Dr. Ali Khan is an Associate Professor of Anthropology and Department Chair at the Department of Humanities and Social Sciences at Lahore University of Management Sciences. He has an MPhil and a PhD in Social Anthropology from the University of Cambridge, England. Dr. Khan's research interests vary from labour issues, particularly child and bonded labour to popular culture in Pakistan focusing mainly on cinema and sports. Dr. Ali Khan's book 'Representing Children: Power, Policy and the Discourse on Child Labour in the Football Manufacturing Industry of Pakistan' was published in October 2007 by Oxford University Press. He is also the General Editor for a series of books on Sociology and Anthropology in Pakistan.

Selected Publications

- Khan, A. (2014). Pakistani Film Poster Art. Bioscope: South Asian Screen Studies, 5(2), 183-190
- Khan, A. Discourses on Childhood: Policy-making with regard to Child Labour in the Context of Competing Cultural and Economic Perceptions in History and Anthropology. 21(2), Taylor and Francis
- Khan, A. (2010). Peshgi without bondage: Reconsidering The Links between Debt and Bonded Labour. Cultural Dynamics, 22(3), 247-266

Title: Cricket in the Age of Late Capitalism: an Interdisciplinary Perspective from the Social Sciences
PI: Dr. Ali Khan
Co-PI: Dr. Ali Nobil Ahmad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Education
Description: This project proposes to study, research and analyse cricket as a social, political, cultural and commercial phenomenon in Pakistan and beyond. Although the project focuses on cricket in Pakistan, it studies our national game in comparative and transnational perspective – that is, in relation to connections and contrasts with neighbouring countries and societies. The project's projected output includes academic articles and chapters in peer reviewed journals; an edited book, and a short documentary. The project will contribute to the establishment of an interdisciplinary course of academic study at the Department of Humanities and Social Sciences.

Dr. Ali Raza
Department of Humanities & Social Sciences, MGSHSS
aliraza@lums.edu.pk
+9242335608092



Profile Dr. Ali Raza is an Assistant Professor of Economics at Lahore University of Management Sciences. He obtained a DPhil in Modern South Asian History from St. Antony's College, University of Oxford, England. His Thesis was based on Interrogating Provincial Politics: The Leftist Movement in Punjab. Prior to that, he graduated with a distinction in Masters in African/Asian History from the School of Oriental and African Studies, University of London, England and Bachelors of Science (Honours) with a major in Computer Science; minor in Social Sciences from LUMS. Prior to joining LUMS, he worked as a postdoctoral researcher at the Zentrum Moderner Orient in Berlin. His research interests include the histories of leftist internationalism and fascism in South Asia. He teaches courses related to colonialism, decolonisation, and modern South Asia.

Selected Publications

- Raza, A., Roy, F. (2015). Paramilitary Organisations in Interwar India. South Asia: Journal of South Asian Studies, 38(4), 671-689
- Raza, A. (2014). Separating the Wheat from the Chaff: Meerut and the Creation of Official Communism in India. Comparative Studies of South Asia, Africa, and the Middle East
- Raza, A. (2013). An Unfulfilled Dream: The Left in Pakistan ca. 1917-50. South Asian History and Culture, Vol.4 No. 4
- Raza, A. (2013). Looking towards Moscow: The Ghadar Party's Engagement with Communism. Ghadar Movement: Background, Ideology, Action and Legacies

Title: LUMS Digital Library: Digitizing Partition Testimonies
PI: Dr. Ali Raza
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 840,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: The fundamental objective of this project is to transcribe and digitise partition interviews collected by Professor Ishtiaq Ahmed during the course of his research on the Partition of Punjab. The ultimate objective is to launch an online portal for these testimonies by next year in time for the 70th anniversary of partition. This will also be the first initiative of LUMS in digital archives and the digital humanities in general.

Dr. Ali Usman Qasmi
Department of Humanities & Social Sciences, MGSHSS
ali.qasmi@lums.edu.pk
+924235602110

Profile Dr. Ali Usman Qasmi is an Assistant Professor (History) at MGSHSS since January 2012. He received his PhD from the South Asia Institute of Heidelberg University in March 2009. Before joining LUMS, he was a Newton Fellow for postdoctoral research at Royal Holloway College, University of London. He has published extensively in reputed academic journals, such as Modern Asian Studies, The Muslim World and The Oxford Journal of Islamic Studies. He has recently published a monograph titled, *Questioning the Authority of the Past: The Ahl al-Qur'an Movements in the Punjab* (Karachi: Oxford University Press, 2011). Besides these, he has co-edited a volume on Muhammad Iqbal titled, *Revisioning Iqbal as a Poet and Muslim Political Thinker* (Heidelberg: Draupadi, 2010; Karachi: Oxford University Press, 2011). Dr. Qasmi is also a visiting research fellow in History at the Royal Holloway College, University of London.

Selected Publications

- Qasmi, A. U. (2017). Identity formation through national calendar: holidays and commemorations in Pakistan. Nations and Nationalism
- Jones, J., Qasmi, A.U. Preface (2015) The Shi'a in Modern South Asia: Religion, History and Politics, pp. v-vi.
- Jones, J., & Qasmi, A. U. (Eds.). (2015). The Shi 'a in Modern South Asia: Religion, History and Politics. Cambridge University Press
- Qasmi, A. U. (2015). The Ahmadis and the Politics of Religious Exclusion in Pakistan. Anthem Press
- Ansari, S., Jones, J., & Qasmi, A. U. (2014). Special issue isna 'ashari and isma'ili shi'ism: From south Asia to the Indian Ocean. Journal of the Royal Asiatic Society, 24(3), 351

Title: Rhetoric and Politics: The Life and Ideas of Sayyid Ata Ullah Shah Bukhari (1892-1961)
PI: Dr. Ali Usman Qasmi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 800,000
Project Initiated in: 2016
Duration: 12 Months
Category: Arts and Heritage
Description: The proposed project is aimed at producing a well-researched biography of Sayyid Ata Ullah Shah Bukhari (1892-1961) which will also discuss the ideology of Majlis-i-Ahrar. This project seeks to fill the gap in the academic literature on colonial Punjab's history. The main objective is to trace the colonial origins of sectarian mobilisations among the Muslims of South Asia and its continuities/transformations during the postcolonial period. This project is discussing the politics and history of British Punjab during the interwar period using the prism of Bukhari's life story.

Dr. Amen Jaffer
Department of Humanities & Social Sciences, MGSHSS
amen.jaffer@lums.edu.pk
+924235608021

Profile Dr. Amen Jaffer is a sociologist trained in urban ethnography with a PhD in Sociology from the New School for Social Research. His teaching and research interests lie in the Sociology and Anthropology of religion, social interaction, urban communities and networks, difference and social control, social theory and the politics of space and infrastructure. He is currently working on two projects. One is a comparative ethnography of urban citizenship in low-income neighbourhoods of Lahore which looks at poor residents 'engagements with the infrastructures of their neighbourhoods as acts of creating political communities. In collectively constructing sewage drains or forcing the state to fix gas supply lines, to give two examples, residents actively create and shape not only space but also their relationships with each other and the Pakistani state. The other project is a book manuscript that explores the sociability of diverse communities in the space of Sufi shrines in South Asia. He argues that the unique experience of time in this religious institution allows for the emergence of a particular sociability that cuts across caste, religion, and to an extent, class divides in South Asian society. These shrines thus offer a unique model for relating to the other that in some ways goes beyond liberal tolerance.

Selected Publications

- Jaffer, A. (2018). A Drama of Saintly Devotion: Performing Ecstasy and Status at the Shaam-e-Qalandar Festival in Pakistan Theatre and Drama Review
- Jaffer, A. (2017). Spiritualizing Marginality: Sufi Concepts and the Politics of Identity in Pakistan. Society and Culture in South Asia 3 (2): 175 – 197
- Jaffer, A. (2017). The Politics of Infrastructure in Pakistan. Global Dialogue 7 (2): 15 – 16

Title: Urban Citizenship and the Politics of Infrastructure in Lahore
PI: Dr. Amen Jaffer
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 980,000
Project Initiated in: 2017
Duration: 12 Months
Category: Social Sciences
Description: The objective of this research project is to challenge conventional understandings of politics from four different perspectives. First, it challenges the premise that the political community that defines citizenship only exists at the national scale. By exploring city-level forms of political belonging, it seeks to demonstrate the multiple scales on which citizenship operates. Second, this research also aims to critically assess the democratic potential of this urban citizenship for socially and economically marginalised communities. It investigates the possibilities for such communities to access resources and influence decision-making as urban citizens as well as the costs and limitations of such politics. Third, it focuses attention on the infrastructure as a key site for politics in contemporary Pakistan. Finally this research project seeks to highlight the importance of everyday life and social institutions as sites of politics. It thus aims to shift attention away from electoral politics to demonstrate that other realms are also critical for understanding the workings of politics in urban Pakistan.

Dr. Anushay Malik
Department of Humanities & Social Sciences, MGSHSS
anushay@lums.edu.pk
+924235602227

Profile Dr. Anushay received her PhD from the School of Oriental and African Studies, University of London in 2013. She received the Bachelor of Science in 2008 from Lahore University of Management Sciences (LUMS) and complete her Masters with a distinction in 2009 from School of Oriental and African Studies, University of London. Since 2013, she is serving LUMS as an Assistant Professor. Her areas of interest include Histories of Work, Violence and Conflict in the Post-colonial state in South Asia and Pakistan Studies.

Selected Publications

- Malik, A. Alternative Politics And Dominant Narratives: Communists And The Pakistani State In The 1950s, South Asian History And Culture,(4:4): 520-537
- Malik, A. (2014). Nationalist Articulations in Pakistan and Bangladesh, 1947 – 1971. Brown Bag Series, Department of Economics, Lahore University of Management Sciences
- Malik, A. (2015). From Subjects to Citizens: Society and Everyday State in India and Pakistan, 1947-1970

Title: The Many Stories of Youhanabad's Christian Minorities
PI: Dr. Anushay Malik
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 960,000
Project Initiated in: 2017
Duration: 12 Months
Category: Behavioural Studies
Description: In recent years, Christians in Pakistan have been given a lot of media attention that has focused on their status as a minority community. This project aims to explore how Christians have engaged with what it means to be a citizen within the Pakistani nation state. This project will focus on the residents of Youhanabad and will combine oral history and primary documents gathered from case law, newspapers, the records of Churches and Christian Organisations (such as the Salvation Army and the Jesuit archives in Loyola Hall) that have worked in the area.

Dr. Basit Bilal Koshul
Department of Humanities & Social Sciences, MGSHSS
basitb@lums.edu.pk
+924235608104

Profile Dr. Basit Koshul received his first PhD in 2003 from Drew University, specialising in the sociology of religion. He joined the School of Humanities, Social Sciences and Law at LUMS in 2006. His areas of interests include the relationship between religion and modernity, philosophy of science, philosophy of religion, the sociology of culture and the contemporary Islam-West encounter. He is especially interested in integrating the ideas of Muhammad Iqbal, Charles Peirce and Max Weber. He has a number of publications to his credit, including a book titled The Postmodern Significance of Max Weber's Legacy: Disenchanting Disenchantment (Palgrave, 2005). He has co-edited a collection of essays titled Scripture, Reason and the Contemporary Islam-West Encounter: Studying the Other, Understanding the Self (Palgrave, 2007). He has also co-edited a collection of essays titled Muhammad Iqbal: A Contemporary (Iqbal Academy, 2010). He completed his second PhD in 2011 from the University of Virginia. The title of his dissertation was Max Weber, Charles Peirce and the Integration of the Nature and Geisteswissenschaftern. The dissertation begins with an integration of Max Weber's methodology of the social sciences and the philosophy of Charles Sanders Perice. It goes on to show that the conversation between Weber and Peirce opens up the possibility of the conceptual integration of science, philosophy and religion.

Selected Publications

- Hillier, H.C., Koshul, B.B. Preface (2015) Muhammad Iqbal: Essays on the Reconstruction of Modern Muslim Thought, pp. vii-xii
- Hillier, H. C., & Koshul, B. B. (Eds.). (2015). Muhammad Iqbal: Essays on the Reconstruction of Modern Muslim Thought. Edinburgh University Press
- Koshul, B. B. (2015). The Contemporary Relevance of Muhammad Iqbal. [Book Chapter]. Muhammad Iqbal: Essays On The Reconstruction Of Modern Muslim Thought, 56-87
- Akhtar, J., Koshul, B. B., & Awais, M. M. (2013). A Framework for Evolutionary Algorithms Based On Charles Sanders Peirce's Evolutionary Semiotics. Information Sciences, 236, 93-108
- Akhtar, J., Awais, M. M., & Koshul, B. B. (2013). An Evolutionary Algorithm Derived from Charles Sanders Peirce's Theory of Universal Evolution. Paper Presented At The GECCO 2013 - Proceedings Of The 2013 Genetic And Evolutionary Computation Conference Companion
- Akhtar, J., Awais, M. M., & Koshul, B. B. (2013). Putting Peirce's Theory to the Test: Peircean Evolutionary Algorithms. Transactions Of The Charles S Peirce Society, 49(2), 203-237

Title: Reviving Islamic Philosophy
PI: Dr. Basit Bilal Koshul
Sponsor: University of Edinburgh
Funding Amount: PKR 336,963
Project Initiated in: 2018
Duration: 5 Months
Category: Arts and Heritage
Description: The primary objective of this project is to scope the important and fruitful areas of Islamic philosophy within the western academy, bring together a worldwide network of scholars and map out trajectories for future collaboration and research. Under this project, Muslim and non-muslin scholars from around the world will be presenting a short paper in their own area of research with the current philosophical questions that they feel are most important to Islamic thought today. The conference aims to bring together leading Muslim and non-Muslim scholars in the field of Islamic philosophy. The primary aim is to begin a conversation on the current state of Islamic philosophy in the academy and explore new trends emerging in Islamic philosophical thought. In line with the aims of John Templeton Foundation, this project intends to explore ways in which the rich Islamic philosophical tradition can be brought out from the academy and impact the lived realities of contemporary Muslim societies.

Dr. Hassan Javid
Department of Humanities and Social Sciences, MGSHSS
hassan.javid@lums.edu.pk
+924235602118

Profile Dr. Hassan Javid is an Assistant Professor of Sociology in the Mushtaq Gurmani School of Humanities and Social Sciences. His research focuses on the legacies of colonialism in South Asia, path dependence and institutional development, and the relationship between class, state, and democratization in Pakistan.

Selected Publications

- Javid, H. (2011). Class, Power and Patronage: Landowners and Politics in Punjab. History and Anthropology, Vol. 22, No. 3, pp. 337-369
- Javid, H. (2015). Path Dependence and the Persistence of Landed Power in the Punjab. Roger Long, Ian Talbot, Gurharpal Singh, and Yunus Samad (eds.) Beyond Islam and Security: State and Nation-Building in Pakistan, London: Routledge, pp. 35-59
- Javid, H. (2018). Land and Power: The Politics of Space in Punjab's Canal Colonies. International Journal of South Asian Studies, Vol. 9
- Javid, H. (2019, forthcoming). The Politics of Patronage in Pakistan. Matthew McCartney and S Akbar Zaidi (eds.) New Perspectives on Pakistan's Political Economy: State, Class, and Social Change, Cambridge: Cambridge University Press
- Javid, H., Mufti, M. (2019, forthcoming). Candidate-Party Linkages: Why do Candidates Stick with Losing Parties? Mariam Mufti, Sahar Shafqat, and Niloufer Siddiqui (eds.) Political Parties in Pakistan, Washington DC: Gerogetown University Press

Title: Governance, Masculinity and Radicalization: Attitudes to Violence
PI: Dr. Hassan Javid
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 976,000
Project Initiated in: 2018
Duration: 12 Months
Category: Behavioural Sciences
Description: This project investigates the sociological basis for violence by researching the attitudes young people have to violence prior to joining or participating in any organised violent activity. A pilot study was conducted in localities not known for violence, revealing surprisingly high support for the use of force among young men, which was indicative of how the broader support for, and potential engagement in, violent activity is often underestimated. The proposed study will further explore, and validate or disprove, the pilot's findings by investigating attitudes to violence in young people, both men and women. It is hypothesized that poor governance and the lack of a social contract between the state and citizens provides the context for violent attitudes among young people, with the demand for justice resulting in a search for alternative dispute resolution strategies. Building on the pilot study, the proposed study will also examine the extent to which the prevalence of sectarian attitudes facilitates religious extremism and can serve as a means through which to radicalise young people. It will also probe the correlation that appears to exist between violence in the public sphere between men and violence in the private sphere against women. By unpacking precisely how attitudes to violence are shaped by broader societal processes in Pakistan, this project aims to contribute to understanding the root causes of violence and the ways in which it can be curtailed.

Dr. Nadhra Shahbaz Naeem Khan
Department of Humanities and Social Sciences, MGSHSS
nadhra.shahbaz@lums.edu.pk
+924235602277

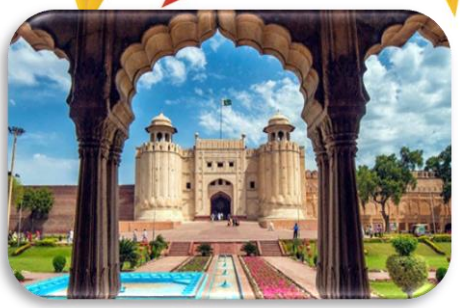
Profile Dr. Nadhra Shahbaz Naeem Khan's primary area of research and interest is 19th Century Sikh Art and Architectural Ornament in the Punjab, but she also focuses on Mughal Art and Architecture (16th to 18th century). Her work emphasises the significance of the Sikh period as the last episode of century's old indigenous art and architectural tradition before annexation of the Punjab by the British in 1849 that changed, among other things, the visual culture of the Punjab forever. A research project that started with one Sikh funerary monument or samadhi built to honour Maharaja Ranjit Singh has led her to study almost all major monuments dateable to this period, including the Golden Temple Amritsar, Sikh period havelis and various other samadhis. Her current research includes the impact of Sikh architectural vocabulary on subsequent British Raj architecture in the Punjab and the deep impact of British art and craft education on traditional art and craft practices.

Selected Publications

- Khan, N. S. N. (2012). Posthumous Homage Paid to Maharaja Ranjit Singh. Jamal: A Journal of Aesthetics, Vol. 1, No. 1. 65-74
- Khan, N. S. N. (2011). Carved Doors of the Gateway to Maharaja Ranjit Singh Samadhi. Sikh Arts & Heritage, Sikh Arts Forum
- Khan, N. S. N. (2010). Frescoes at Maharaja Ranjit Singh's Samadhi Vol. 61, No. 4. 72-85
- Khan, N. S. N. (2013). The Secular Sikh Maharaja and his Muslim Wife: Rani Gul Bahar Begum in Indian Painting: Themes, Histories, Interpretations. Essays in Honour of B. N. Goswamy. 247-254.

Title: Documentation, Presentation and Promotion of Picture Wall, Lahore Fort
PI: Dr. Nadhra Shahbaz Naeem Khan
Sponsor: Aga Khan Cultural Service - Pakistan (AKCS-P)
Funding Amount: PKR 700,000
Project Initiated in: 2016
Duration: 2 Months
Category: Arts and Heritage
Description: The consultancy services shall meet the following requirements; Photographic documentation of the northern part of the picture wall not included in AKCSP's current documentation work, Inventorying of all panels and, if necessary, establishing a panel nomenclature system which will supplement AKTC identifiers of each panel in its respective section of the picture wall. For this purpose, Dr. Nadhra will establish a Classification of decorative elements and themes assigning a title to each individual motif and theme Building up an archive of published and other data on the Picture Wall and translate any epigraphy on the picture wall and its associate architectural elements such as the Hati Pol gate, and of other relevant texts into English, relating them with other epigraphic material and historic references from the Lahore Fort and elsewhere.

Title: Digital Documentation of Lahore Fort
PI: Dr. Nadhra Shahbaz Naeem Khan
Sponsor: Aga Khan Cultural Service - Pakistan (AKCS-P)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 5 Months
Category: Arts and Heritage
Description: The main objective of this project is the detailed iconographic analysis of the northern section of the PW creating an interpretive document containing the interpretation and analysis of iconography found on the monument. Relating them with other epigraphic material and historic references from the Lahore Fort and elsewhere as well as describing possible symbolical, political, cultural or any other significance.



Title: Master Plan for the Lahore Fort World Heritage Site and its Buffer Zone
PI: Dr. Nadhra Shahbaz Naeem Khan
Sponsor: Aga Khan Cultural Service - Pakistan (AKCS-P)
Funding Amount: PKR 350,000
Project Initiated in: 2018
Duration: 5 Months
Category: Arts and Heritage
Description: The main objective of this project is to provide editorial review and critique to the historical description of Lahore and Lahore Fort that will be prepared by other members of the planning team as part of the Lahore Fort Master Plan. It entails providing guidance to AKCS-P personnel and consultants undertaking archival research on the history of the Lahore Fort in the archives of the Department of Archaeology, the old archives of the Archaeological Survey of India in the Lahore Fort, and/or in the Archives of the Government of Punjab. It also involves providing additional historical materials, historical references and quotes from historical references to be included in the sections of the Master Plan pertaining to the history of Lahore and the Lahore Fort.

Dr. Nida Yasmeen Kirmani
Department of Humanities and Social Sciences, MGSHSS
nida.kirmani@lums.edu.pk
+924235608109

Profile Dr. Nida Kirmani completed her PhD in Sociology in 2007 from the University of Manchester. Since then, she has been working as a Research Fellow with the Religions and Development Research Programme at the University of Birmingham. Dr. Nida is working as an Associate Professor of Sociology at LUMS. She is also the Faculty Director of the Saida Waheed Gender Initiative. Dr. Kirmani has published widely on issues related to women's movements, Islam, urban marginality and violence.

Selected Publications

- Kirmani, N. (2018) 'Earning As Empowerment?: The Relationship Between Paid Work And Domestic Violence In Lyari, Karachi,' In Rethinking New Womanhood: Practices Of Gender, Class, Culture And Religion In South Asia, Nazia Hussein (Ed.), London: Palgrave
- Kirmani, N. (2017). "Resistance and Its Limits Protesting Urban Violence in Lyari, Karachi." Economic And Political Weekly 52(7)
- Kirmani, N. (2017) Life In A 'No-Go Area': Experiences Of Marginalisation And Fear In Lyari,' In Publics And Counter-Publics Of Violence In Karachi, Nichola Khan (Ed.), London: Hurst, 2017
- Kirmani, N. (2015). Religion, Gender and Development in South Asia. [Book Chapter]. The Routledge Handbook Of Religions And Global Development, 215-230
- Kirmani, N. (2015). Fear and the City. Journal Of The Economic And Social History Of The Orient, 58(5), 732-755
- Kirmani, N. (2013) Questioning 'The Muslim Woman': Space, Identity And Insecurity In An Urban Locality, Routledge, India

Title: Gendering Urban Violence: Marginalization, Conflict and Resistance in Lyari, Karachi
PI: Dr. Nida Yasmeen Kirmani
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 650,000
Project Initiated in: 2017
Duration: 12 Months
Category: Social Sciences
Description: The proposed project examines the experiences of multiple forms of violence amongst the marginalised citizens of Lyari, which is one of the oldest settlements in Karachi, Pakistan. This multi-ethnic, densely populated, largely working class area has been the site of on-going conflict between rival gangs, political parties and state security forces for the past two decades. The research demonstrates the ways in which various forms of violence including political, criminal, ethnic, and institutional violence are gendered, analysing how women and men are affected by, negotiate, participate in and resist violence differently in the context of their everyday lives. This project will explore in greater depth the experiences of residents vis-a-vis the gangs and the experiences of economic marginality by the area's residents. Research on Lyari lies at the intersection between urban sociology, anthropology and gender studies and makes a critical intervention into the literature on gender and conflict in postcolonial cities.

Dr. Rasul Bakhsh Rais
Department of Humanities and Social Sciences, MGSHSS
rasul@lums.edu.pk
+924235608107

Profile Dr. Rasul Bakhsh Rais is Professor of Political Science in the Department of Humanities and Social Sciences, LUMS, Lahore since 2002. He took time off from LUMS and served at the Institute of Strategic Studies, Islamabad from August 2013 to December 2014. Dr. Rais has PhD in Political Science from University of California, Santa Barbara. Before joining LUMS, he remained associated with the Quaid-i-Azam University, Islamabad for nearly 22 years as Professor/Director, Area Study Centre and prior to that as Associate Professor in the Department of International Relations. He was Quaid-i-Azam distinguished Professor of Pakistan Studies at Columbia University, New York for 3 years, 1991-94. He is author of Recovering the Frontier State: War, Ethnicity and State in Afghanistan (Lanham: Lexington Books, 2008), War Without Winners: Afghanistan's Uncertain Transition after the Cold War(Karachi: Oxford University Press, 1996), Indian Ocean and the Superpowers: Economic, Political and Strategic Perspectives (London: Croom Helm, 1986), editor of State, Society and Democratic Change in Pakistan (Karachi: Oxford University Press, 1997) and with Charles H. Kennedy, Pakistan 1995 (Boulder: Westview Press, 1996). He has published widely in professional journals on political and security issues pertaining to South Asia, Indian Ocean and Afghanistan.

Selected Publications

- Rais, R. B. (2017). Geopolitics on the Pakistan–Afghanistan Borderland: An Overview of Different Historical Phases. Geopolitics, 1-24
- Rais, R. B. (2016). Social Drivers Of Democratic Change Pakistan's Democratic Transition: Change And Persistence (Pp. 95-109)
- Rais, R. B. (2015). Pakistan's Strategic Culture and Deterrence Stability on the Subcontinent. Deterrence Instability, Pp. 95
- Rais, R. B. (2011). Religious Extremism and Terrorism in Pakistan: Challenges for National Security. In South Asia: Beyond The Global Financial Crisis (Pp. 117-139)

Title: Junior Fellowship in Peace and Conflict Studies
PI: Dr. Rasul Bakhsh Rais
Sponsor: United States Institute of Peace (USIP)
Funding Amount: PKR 4,310,188
Project Initiated in: 2016
Duration: 12 Months
Category: Education
Description: The aim of the fellowship is to groom and train young scholars in the field of Peace and Conflict Studies and promote innovative, empirical research and fresh approaches to the study of conflicts and peace building. The Department of Humanities and Social Sciences at LUMS will invite research proposals in the fields of new approaches to Peace and Conflict in Pakistan, Contemporary Conflicts in Pakistan, Peace Building and Conflict Resolution.

Title: Conflict in Baluchistan: Actors, Motives and Violence
PI: Dr. Rasul Bakhsh Rais
Sponsor: GST LLP
Funding Amount: PKR 4,785,532
Project Initiated in: 2017
Duration: 6 Months
Category: Social Sciences
Description: The fundamental objective of this project is to write a proposal and provide an expert opinion on the security situation in the province of Baluchistan from the perspective of the realities of the social, cultural, and political norms present in the province.

Dr. Taimur Rahman
Department of Humanities & Social Sciences, MGSHSS
taimur@lums.edu.pk
+924235608310

Profile Dr. Taimur received his doctorate from School of Oriental and African Studies, University of London, United Kingdom in 2010. He completed his masters in international relations from University of Sussex, Brighton, and United Kingdom in 2002. Dr. Taimur Rahman has been teaching political science at LUMS since 2002. He is also the spokesperson for the band Laal and a grassroots political activist. His research interests include Political theory and philosophy, political economy and class, socio-political history and structures of Pakistan, Marxism and critical theory, and 20th century left politics.

Selected Publications

- Rahman, T. (2016). Mazdoor Kissan Party. Economic and Political Weekly (EPW) , Sameekhsha Trust Publications , pp. 22-24
- Rahman, T. (2016). An Unequal World. Big Questions of our Time: The World Speaks , Strategic Foresight Group , pp. 63
- Rahman, T. (2015). Internet Youth and Education in Pakistan: An Appraisal and a Plan for the Future. National Human Development Report, 2015 , UNDP, Pakistan
- Rahman, T. (2015) "The Democratic State and the Labour Movement" in Democratic Governance and Politics of the Left in South Asia, Aakar Books Delhi
- Rahman, T. (2015) "Review: The Army and Democracy: Military Politics in Pakistan. By Aqil Shah", Pacific Affairs, University of British Columbia, Vancouver

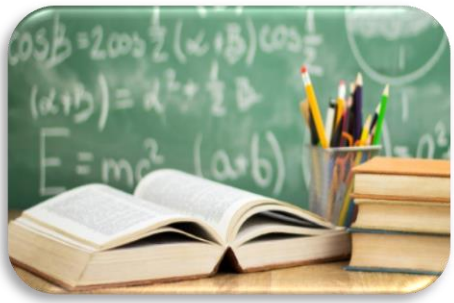
Title: Peer to Peer (P2P): Challenging Extremism
PI: Dr. Taimur Rahman
Sponsor: EdVenture Partners
Funding Amount: PKR 470,250
Project Initiated in: 2016
Duration: 8 Months
Category: Education
Description: The project was called PEACE which stood to promote Education and Counter Extremism. A team of students entered into a world-wide student competition to design a campaign that would be online as well as on the grassroots level to create tolerance amongst the members of their community. As part of PEACE campaign the students of LUMS visited nearly 30 schools where they conducted various workshops and activities that encouraged religious and communal harmony amongst young people. They reported their activities on their online Facebook page. The campaign was a very big success and the Peer 2 Peer judges gave it an honourable mention amongst the various competitors from all over the world.

Dr. Tania Saeed
Department of Humanities & Social Sciences, MGSHSS
tania.saeed@lums.edu.pk
+924235608117

Profile Dr. Tania Saeed obtained her DPhil in Education from the University of Oxford, UK and MSc in Gender, Development and Globalization from the London School of Economics and Political Science in 2013 and 2006, respectively. She has worked as an Equity and Social Inclusion Advisor for DFID's Punjab Education Sector Programme (PESP)-II, focusing on planning interventions to improve access to quality education for out of school children belonging to the most marginalized communities in Punjab. She has also worked on education and intolerance as part of a University of Oxford and Centre on Religion and Geopolitics project, studying teacher attitude and biases in government schools in Lahore and on monitoring and evaluating teacher education policy in India (Madhya Pradesh, Uttar Pradesh and Bihar). Dr. Saeed completed her Bachelor's degree in Social Sciences from LUMS in 2005. She is an Associate Fellow at the Institute of Development and Economic Alternatives (IDEAS).

Selected Publications

- Saeed T. (2018) Islamophobia in Higher Education: Muslim Students and the "Duty of Care". In J. Arday and H. S. Mirza, (Eds.) Dismantling Race in Higher Education. Racism, Whiteness and Decolonising the Academy. UK: Palgrave Macmillan
- Saeed T. (2017) Education and Disengagement: Extremism and the Perception of Muslim Students. In F. Panjwani, L. Revell, R. Gholami and M. Diboll (Eds.) Extremisms: Rethinking Liberal Pedagogies in the Contemporary World. UK: Routledge
- Saeed T. (2017) Muslim Narratives of Schooling in Britain: From "Paki" To the "Would-Be Terrorist". In M.M. Ghaill, and C. Haywood (Eds.) Education, Neo-Liberalism and Muslim Students: Schooling a 'Suspect Community'. UK: Palgrave Macmillan
- Saeed T. And Johnson D. (2016) Intelligence, Global Terrorism and Higher Education: Neutralising Threats or Alienating Allies? British Journal Of Educational Studies, 64(1), Pp.37-51
- Saeed, T. (2016) Islamophobia and Securitization. Religion, Ethnicity and the Female Voice. UK: Palgrave Macmillan
- Brown. K.E. And Saeed T. (2015) Radicalisation and Counter-Radicalisation at British Universities: Encounters and Alternatives. Ethnic And Racial Studies, Vol. 38 (11), Pp. 1952-68



Title: Higher Education and the Neo liberal economy: Examining Education Quality and the University Ranking Framework in Pakistan
PI: Dr. Tania Saeed
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 661,000
Project Initiated in: 2017
Duration: 12 Months
Category: Education
Description: The proposed study investigates the link between higher education ranking systems and neoliberal market forces in Pakistan by focusing on the Higher Education Commission's (HEC) university ranking. The aim of the study is to understand how the ranking system works in Pakistan and to propose recommendations to either improve the ranking system or provide an alternative. This research study examines the HEC's university ranking system and its impact on 5 universities in Pakistan. The HEC's ranking system aims to improve quality, while competing in the international market in order to encourage Pakistani universities to become "world-class."

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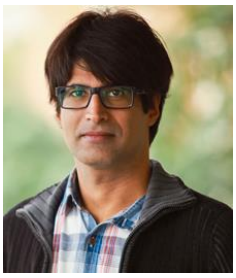
Syed Babar Ali School of Science and Engineering (SBASSE)

DEPARTMENT OF BIOLOGY

Dr. Ahmed Jawaad Afzal
Department of Biology, SBASSE
ahmed.afzal@lums.edu.pk
+924235608354



Profile Dr. Ahmed Jawaad is an Associate Professor at the Department of Biology in SBASSE. Plants employ multiple layers of immunity to guard against infection. His current work focuses on understanding the role of the multifunctional protein RIN4, which regulates both branches of the plant immune system. His current work focuses on understanding the role of the multifunctional protein RIN4, which regulates both branches of the plant immune system. The first layer responds to structures within conserved microbial molecules. The second layer responds to effector proteins, which are pathogen-encoded virulence factors. These two "branches" of the immune system synergize to provide robust host defence that halts most infections.

Selected Publications

- Rai, M. I., Alam, M., Lightfoot, D. A., Gurha, P., & Afzal, A. J. (2018). Classification and Experimental Identification of Plant Long Non-Coding RNAs. Genomics
- Espada, J. (2016). Current Methods to Unravel ROS Biology. Methods (San Diego, Calif.), 109,1
- Iqbal, M. J., Majeed, M., Humayun, M., Lightfoot, D. A., & Afzal, A. J. (2016). Proteomic Profiling and the Predicted Interactome of Host Proteins in Compatible and Incompatible Interactions between Soybean and Fusarium Virguliforme. Applied Biochemistry And Biotechnology, 1-18
- Ahmad, M., Chaudhary, S. U., Afzal, A. J., & Tariq, M. (2015). Starvation-Induced Dietary Behaviour in Drosophila Melanogaster Larvae and Adults. Scientific Reports
- Afzal, A. J., Kim, J. H., & Mackey, D. (2013). The Role of NOI-Domain Containing Proteins in Plant Immune Signalling. BMC Genomics, 14(1), 327

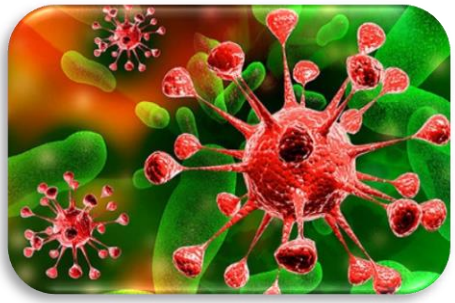
Title: Understanding Elicitor Specificity of RPM1 and RPS2 by the Generation of Protein Chimeras
PI: Dr. Ahmed Jawaad Afzal
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: The main objective of this project is to investigate the underlying molecular mechanisms by which RPM1 and RPS2 are able to specifically respond to AvrRpm1 and AvrRpt2, two distinct elicitors introduced by Pseudomonas syringae. This project will lead to the development of pathogen-resistant varieties of agronomically important crops via the incorporation of durable "R genes" that may eventually reduce plant morbidity, yield loss, food shortage and malnutrition. The long-term objective is to enhance the understanding of disease resistance (R) proteins in plants so that the functioning of the plant immune system can be better understood.

Dr. Amir Faisal
Department of Biology, SBASSE
amir.faisal@lums.edu.pk
+924235608453

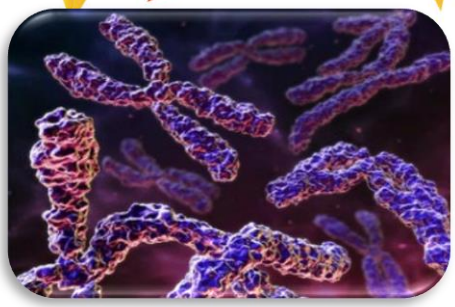
Profile Dr. Amir Faisal received his PhD in Cell Biology from Friedrich Miescher Institute for Biomedical Research/University of Basel, Switzerland in 2004. During his PhD he identified novel roles for SHC protein, an important adaptor downstream of tyrosine kinases, in insulin signalling and cytoskeletal reorganization. He received his first postdoctoral training (2004-2008) in Protein Phosphorylation Laboratory at London Research Institute where he discovered that another adaptor protein, MyD88, couples Protein Kinase C epsilon to Toll like receptors during innate immunity. From 2008 to 2014, he worked at Cancer Therapeutics Unit of Institute of Cancer Research in Sutton first as postdoctoral fellow and later as senior scientist. He played an important role in progression of several drug discovery projects, one of which resulted in discovery of a pre-clinical development candidate that will undergo phase I clinical trials in 2016. After joining LUMS in August 2014, he has been establishing a cancer therapeutics lab at SBASSE.

Selected Publications

- Gurden, M. D., Anderhub, S. J., Faisal, A., & Linardopoulos, S. (2018). Aurora B Prevents Premature Removal Of Spindle Assembly Checkpoint Proteins From The Kinetochore: A Key Role For Aurora B In Mitosis. Oncotarget, 9(28), 19525
- Shah, O. S., Chaudhary, M. F. A., Awan, H. A., Fatima, F., Arshad, Z., Amina, B., & Faisal, A. (2018). ATLANTIS-Attractor Landscape Analysis Toolbox for Cell Fate Discovery and Reprogramming. Scientific Reports, 8(1), 3554
- Manzoor, S., Bilal, A., Khan, S., Ullah, R., Iftikhar, S., Emwas, A. H., & Faisal, A. (2018). Identification and Characterization of SSE15206, A Microtubule Depolymerizing Agent That Overcomes Multidrug Resistance. Scientific Reports, 8(1), 3305
- ARANY, I., HALL, S., FAISAL, A., & DIXIT, M. (2017). Nicotine Exposure Augments Renal Toxicity of 5-Aza-Cytidine through P66shc: Prevention by Resveratrol. Anticancer Research, 37(8), 4075-4079
- Iftikhar, S., Khan, S., Bilal, A., Manzoor, S., Abdullah, M., Emwas, A. H., & Saleem, R. S. Z. (2017). Synthesis and Evaluation of Modified Chalcone Based P53 Stabilizing Agents. Bioorganic & Medicinal Chemistry Letters, 27(17), 4101-4106
- Faisal, A., Mak, G. W., Gurden, M. D., Xavier, C. P., Anderhub, S. J., Innocenti, P., ... & Brandon, A. K. D. H. (2017). Characterisation Of CCT271850, A Selective, Oral And Potent MPS1 Inhibitor, Used To Directly Measure In Vivo MPS1 Inhibition Vs Therapeutic Efficacy. British Journal Of Cancer
- Riaz, M., Bilal, A., Ali, M. S., Fatima, I., Faisal, A., Sherkheli, M. A., & Asghar, A. (2016). Natural Products from Cuscuta Reflexa Roxb with Antiproliferation Activities in HCT116 Colorectal Cell Lines. Natural Product Research, 1-5

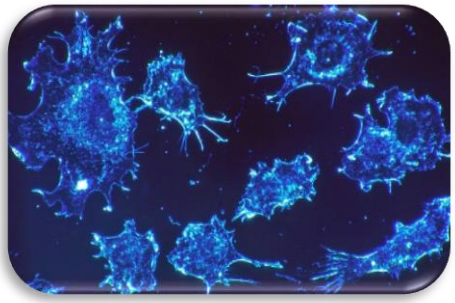


Title: Cellular Characterization of Aurora - A Kinase Inhibitors for Cancer Therapeutics and Identification of Resistance Mechanisms
PI: Dr. Amir Faisal
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: The project aims to characterise Aurora A kinase selective inhibitors (co-discovered by PI at the Institute of Cancer Research, UK) in cancer cell lines. This will include studying the effect of inhibitors on activation of Aurora A kinase and its substrate(s) in the cells and consequences of this inhibition in the form of Aurora A specific phenotypes. This research project will also screen a number of cancer cell lines for their "sensitivity" towards these inhibitors in order to determine whether these inhibitors can potently kill or stop the growth of cancer cell lines derived from different tissues.



Title: Pre-Clinical Identification and Evaluation of Novel Therapeutic Strategies for Targeting Oral Cancer in Pakistan; Molecular Profiling Based Personalized Approach
PI: Dr. Amir Faisal
Co-PI: Dr. Saira Saleem - Shaukat Khanum Memorial Cancer Hospital and Research Centre
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 4,599,998
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences

Description: The purpose of proposed study is to characterise oral cancers from the local population and investigate various targeted drugs (alone or in combination) for their treatment for the first time in Pakistan. Successful completion of the project will propose new therapeutic strategies to be tested in the clinic for treatment of oral cancer in Pakistan. This project will lead to identification of new targeted drugs that show in vitro efficacy in oral cancer cells of South Asian and Pakistani origin. The new therapeutic strategies identified in this study could be further evaluated by clinicians for treatment of advanced metastatic oral cancers. If successful in clinic, these would have impact on the patient survival and their quality of life.



Title: Discovery and Characterization of In-House Microtubule Targeting Compounds as Potent Anti-Cancer Agents that can Overcome Multidrug Resistance
PI: Dr. Amir Faisal
Co-PI: Dr. Rahman Shah Zaib Saleem
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences

Description: Cancer is caused by the uncontrolled division and spread of abnormal cells; it is responsible for over 8 million deaths worldwide each year making it the 2nd leading cause of deaths after coronary heart disease. As a result of collaborative effort between chemistry and biology departments at LUMS, a series of novel compounds (synthesized at LUMS) that potently inhibit proliferation of cancer cells have been identified. The main objective of this project is to validate microtubules as their targets in vitro and in cells, and further characterise them in various cancer cell lines including multidrug resistant (MDR) ovarian cell line. The proposed project would, therefore, result in discovery and characterisation of a novel microtubule-targeting drug that can overcome resistance to chemotherapy.

Title: Development of Biochemical Assays for Lead Optimisation and Compound Library Screening
PI: Dr. Amir Faisal
Co-PI: Dr. Rahman Shah Zaib Saleem
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Health

Description: The main objective of this project is development of an ELISA-based biochemical assay for p53-MDM2 interaction in 96 well plate format. This will involve expression and purification of p53 and MDM2 proteins in bacteria, and optimisation of the assay. This assay will be validated using Nutlin-3a, a known inhibitor of p53-MDM2 interaction. The project will focus on establishment of microtubule polymerisation assay. It will involve purification of tubulin from bovine brain and optimisation of the protocol for the polymerisation of microtubules. The assay validation will be done by paclitaxel and nocodazole that increase polymerisation and depolymerisation of microtubules, respectively. This project further aims at the development of ELISA-based Aurora A kinase assay. This will involve purification of Aurora A kinase domain and TACC3 in bacteria followed by optimisation of the protocol for colorimetric or dot-blot based assay in 96 well format.

Dr. Aziz Mithani
Department of Biology, SBASSE
aziz.mithani@lums.edu.pk
+924235608397

Profile Dr. Aziz Mithani started as a computer scientist and received his Master's in Computer Sciences from FAST-NU, Karachi before going to the University of Cambridge, UK where he did MPhil in Computational Biology. In summer 2006, he went to Harvard Medical School for a research internship in Paulsson Lab at Department of Systems Biology. Dr. Mithani received his DPhil in Statistics (Computational Biology) from University of Oxford, UK in November 2009 under the supervision of Prof. Jotun Hein and Dr. Gail Preston. His dissertation focused on modelling the evolution and analysis of the properties of metabolic networks. Subsequently, Dr. Mithani joined Harberd Lab at the Department of Plant Sciences, University of Oxford, UK as a postdoctoral research associate where he worked for two years on the evolution of bread wheat. His research interests include the application of computational and mathematical methods in the area of modern biology. Specifically, he is interested in the development of computational tools and techniques to model and analyse biological systems and to investigate how different organisms evolve over time.

Selected Publications

- Belfield, E. J., Ding, Z. J., Jamieson, F. J., Visscher, A. M., Zheng, S. J., Mithani, A., & Harberd, N. P. (2018). DNA Mismatch Repair Preferentially Protects Genes from Mutation. Genome Research, 28(1), 66-74
- Fones, H. N., McCurrach, H., Mithani, A., Smith, J. A. C., & Preston, G. M. (2016, May). Local Adaptation is Associated with Zinc Tolerance in Pseudomonas Endophytes of the Metal-hyperaccumulator Plant Noccaea Caerulescens. In Proc. R. Soc. B (Vol. 283, No. 1830, p. 20160648). The Royal Society
- Khan, A., Belfield, E. J., Harberd, N. P., & Mithani, A. (2016). HANDS2: Accurate Assignment of Homoeallelic Base-identity in Allopolyploids despite Missing Data. Scientific Reports
- Leach, L. J., Belfield, E. J., Jiang, C., Brown, C., Mithani, A., & Harberd, N. P. (2014). Patterns of Homoeologous Gene Expression Shown by RNA Sequencing in Hexaploid Bread Wheat. BMC Genomics
- Belfield, E. J., Brown, C., Gan, X., Jiang, C., Baban, D., Mithani, A., Harberd, N. P. (2014). Microarray-based Ultra-high Resolution Discovery of Genomic Deletion Mutations. BMC Genomics
- Jiang, C., Mithani, A., Belfield, E. J., Mott, R., Hurst, L. D., & Harberd, N. P. (2014). Environmentally Responsive Genome-wide Accumulation of de novo Arabidopsis Thaliana Mutations and epimutations. Genome Research, 24(11), 1821-1829

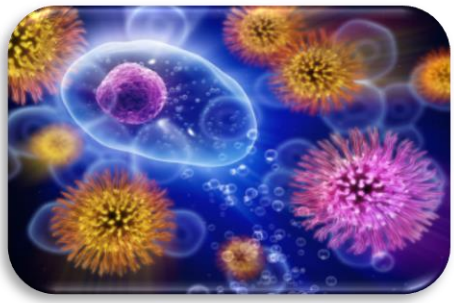
Title: Genome-Wide Identification of Salt Tolerant Genes in Using High-Throughput Sequencing Data
PI: Dr. Aziz Mithani
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Agriculture
Description: The main objective of this project is to use a multidisciplinary approach consisting of the latest genomic science including high-throughput sequencing analysis, comparative genomics and associated computational and statistical analyses study the differences in the expression of the genes relating to salt stress in bread wheat. Results obtained from this project will not only enhance understanding of the complex genome architecture of wheat but also provide the ability to relate, on a genome-wide basis, specific transcriptional variants to an important agronomic trait, namely salt tolerance, thus increasing the precision of crop-breeding solutions to address the challenge of global food security.

Dr. Muhammad Tariq
Department of Biology, SBASSE
m.tariq@lums.edu.pk
+924235608218

Profile Dr. Muhammad Tariq received his PhD in Molecular Cell Biology from Friedrich Miescher Institute for Biomedical Research, Switzerland. During his PhD, he worked in Jerzy Paszkowski's lab specializing in epigenetic gene silencing in Arabidopsis. In 2003, he joined Renato Paro's lab as a postdoctoral fellow at Zentrum fur Molekulare Biologie Heidelberg (ZMBH). He was awarded EMBO long term fellowship for his postdoctoral studies elucidating a link between molecular chaperones, in particular Hsp90 (Heat shock protein 90), and epigenetics in Drosophila. He joined ETH Zurich as an Oberassistant (Senior Researcher) in 2006 where he continued his work on Hsp90 and Epigenetics in Department of Biosystems Science and Engineering (D-BSSE), Basel.

Selected Publications

- Siddiqi, S. A., Manzoor, F., Jamal, A., Tariq, M., Ahmad, R., Kamran, M., & Rehman, I. U. (2016). Mesenchymal stem cell (MSC) Viability on PVA and PCL Polymer Coated Hydroxyapatite Scaffolds Derived from Cuttlefish. RSC Advances, 6(39), 32897-32904
- Shahzadi, L., Yar, M., Jamal, A., Siddiqi, S. A., Chaudhry, A. A., Zahid, S., ... & MacNeil, S. (2016). Triethyl orthoformate Covalently Cross-linked Chitosan-(poly vinyl) Alcohol Based Biodegradable Scaffolds with Heparin-binding Ability for Promoting Neovascularisation. Journal of Biomaterials Applications
- Abbas, W., Tariq, M., Iqbal, M., KuMar, A., & Herbein, G. (2015). Eradication of HIV-1 from the Macrophage Reservoir: An Uncertain Goal? Viruses, 7(4), 1578-1598
- Ahmad, M., Chaudhary, S. U., Afzal, A. J., & Tariq, M. (2015). Starvation-Induced Dietary Behaviour in Drosophila melanogaster Larvae and Adults. Scientific Reports, 5
- Iqbal, A., Muhammad, I. F., Faraz, M., Tariq, M. S., & Banna, H. U. (2015, June). Economic Analysis of a Small Hybrid Power System. In Power Generation System and Renewable Energy Technologies (PGSRET), 2015(pp. 1-5). IEEE



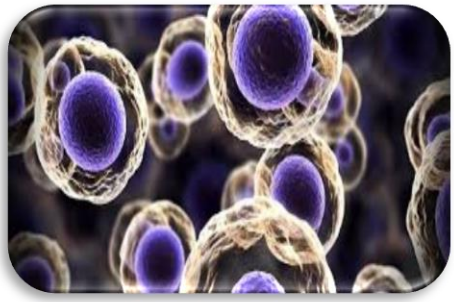
Title: Reverse Genetics Approach to Link Epigenetic Cell Memory and Cell Signalling
PI: Dr. Muhammad Tariq
Co-PI: Dr. Aziz Mithani
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 9,659,998
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: The aim of this project is to develop a systematic approach to functionally evaluate all the candidates emerging from RNAi screens in the long run and construct a high confidence interaction network of genes affecting the PcG/TrxG mediated epigenetic cell memory. Such a network will predict and study the involvement of PcG/TrxG in different functional gene modules.

Dr. Safee Ullah Chaudhary
Department of Biology, SBASSE
safeeullah@lums.edu.pk
+924235608352

Profile Dr. Safee Ullah Chaudhary received his PhD in 2013 from the Department of Bio. & Brain Engineering, Korea Advanced Institute of Science and Technology (KAIST), South Korea. His research was focussed on the computational modelling of multiscale cancer systems biology. He took an agents-based (multi-agent) approach to model tumorigenesis as described in the Warburg Effect. His work also led to the development of Electronic Cancer System (ELECANS), which is a next-generation modelling platform for applications in cancer systems biology. In 2014, he joined the Department of Biology at LUMS where he is involved in the development of a GPU-based cancer modelling and simulation pipeline by leveraging the CUDA Toolkit. He is also keenly interested in investigating the oncological manifestations of the Warburg Effect during cell death.

Selected Publications

- Shah, O. S., Chaudhary, M. F. A., Awan, H. A., Fatima, F., Arshad, Z., Amina, B., & Faisal, A. (2018). ATLANTIS-Attractor Landscape Analysis Toolbox for Cell Fate Discovery and Reprogramming. Scientific reports, 8(1), 3554
- Ahmad, F., Hussain, A., Chaudhary, S. U., Ahmad, I., & Ramay, S. M. (2016). A Novel Method for Detection of Voxels for Decision Making: An fMRI Study. International Journal of Imaging Systems and Technology, 26(2), 163-167
- Hamera, S., Yan, Y., Song, X., Chaudhary, S. U., Murtaza, I., Su, L., & Fang, R. (2016). Expression of Cucumber Mosaic Virus Suppressor 2b Alters FWA Methylation and its siRNA Accumulation in Arabidopsis Thaliana. Biology Open, 5(11), 1727-1734
- Ahmad, M., Chaudhary, S. U., Afzal, A. J., & Tariq, M. (2015). Starvation-Induced Dietary Behaviour in Drosophila melanogaster Larvae and Adults. Scientific Reports



Title: Design and Development of a Next-Generation Modelling and Simulation Platform for Cancer Systems Biology
PI: Dr. Safee Ullah Chaudhary
Co-PI: Dr. Sameer Ahmed
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 14,987,180
Project Initiated in: 2017
Duration: 36 Months
Category: Technology
Description: The proposed project outlines the design and development of a next generation multiscale modelling platform for applications in cancer systems biology. This modelling platform envisages a seamless integration of next generation sequencing and quantitation data from the wet labs and its onward usage for investigating the roles of known oncological factors. The proposed modelling platform will not only assist in the modelling of next generation cancer systems biology data, but will also significantly enhance the throughput of the model building and simulation processes.

Title: Design and Development of a Top-down Protein Sequence Search Engine for High Resolution Mass Spectra
PI: Dr. Safee Ullah Chaudhary
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 5,662,600
Project Initiated in: 2016
Duration: 36 Months
Category: Technology
Description: The main objective of this project is to develop a next generation protein sequence search engine and the associated algorithms that can optimally leverage this high resolution spectral data and act as a platform to seed and stir computational top-down (whole protein) and bottom-up (peptides) proteomics research in Pakistan. This project will design and develop a web-based software architecture that will make this search engine available, free of cost, to the experimental and in silico biologists across the country.

Title: Design and Development of a Multi-User Web Platform for Integrative Modelling and Simulation of Cancer Systems Biology
PI: Dr. Safee Ullah Chaudhary
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: The proposed multiscale cancer modelling platform will be the state-of-the-art software in cancer modelling which will stand to deliver major advantages to the cancer patients, researchers and the pharmaceutical industry. The patients will be benefited by the personalized medicines and therapeutics developed by modelling and analysis of their pathological data using the proposed platform. The cancer researchers stand to gain by obtaining a computational modelling framework using which they can save precious wet-lab materials and resources. The pharmaceutical industry can use this platform to investigate novel drug targets from personalised patient data and design newer drugs for treatment of cancer.

Title: Effect of Surah AlRehman on Human Brain
PI: Dr. Safee Ullah Chaudhary
Co-PI: Dr. Muhammad Tariq
Sponsor: Mr. Asif Riaz
Funding Amount: PKR 700,000
Project Initiated in: 2018
Duration: 60 Months
Category: Education
Description: Several clinicians across Pakistan have been reporting a significantly enhanced patient response upon augmentation of treatment plan with an audio stimulus of Surah Al-Rehman from the Holy Quran. These reports have created a stir in the scientific community as the molecular or neurological foundation of the phenomenon is yet to be deciphered. This project aims to setup an EEG lab for measurement of brain signals upon presentation of selected audio and visual stimuli upon patients. EEGLab will be employed for data analysis and to explore the existing literature as well as newly acquired data towards identifying brain signal fingerprints in response to external stimuli. The purpose of this project is to find out the impact of the recitation of the Surah on the patient brain and its contribution in healing.

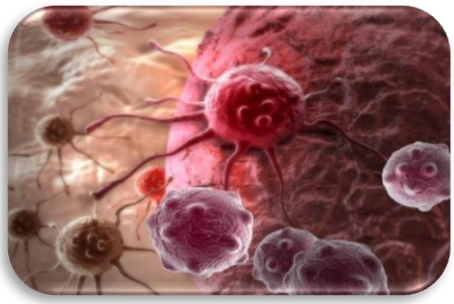
Title: An Integrated Computational-Experimental Study Of Hepatitis-C Virus (Genotype 3a) Sequence Heterogeneity, Protein-Drug Interactions and Immune Responses
PI: Dr. Safee Ullah Chaudhary
Co-PI: Dr. Sohail Asif Qureshi
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 4,169,592
Project Initiated in: 2015
Duration: 24 Months
Category: Health
Description: This is an exploratory research project that aims to comprehensively study the NS3 serine protease from the HCV genotype-3a circulating in Pakistan from an evolutionary, therapeutic as well as immunological stand point. The purpose of this project is to determine the degree of sequence variation within the NS3 region of HCV genotype-3a, identify hot and cold spots in it and study the pattern of NS3 evolution. The objective of this project is to understand the relationship between sequence heterogeneity of HCV 3a and its clinical implications by correlating NS3 sequence profiles with clinical background of patients.

Dr. Shaper Mirza
Department of Biology, SBASSE
shaper.mirza@lums.edu.pk
+924235608413

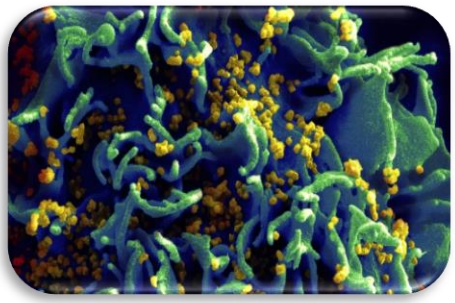
Profile Dr. Shaper Mirza holds a BSc (Hon) degree from University of Karachi and a doctorate from The University of Alabama at Birmingham (UAB). Her PhD studies involved understanding mechanisms of nasal colonisation by a Gram-positive pathogen Streptococcus pneumoniae. More specifically the work was focused on understanding the interaction of a human mucosal protein lactoferrin with pneumococcal surface proteins and its downstream effects on colonisation by Streptococcus pneumoniae. Dr. Mirza received several awards and honours during her PhD which included a student travel grant award for Gordon Conference on Structure and Functions of Lactoferrin, held in Hawaii 2005; Gail Castle award for best poster presentation as PhD student and Gail Castel Award for best post-doctoral presentation. Dr. Mirza joined LUMS as an Associate Professor in the Department of Biology at Syed Babar Ali School of Science and Engineering. Dr. Mirza's specialised areas of teaching at LUMS include immunology and bacterial pathogenesis, where she continues to develop her studies on association of immune impairments in diabetes with pneumococcal infections. While teaching at LUMS, Dr. Mirza has also developed a lab as part of her programme, which is currently investigating the role of hyperglycaemia, characteristic of type-2 diabetes in impairment in immune functions of neutrophils and CD4+T cells. Information derived from these studies will be valuable in developing more targeted vaccines for prevention and control of invasive pneumococcal disease in this high-risk population.

Selected Publications

- Andre, G. O., Politano, W. R., Mirza, S., Converso, T. R., Ferraz, L. F., Leite, L. C., Darrieux, M. (2017). Combined Effects of Lactoferrin and lysozyme on Streptococcus Pneumoniae Killing Microbial Pathogenesis 89-7-17
- Mirza, S., Benjamin, W. H., Coan, P. A., Hwang, S. A., Winslett, A. K., Yother, J., & Briles, D. E. (2016). The Effects of Differences in pspA Alleles and Capsular Types on the Resistance of Streptococcus Pneumoniae to Killing by Apolactoferrin. Microbial Pathogenesis, 99, 209-219
- Gay, J. L., Salinas, J. J., Buchner, D. M., Mirza, S., Kohl, H. W. 3rd, Fisher-Hoch, S. P., McCormick, J. B. (2015). Meeting Physical Activity Guidelines is Associated with Lower Allostatic Load and Inflammation in Mexican Americas. J Immigration and Minority Health. 17(2) 574-81
- Carey, A. J., Tan, C. K., Mirza, S., Irving-Rodgers, H., Webb, R. I., Lam, A., Ulett, G. C. (2014). Infection and Cellular Defense Dynamics in a Novel 17 Beta-eterdiaol Murine Model of Chronic Human Group B Streptococcus Genital Tract Colonization Reveal a Role for Hemolysin in Persistence and Neutrophil Accumulation. Journal of Immunology. 15: 192(4), 1718-31
- Kruzel, M.L., Actor, J.K., Zimecki, M., Wiser, J., Ploszaj, P., Mirza, S., Kruzel, M., Hwang, S.A., Ba, X., Boldogh, I. (2013). Novel recombinant human lactoferrin: differential activation of oxidative stress related gene expression. Journal of Biotechnology. 168(4) 666-675



Title: Mechanisms of Immune Protection Induced by Pneumococcal Polysaccharide Vaccine
PI: Dr. Shaper Mirza
Co-PI: Dr. Bilal bin Younis - Shalamar Hospital
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 5,745,409
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: The main objective of this project is to systematically understand the immune response to PPV and identify impairments and alterations in immune system that leads to poor efficacy of vaccine in those with diabetes. Interactions between immune molecules are complex and require an integrated approach to understand all interactions and their role in immune response. The purpose of this project is to propose a novel multidisciplinary approach to understand the mechanisms at cellular level. This approach involves integration of systems of biology, immunology, proteomics and genomics. Results of the research will be used to develop immune signatures corresponding to responses in healthy individuals and in those with diabetes.



Title: Vero Cell Immunogenicity and Safety after A One-Week, 4-Site, Intradermal (10) Pre-Exposure Prophylaxis Regimen (4-4-4-0-0) and Four-Weeks, 2-Site, Intradermal (10) Pre-Exposure Prophylaxis Regimen (2-2-2-0-2), 4-Site 10 Booster after One Year
PI: Dr. Shaper Mirza
Sponsor: Indus Hospital
Funding Amount: PKR 289,302
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: The main objective of this research project is to demonstrate that PEP using the new "one-week, 4-site" (4-4-4-0-0) ID vaccination regimen, is not inferior to PEP (2-1-1-1-1) IM vaccination regimen in terms of seroprotection rate at D14. This project will demonstrate that PEP using the new "one-week, 2-site" (2-2-2-0-0) ID vaccination regimen, is not inferior to PEP (1-1-1-1-1) IM Essen vaccination regimen in terms of seroprotection rate at D14.the secondary objective is to describe the immune response in each group at D0, D14 and D90.

Title: Hyperglycaemia Mediated Dysregulation of Macrophage Activation and Polarization in Type 2-Diabetes
PI: Dr. Shaper Mirza
Co-PI: Dr. Amir Faisal
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: The main objective of this project is to investigate the role of hyperglycaemia in differential regulation of activation, polarization and function of macrophage in type 2-diabetes. A unique aspect of this study is the use of monocyte/macrophages isolated from diabetic patients. The long-term objective is to develop a more advanced understanding of metabolic control of macrophage activation. Information harnessed from results of this study will be used to develop new, more targeted and therapeutic strategies. Short-term objectives are to identify mechanisms, pathways and molecules in macrophages that are dys-regulated by hyperglycaemia, and to determine the downstream effects of dysregulation on bactericidal and pro-inflammatory activity of macrophages.

Title: Off-site Quality Assurance Test for Products from Packages Pvt (Ltd)
PI: Dr. Shaper Mirza
Co-PI: Dr. Muhammad Tariq
Sponsor: Packages Pvt (Ltd)
Funding Amount: PKR 320,666
Project Initiated in: 2016
Duration: 12 Months
Category: Economic development
Description: The main purpose of this proposed collaboration is to provide consultancy for setting up quality control standards for paper products from Packages limited. The products include facial tissues , toilet rolls and party tissues (bulk packs).Although paper products have lower risk of human infections than for example meat, dairy, fruits or vegetables, nonetheless they can still become contaminated with potentially hazardous materials that can cause anything form mild skin irritation to severe skin infections. Therefore quality assurance and identification of hazardous materials should be performed to protect consumers.

Dr. Syed Shahzad ul Hussan
Department of Biology, SBASSE
shahzad.hussan@lums.edu.pk
+924235608351

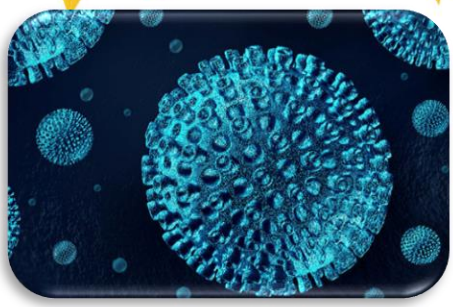
Profile Dr. Shahzad ul Hussan joined the Department of Biology at Syed Babar Ali School of Science and Engineering (SSE) in LUMS in December 2013 as an Associate Professor. He earned his PhD in Bioorganic Chemistry from the University of Luebeck, Germany in 2005. In 2005, he obtained the Postdoctoral Visiting Fellowship Award from the National Institutes of Health (NIH), USA and joined the Laboratory of Bioorganic Chemistry at NIDDK, NIH. During the postdoctoral training his research was focused on NMR structural studies of anti-HIV lectins and understanding the sub-molecular level basis of HIV entry inhibition by those lectins.

Selected Publications

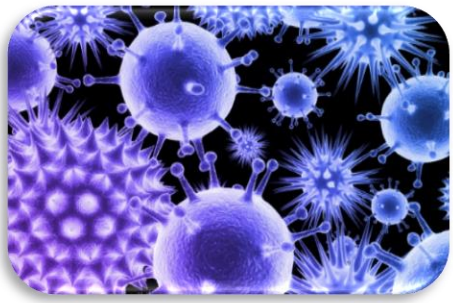
- Qadir, A., Riaz, M., Saeed, M., and Shahzad-ul-Hussan, S. (2018). Potential Targets for Therapeutic Intervention and Vaccine Design against Zika virus. European Journal of Medicinal Chemistry, 156, 444-460
- Zhou, T., Zheng, A., Baxa, U., Chuang, G. Y., Georgiev, I.S., Kong, R., O'Dell, S., Shahzad-ul-Hussan, S., Shen, C.H., Tsybovsky, Y., Bailer, R.T., Gift, S.K., Louder, M.K., McKee, K., Rawi, R., Stevenson, C.H., Stewart-Jones, G.B.E., Taft, J.D., Waltari, E., Yang, Y., Zhang, B., Shivatare, S.S., Shivatare, V.S., Lee, C.D., Wu, C.Y.; NISC Comparative Sequencing Program, Mullikin, J.C., Bewley, C.A., Burton, D.R., Polonis, V.R., Shapiro, L., Wong, C.H., Mascola, J.R., Kwong, P.D., Wu, X. A. (2018). Neutralizing Antibody Recognizing Primarily N-Linked Glycan Targets the Silent Face of the HIV Envelope. Immunity, 48, 500-513
- Ullah, R., Dar, S., Ahmad, T., de Renty, C., Usman, M., DePamphilis, M. L., & Ullah, Z. (2018). CDK1 Inhibition Facilitates Formation of Syncytiotrophoblasts and Expression of Human Chorionic Gonadotropin. Placenta
- Shahzad-ul-Hussan, S., Sastry, M., Lemmin, T., Soto, C., Loesgen, S., Scott, D. A., & Bewley, C. A. (2017). NMR Insights into the Conformational Properties of Man-9 and its Recognition by Two HIV Binding Proteins. ChemBioChem

Title: Identification of Hepatitis C Neutralizing Antibodies and Structural Study of Their Epitopes to Obtain Essential Information for Rational Vaccine Design
PI: Dr. Syed Shahzad ul Hussan
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 11,005,383
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: Hepatitis C virus (HCV) infections are one of the biggest challenges to health care all over the world. These infections are the major cause of liver cirrhosis and hepatocellular carcinoma. This project is intended to identify new HCV neutralizing antibodies that are targeted against conserved regions of the HCV envelope and understand the structure of their target sites in the antibody bound conformation.

Title: Establishment of Protocols to Discover New Dengue Virus Inhibitors from Natural Sources
PI: Dr. Syed Shahzad ul Hussan
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: The main objective of this project is to discover new DENV entry inhibitors from natural sources by utilising an innovative methodology of developing a probe consisting of the E glycoprotein to specifically identify carbohydrate-binding agents from algal strains. The primary goal is to design and synthesise the gene encoding for the soluble part of Dengue envelope glycoprotein E and sub-clone the synthesised gene in pMT/BiP/V5.



Title: Establishment of NMR Based Screening to Discover New Potential Therapeutics against Hepatitis C Virus by Targeting Non-structural Proteins of the Virus
PI: Dr. Syed Shahzad Ul Hussan
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Sciences
Description: The aim of the project is to identify new potential therapeutics against HCV by targeting two of the HCV proteins, NS5a and NS5b, which play a crucial role in the replication cycle of the virus. It intends to develop strategy that combines high throughput screening and detailed atomic level understanding of drug-target interactions. Saturation Transfer Difference (STD) NMR is a technique by which not only a molecule binding to the target protein can be identified from a mixture of several types of molecules but also information about the atoms of that molecule involved in direct interactions with the target protein can be obtained. STD NMR will be used to discover new inhibitors of NS5a and NS5b as potential therapeutics of hepatitis C, from the extracts of different algae collected and cultured in our laboratory. In parallel, this project further aims to perform virtual screening to identify NS5a and NS5b inhibitors from a very large libraries of compounds and subsequently verify the identified inhibitor by STD NMR. This project is highly significant to discover new potential therapeutics against HCV by using state of the art methodologies.



Title: Discovery of New HCV Entry Inhibitor Lectins and Design of an Anti-HIV Lectin as a Better Potential Therapeutic
PI: Dr. Syed Shahzad ul Hussan
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 5,987,705
Project Initiated in: 2015
Duration: 36 Months
Category: Health
Description: This study has two main aims. To begin with, it aims to identify new HIV and HCV cellular-entry inhibitor lectins from different algal strains. Based on the observation that most of the antiviral lectins have been identified from different algal strains, it has been hypothesised that by using specific probes consisting of envelope glycoproteins of HIV and HCV new anti-HIV and anti-HCV lectins can be identified from algal extracts. Envelope glycoprotein, gp120 of HIV and E2 of HCV have already been produced in the laboratory. In this project, these glycoproteins will be covalently linked to an appropriate resin to develop a specific affinity column to identify new anti-HIV and anti-HCV lectins by screening extracts of various algal strains and characterise their atomic level details of viral entry inhibition by using NMR, viral neutralisation assays, isothermal calorimetry titrations (ITC) and surface plasmon resonance (SPR). Secondly, the study also aims to construct a smaller sized MVN lectin to make it better drug like molecule. As potential therapeutics larger protein molecules have very limited oral availability, less membrane permeability and potential immunogenicity.

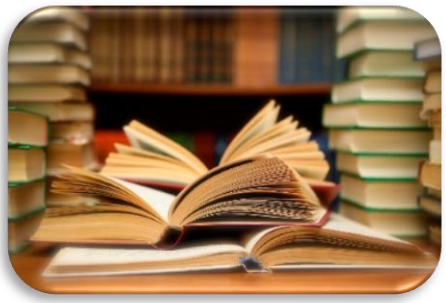
DEPARTMENT OF CHEMISTRY AND CHEMICAL ENGINEERING

Dr. Basit Yameen
Department of Chemistry and Chemical Engineering, SBASSE
basit.yameen@lums.edu.pk
+924235608481

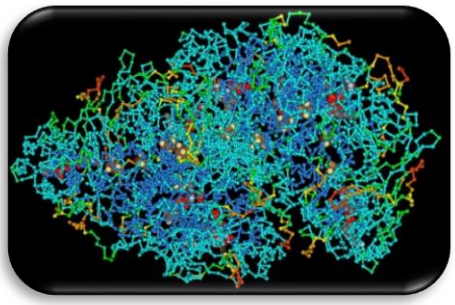
Profile Dr. Basit Yameen received his M.Sc. degree (1998-2000) in the subject of Chemistry with distinction (awarded a gold medal and an academic roll of honour) from Government College University, Lahore, Pakistan. During early 2001, he moved to the Department of Chemistry, Quaid-e-Azam University, Islamabad Pakistan, where he completed his M.Phil. Degree (2001-2003) with a specialization in Organic Chemistry while carrying out his one year thesis research in the field of Polymer Chemistry. He was later awarded a PhD scholarship from the Higher Education Commission of Pakistan and received his PhD degree (2004-2008) from Johannes Gutenberg University, Mainz, Germany for his research work which was carried out under the supervision of Prof. Dr. Wolfgang Knoll in the Materials Science Research Group.

Selected Publications

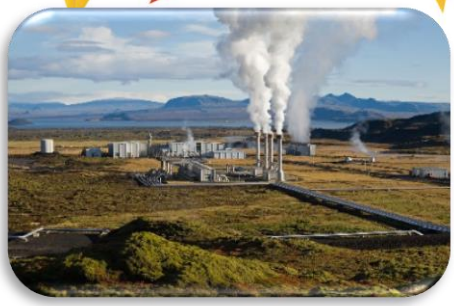
- Nazar, M. F., Saleem, M. A., Bajwa, S. N., Yameen, B., Ashfaq, M., Zafar, M. N., & Zubair, M. (2017). Encapsulation of Antibiotic Levofloxacin in Biocompatible Microemulsion Formulation: Insights from Microstructure Analysis. The Journal of Physical Chemistry B, 121(2), 437-443
- Nayab, S., Trouillet, V., Gliemann, H., Hurrle, S., Weidler, P. G., Tariq, S. R., & Yameen, B. (2017). Chemically Reprogrammable Metal Organic Frameworks (MOFs) Based on Diels–Alder Chemistry. Chemical Communications
- Pinto, M. P., Arce, M., Yameen, B., & Vilos, C. (2017). Targeted Brain Delivery Nanoparticles for Malignant Gliomas. Nanomedicine, 12(1), 59-72
- Picco, A. S., Yameen, B., Knoll, W., Ceolín, M. R., & Azzaroni, O. (2016). Temperature-Driven Self-Assembly of Self-Limiting Uniform Supraparticles from Non-uniform Unimolecular Micelles. Journal of Colloid and Interface Science, 471, 71-75
- Fuentes, E., Yameen, B., Bong, S. J., Salvador-Morales, C., Palomo, I., & Vilos, C. (2016). Antiplatelet Effect of Differentially Charged PEGylated Lipid-polymer Nanoparticles. Nanomedicine: Nanotechnology, Biology and Medicine



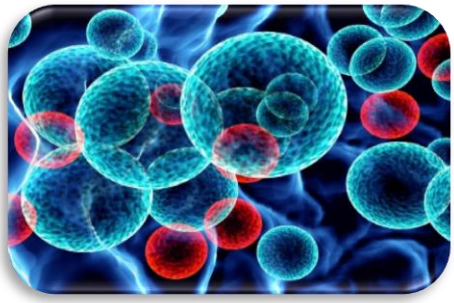
Title: Summer Internship in Science and Engineering (RISE) for Young Community – RISE Community
PI: Dr. Basit Yameen
Co-PI: Dr. Irshad Hussain, Dr. Falak Sher
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 200,000
Project Initiated in: 2016
Duration: 1 Month
Category: Sciences
Description: The aim of this project is to develop a 4-weeks training programme named as "Summer Internship in Science and Engineering (RISE) for Young Community – RISE Community" where students (matric/intermediate) and teachers from the public schools in our less developed neighbourhood will spend one month in different research groups engaging in cutting-edge research at various departments at SBASSE.



Title: Solar Cell Performance Enhancement by Polymer Side Chain Engineering
PI: Dr. Basit Yameen
Co-PI: Dr. Habib-ur-Rehman
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 12,066,958
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: The main objective of this project is to produce an immense wealth of new polymeric materials with controlled molecular architectures thus expanding current knowledge of controlled macromolecular synthesis. The knowledge created as a result of this project will be of importance for both local and international communities striving to develop reliable and environmentally benign energy producing technologies. The success of this project will build a strong polymer synthesis and characterisation capacity, which will be beneficial for LUMS, for local institutions in the area, and will also serve as an open facility for scientists of all other institutions in Pakistan.



Title: Transforming Biomass Ash Residues into Commercialisable Products
PI: Dr. Basit Yameen
Co-PI: Dr. Habib-ur-Rehman, Dr. Falak Sher
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 13,944,000
Project Initiated in: 2017
Duration: 24 Months
Category: Economic Development
Description: The fundamental aim of this project is to propose a systematic approach to develop industrially viable knowledge based recycling technologies for ash residues produced in biomass thermal power stations. Biomass thermal power station produces two types of ash residues; bottom ash and fly ash. The proposed project will establish understanding on relationship between nature of biomass fuel and the chemical nature of fly and bottom ash residues produced during the combustion of biomass in the biomass thermal power station installed at BSP facility in Kasur.



Title: Building From Scratch: How Nanomaterials Can Help Resolve Membrane Scaffold Geometry and Function
PI: Dr. K. H. Aaron Lau - University of Strathclyde
Co-PI: Dr. Basit Yameen, Dr. Carsten Mim - KTH Royal Institute of Technology
Sponsor: Human Frontier Science Program
Funding Amount: PKR 31,381,500
Project Initiated in: 2016
Duration: 36 Months
Category: Sciences
Description: The main objective of this project is to develop a nanosheet synthetic scaffold that can present gephyrin with its binding motif in a precisely defined geometry and nanoparticles functionalized with GlyR drug targets that provide high electron contrast labelling and bi-functional cross linkers for the structure-function measurements. These nanomaterials will enable assays of gephyrin scaffold formation and GlyR complex formation, and electron microscopy functional mapping of GlyR. The proposed research will provide insight into gephyrin-GlyR structure-function relationship and demonstrate new tools for biological characterization.

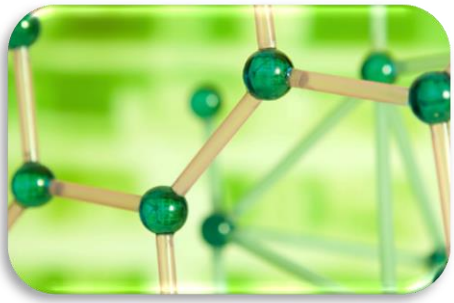
Title: Development of Functional For Polyolefin via Light Triggered Polymerization
PI: Dr. Basit Yameen
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Sciences
Description: This project offers a facile and scalable solution to control the surface chemical properties of polyolefin films. Materials interact with their environment through their surface. Surface of any material acts as a phase boundary residing between bulk and the outer environment. Often the materials chosen for a particular application possess the appropriate bulk properties (such as mechanical properties), while their surface properties are insufficient for the target application. This consequently have adverse problems in adhesion, coating, painting, colouring, biocompatibility etc. To overcome these problems the regulation of a material's surface interaction with its environment and other substances is of prime importance. Regulation of material surface properties require a control over its surface chemical nature. Polyolefin (hydrocarbon polymers) are most widely used polymer worldwide. Every day we interact with polyolefin in the form of plastic bags (polyethylene bags) and other packaging materials. Polyolefin are most difficult substrate materials to modify because of their inert nature. Their films are extremely difficult to print or glue to other materials. For similar reasons, it is very difficult to apply any coating on the surface of polyolefin polymer films. Polyolefin industry is aggressively looking for scalable surface modification solution that could give them a better control over the surface properties of these polyolefin films. The success of this project will result in coating technologies that will revolutionise the polyolefin film industry by moving it from commodity to specialised category.

Dr. Ghayoor Abbas Chotana
Department of Chemistry and Chemical Engineering, SBASSE
ghayoor.abbas@lums.edu.pk
+924235608281

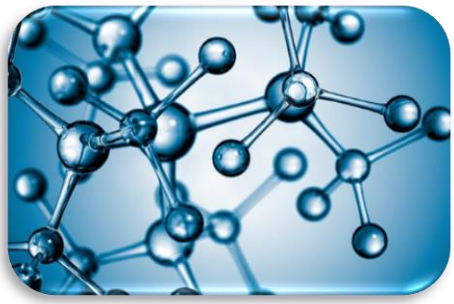
Profile Dr. Ghayoor Abbas obtained his MSc in Chemistry from Quaid-i-Azam University, Islamabad, Pakistan. After serving as a lecturer in chemistry in the Punjab Education Department/GCU Lahore for couple of years, he went to the Michigan State University, USA for his PhD studies. At MSU, he worked on the applications of iridium catalysed aromatic C-H borylation in organic synthesis, and completed his PhD in Chemistry in 2008. He worked as a Postdoctoral Associate at Indiana University, Bloomington, USA, before joining Syed Babar Ali School of Science and Engineering (SSE), LUMS in fall 2009. Dr. Ghayoor Abbas has presented his research work in various international conferences including the meetings of the American Chemical Society, the US National Organic Symposium, and the Gordon Organometallic Conference.

Selected Publications

- Asghar, S., Shahzadi, T., Alazmi, M., Gao, X., Emwas, A. H., Saleem, R. S., & Chotana, G. A. (2018). Iridium-Catalysed Regioselective Borylation of Substituted Biaryls. Synthesis
- Ikram, H. M., Rasool, N., Zubair, M., Khan, K. M., Abbas Chotana, G., Akhtar, M. N., & Rana, U. A. (2016). Efficient Double Suzuki Cross-Coupling Reactions of 2, 5-Dibromo-3-hexylthiophene: Anti-Tumor, Haemolytic, Anti-Thrombolytic and Biofilm Inhibition Studies. Molecules,21(8), 977
- Batool, F., Emwas, A. H., Gao, X., Munawar, M. A., & Chotana, G. A. (2016). Synthesis and Suzuki Cross-Coupling Reactions of 2, 6-Bis (trifluoromethyl) pyridine-4-boronic Acid Pinacol Ester. Synthesis
- Tariq, S. R., Shafiq, M., & Chotana, G. A. (2016). Distribution of Heavy Metals in the Soils Associated With the Commonly Used Pesticides in Cotton Fields. Scientific, 2016



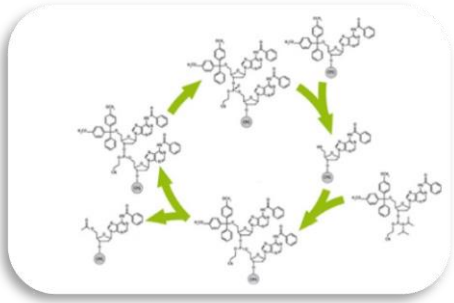
Title: Green Chemistry Route for the Concise and Divergent Synthesis of Halogenated Pseudilins
PI: Dr. Ghayoor Abbas Chotana
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 2,200,332
Project Initiated in: 2017
Duration: 24 Months
Category: Sciences
Description: The main objective of this project is the development of a new synthetic methodology (or route) for the concise and divergent synthesis of halogenated pseudilins analogues. The new synthetic methodology is based on two latest technologies that are Iridium catalysed aromatic C–H borylation invented by Smith (along with Hartwig & Miyaura) and Mild Suzuki coupling reactions of heteroaryl boronic esters .The purpose of this project is to provide the shortest possible route to this highly important class of pharmaceutically active compounds according to the principles of Green Chemistry. The synthesized compounds will be tested for their potential to inhibit IspD protein in the enzymatic essay.



Title: Iridium Catalysed Borylation using Bis [(+)-pinanediolato] diboron: Synthesis of Chiral Arylboronic Esters by C–H Borylation
PI: Dr. Ghayoor Abbas Chotana
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: The main objective of this project is to investigate the use of various chiral boranes as the boron source. If this technique is useful then it will be a shorter route to prepare chiral arylboronic esters. Also the sterically governed selectivity will prepare those chiral arylboronic esters which are not possible through other known routes. Asymmetric synthesis is taught at undergraduate and graduate level. This project will provide students an opportunity to get involved in practical asymmetric synthesis. Asymmetric synthesis is very challenging. Establishing a new asymmetric synthetic route will definitely enhance LUMS image in international scientific community. This project will strengthen collaboration with KAUST for spectroscopic characterization.

Title: Development of Indigenous Process for the Synthesis of Plant Protection Fungicides for Ensuring National Food Security
PI: Dr. Ghayoor Abbas Chotana
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 1,809,332
Project Initiated in: 2017
Duration: 24 Months
Category: Agriculture
Description: Agricultural products are the major exports of Pakistan. Besides cotton based products, various fruits and vegetables are also exported. For improved shelf life, these agricultural products need proper protection from pathogens such as fungi. In this project, the main objective is to synthesize modern agricultural fungicide. This project will lay down the foundation for the indigenous production of agrochemicals (fungicides, insecticides) in Pakistan.

Title: Design and Synthesis of New Boscalid Analogues
PI: Dr. Ghayoor Abbas Chotana
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: This project aims to design and synthesise new analogues of Boscalid. Boscalid is an important fungicide belonging to the class of carboxamides. It was introduced in 2003 in US and now its worldwide annual production exceeds 1000 Metric Ton per year. Boscalid is used in the agricultural fields of various horticultural crops, such as green beans, spring onions, strawberries, grapes, blueberries, tomatoes, and raspberries etc. Boscalid protects crops from gray mold, powdery mildew and other fungus. Boscalid acts by inhibiting spore germination, germ tube elongation and is also effective on all other stages of fungal development.



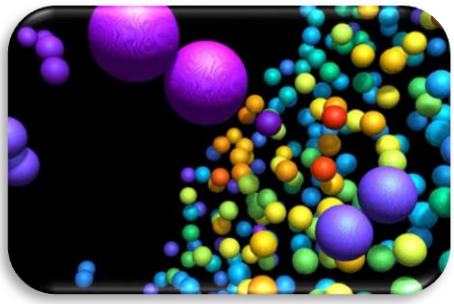
Title: Regiospecific Syntheses of Carbazoles
PI: Dr. Ghayoor Abbas Chotana
Sponsor: Comstech-Twas
Funding Amount: PKR 478,436
Project Initiated in: 2015
Duration: 18 Months
Category: Sciences
Description: This proposal plans to develop a methodology for the concise & regiospecific synthesis of carbazoles using readily commercially available starting materials. This methodology will provide access to substituted carbazoles with substituents on any of the eight positions of carbazole. The significance of the newly developed methodology will be demonstrated by synthesizing various naturally occurring carbazole products which previously have been synthesized using long routes.

Dr. Habib-ur-Rehman
Department of Chemistry and Chemical Engineering, SBASSE
habib.rehman@lums.edu.pk
+924235608125

Profile Dr. Habib-ur-Rehman holds an MPhil degree in physical/polymer chemistry from QAU, Islamabad and PhD in Materials Engineering Degree from the Institute for New Materials, Saarbrucken, Germany. He is currently working as an Assistant Professor of Chemistry. Before joining Syed Babar Ali School of Science and Engineering (SSE), LUMS, he served as Head of Optical Materials, R & D Group at Exxelis Limited, U.K. He developed a number of new materials for optical displays and optimized innovative processes for making LED backlights and light management films. He previously worked for Terahertz Photonics, UK, and was responsible for the development of low loss optical materials for data-comm and ground-breaking sol-gel based silica on silicon deposition technology.

Selected Publications

- Nawaz, S., Monim-ul-Mehboob, M., Tahir, M. N., Hussain, I., Hussain, S. Z., & Ahmad, S. (2018). Synthesis and Crystal Structure of [azido-bis (cis-1, 2-diaminocyclohexane) Copper (II)] Chloride Trihydrate. Zeitschrift für Naturforschung B, 73(3-4), 259-263
- Zulfiqar, U., Hussain, S. Z., Subhani, T., & Hussain, I. (2018). Mechanically Robust Superhydrophobic Coating from Sawdust Particles and Carbon Soot for Oil/Water Separation. Colloids and Surfaces A: Physicochemical and Engineering Aspects, 539, 391-398
- Shah, S. M., Zulfiqar, U., Hussain, S. Z., Ahmad, I., Hussain, I., & Subhani, T. (2017). A Durable Superhydrophobic Coating for the Protection of Wood Materials. Materials Letters
- Butt, A., Farrukh, A., Ghaffar, A., Duran, H., Oluz, Z., Ur Rehman, H., Yameen, B. (2015). Design of Enzyme-Immobilized Polymer Brush-grafted Magnetic Nanoparticles for Efficient Nematicidal activity. RSC Advances, 5(95), 77682-77688
- Javed, Ibrahim, Hussain, Syed Zajif, Rehman, Habib Ur, Hussain, Irshad. (2015)Synthesis, Characterization and Evaluation of Lecithin-based Nanocarriers for the Enhanced Pharmacological and Oral Pharmacokinetic Profile of Amphotericin B : Journal of Materials Chemistry



Title: Development of Optically Clear Novel High Refractive Index Photo-Polymerizable Nano-Composites for Light Management Films and Their Applications in Flat Panel Display
PI: Dr. Habib-ur-Rehman
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 13,786,200
Project Initiated in: 2015
Duration: 36 Months
Category: Sciences
Description: This project aims to utilise polymer brushing technique to synthesise functionalized metal oxide nanoparticles, preferably acrylate functionalized nanoparticles of different metal oxides having high refractive indices and to prepare novel high refractive index acrylate-nano-composites based photo-polymerizable materials. These materials will then be tested for their light management potential in optical displays by making prismatic as well as microlens-based micro-structured brightness enhancement films through UV embossing.

Title: Environment Friendly Perovskite Solar Cells of Enhanced Stability and Efficiency
PI: Dr. Habib-ur-Rehman
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 980,000
Project Initiated in: 2018
Duration: 12 Months
Category: Environment
Description: The core objective of this project is to address the stability and toxicity of the devices by modifying perovskite device structure through composition and morphology engineering. This project aims to develop and establish protocols to synthesise and optimise perovskite absorber layer materials, develop fully functional perovskite devices and improve stability of perovskite devices through compositional manipulation and solvent/additive engineering work methodology.

Dr. Irshad Hussain
Department of Chemistry and Chemical Engineering, SBASSE
ihussain@lums.edu.pk
+924235608133

Profile Dr. Irshad Hussain is among the founding members of SBASSE, LUMS and has played a key role to lead the development of the Chemistry Department. Prior to joining LUMS, Dr. Hussain spearheaded research and development program in Nano biotechnology at National Institute for Biotechnology & Genetic Engineering (NIBGE), Faisalabad, Pakistan, and developed a Nano biotech group/facility for the synthesis of metal nanoparticles and explored their applications in biotechnology and advanced materials fabrication, which is now among the few best facilities in Pakistan. He has published more than 50 research articles in prominent journals including Nature Materials, Angewandte Chemie - Int. Ed., Advanced Materials, and Journal of the American Chemical Society, Small, ChemCommun, Langmuir, and Nanoscale. Dr. Hussain has developed several effective research collaborations with the leading research groups in USA, Europe, China (HUST), Saudi Arabia (KAUST) and several National Institutions in Pakistan. He has got several competitive National/International research grants to explore the applications of metal nanoparticles/ nanoclusters in Chemical/Biomedical Sciences and Renewable Energy Technologies.

Selected Publications

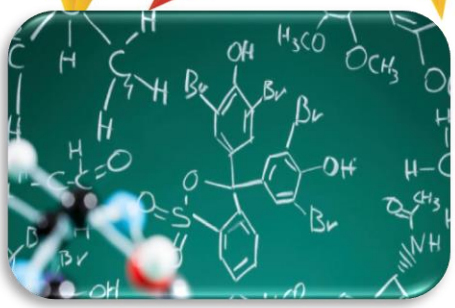
- Ahmad, S., Saleem, M., Georgieva, I., Ruffer, T., Schaarschmidt, D., Lang, H., & Ali, S. (2018). Synthesis, Characterization, DFT Calculations and Antimicrobial Studies of Cadmium (II) Sulfate Complexes of Thioureas and 2-mercaptopyridine; X-ray Structures of Polymeric Diaqua (N, N′-dimethylthiourea) sulfatocadmium (II) and bis (2-mercaptopyridine) sulfatocadmium (II). Polyhedron, 149, 126-133
- Sabir, N., Qayyum, W., Hussain, S. Z., Hussain, I., & Amin, F. (2018, February). Photoluminescence properties of Co and Ni co-doped CdS/ZnS core/shell nanoparticles. In Colloidal Nanoparticles for Biomedical Applications XIII (Vol. 10507, p. 1050705). International Society for Optics and Photonics
- Nawaz, S., Monim-ul-Mehboob, M., Tahir, M. N., Hussain, I., Hussain, S. Z., & Ahmad, S. (2018). Synthesis and Crystal Structure of [Azido-bis (cis-1, 2-diaminocyclohexane) Copper (II)] Chloride Trihydrate. Zeitschrift für Naturforschung B, 73(3-4), 259-263
- Munir, M. U., Ihsan, A., Sarwar, Y., Bajwa, S. Z., Bano, K., Tehseen, B., & Li, J. (2018). Hollow Mesoporous Hydroxyapatite Nanostructures; Smart Nanocarriers with High Drug Loading and Controlled Releasing Features. International Journal of Pharmaceutics, 544(1), 112-120
- Hussain, S., Amjad, R. J., Tanveer, M., Nadeem, M., Mahmood, H., Sattar, A., & Siddique, S. A. (2017). Optical Investigation of Sm 3+ Doped in Phosphate Glass. Glass Physics and Chemistry, 43(6), 538-547
- Majeed, I., Nadeem, M. A., Kanodarwala, F. K., Hussain, E., Badshah, A., Hussain, I., & Nadeem, M. A. (2017). Controlled Synthesis of TiO2 Nanostructures: Exceptional Hydrogen Production in Alcohol-Water Mixtures over Cu (OH) 2–Ni (OH) 2/TiO2 Nanorods. Chemistry Select, 2(25), 7497-7507

Title: Development of Nanoparticles-Based Sensitive Method for the Detection of Bacteria in Drinking Water
PI: Dr. Irshad Hussain
Co-PI: Dr. Shaper Mirza
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,000
Project Initiated in: 2016
Duration: 12 Months
Category: Health
Description: It is extremely important to have proper domestic, municipal and industrial wastewater disposal and effective treatment plants for drinking water with appropriate maintenance and monitoring at all times. In particular, the bacterial detection assay needs to be sensitive and accessible to common man for on-site monitoring of drinking water for bacterial contamination. The monitoring of microbial contamination of drinking water is of a paramount importance for public health and food safety to minimise the risk of outbreak of waterborne diseases. The purpose of this project is, therefore, to supplement the funds for the purchase of chemicals and consumables to enable clean drinking water. Furthermore, the project will also help to better understand the interaction of bacteria with nanoparticles. This information will later be harnessed for developing projects to combat multidrug resistance in pathogenic bacteria.

Title: Low-Cost but More Effective Transition Metal Alloy Nanoclusters for Electrocatalytic Water Oxidation
PI: Dr. Irshad Hussain
Co-PI: Dr. Khurram Saleem Joya - UET Lahore
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 4,187,838
Project Initiated in: 2017
Duration: 36 Months
Category: Energy
Description: The main objective of this project is to develop effective and economical nanocatalysts based on other abundant metals such as Fe, Cu and their alloys, including those with Ni nanoclusters and explore their applications for water splitting electrochemically and photochemically. These metal/alloy nanoclusters are expected to be the cost-effective and highly efficient electrocatalysts for the production of hydrogen from water oxidation.

Title: Smart Nanoclusters to Address Multidrug Resistance
PI: Dr. Antonios G. Kanaras- University of Southampton
Co-PI: Dr. Irshad Hussain
Sponsor: Engineering and Physical Sciences Research Council (EPSRC) | University of Southampton
Funding Amount: PKR 2,037,081
Project Initiated in: 2016
Duration: 6 Months
Category: Sciences
Description: Multidrug resistance is emerging as one of the most serious threats globally and most importantly for the underdeveloped countries because of common drug abuse practices. This project will focus on the design of functional nanoscale materials as an alternative and non-conventional approach to address the multidrug resistance challenge. The main objective of this project is to focus on the development of metal/metal oxide water soluble nanoclusters, which will be programmed by design to kill resistant cancer cells and bacteria.

Title: Smart Nanoparticles to Address Multidrug Resistance in Pathogenic Bacteria
PI: Dr. Irshad Hussain
Co-PI: Dr. Shaper Mirza
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: This project aims to explore different ways to target multidrug resistance (MDR) in bacteria through the use of smart nanomaterials/nanocarriers comprising of positively charged silver and copper nanoparticles/nanoclusters and other antibiotics/inhibitors to effectively kill bacterial cells. Various polymeric and small molecule ligands with improved efficiency will be designed to stabilise metallic core and form stable nanocarriers to address MDR. Major objectives of this proposal are synthesis and characterisation of stable silver, copper and possibly their alloy, nanoparticles/nanoclusters by controlling their size and surface chemistry, synthesis and characterisation of anti-bacterial drug and inhibitor loaded nanocarriers in the form of nanocapsules to encapsulate nanoparticles/nanoclusters and other antibiotics/inhibitors to examine the combinatorial effect, antibacterial activity, cytotoxicity study of synthesised nanoparticles/nanoclusters against normal and resistant bacterial strains and in-vitro and in-vivo studies of synthesised nanoparticles/nanoclusters and nanocarriers. It will further evaluate the imaging potential of the designed/synthesised new materials to explore the mechanistic details.



Title: Synthesis of Non-Noble Electrocatalysts for Anion Exchange Membrane Fuel Cells (AEMFC)
PI: Dr. Saim Sahir - UET Peshawar
Co-PI: Dr. Irshad Hussain
Sponsor: UET, Peshawar | U.S Agency for International Development (USAID)
Funding Amount: PKR 1,160,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: The objective of this project is to explore the use of NI nanoparticles/nanoclusters as anode catalyst and Ag nanoparticles/nanoclusters as cathode catalyst. Reproducible and surfactant-free synthesis of well-defined and stable Ni and Ag electrocatalysts on various supports will be of great importance to explore the potential of cheaper catalyst for alkaline fuel cell applications and to study the correlation between size/shape and electrocatalytic performance in detail.

Title: Synthesis and Characterization of Metal Nanoparticles Chemicals and Consumables
PI: Dr. Irshad Hussain
Co-PI: Dr. Najeeb Ullah , UET Peshawar
Sponsor: UET, Peshawar
Funding Amount: PKR 1,000,000
Project Initiated in: 2015
Duration: 24 Months
Category: Health
Description: Dr. Irshad Hussain received funding for Synthesis and Characterization of Metal nanoparticles Chemicals and Consumables from UET, Peshawar.

Dr. Muhammad Saeed
Department of Chemistry and Chemical Engineering, SBASSE
Muhammad.saeed@lums.edu.pk
+924235608347

Profile Dr. Muhammad Saeed is an Associate Professor at the Department of Chemistry and Chemical Engineering, SBASSE, LUMS. He received his M.Sc. in Chemistry from the University of the Punjab, Lahore, Pakistan with distinction (Punjab University topper with Gold Medal) in 1996. Before his PhD research, he served as a Research Assistant/Research Officer at H.E.J. Research Institute of Chemistry, University of Karachi. During this time he was awarded DAAD fellowship to conduct PhD research at the University of Tübingen, Germany under the supervision of Prof. Dr. Wolfgang Voelter. In 2000, he was selected by the DAAD to represent its students in the 50th Annual Nobel Laureate Meeting at Lindau, Germany. By 2001, he was able to synthesise several natural products and their unnatural analogues, which earned him a PhD degree from the University of Tübingen in the span of less than three years.

Selected Publications

- Mukhtar, A., Zaheer, M., Saeed, M., & Voelter, W. (2017). Synthesis of Lignin Model Compound Containing a B-O-4 Linkage. Zeitschrift Für Naturforschung B, 72(2), 119-124
- Nilaweera, T. D., Saeed, M., & Kohen, A. (2015). Targeting the De Novo Biosynthesis of Thymidylate for the Development of a PET Probe for Pancreatic Cancer Imaging. Biochemistry, 54(5), 1287-1293
- Saeed, M. U., Chen, Z., Chen, Z., & Li, B. (2014). Compression Behaviour Of Laminated Composites Subjected To Damage Induced By Low Velocity Impact and Drilling. Composites Part B: Engineering, 56, 815-820

Title: Antiviral Drug Design by Targeting Viral Specific Proteases
PI: Dr. Muhammad Saeed
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Health
Description: Dengue Fever (DF) is a clinical manifestation of infection by dengue virus (DENV), which, in most cases, is very mild and self-healing ailment. Nevertheless, development of DF to dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS) can be fatal and life threatening. Currently, there is no therapeutic treatment or vaccine against DENV infection. Conventional practice to tackle DENV infection involves extensive use of insecticides to curb the transmitting mosquitos. This approach has many negative effects, both on the ecosystem, as well as on the environment. Thus, an alternative approach based on the development of specific drugs against DENV infections is highly desired.

Title: Discovery and Development of Anti-Dengue Therapeutics by Targeting the Virus-Specific Proteases
PI: Dr. Muhammad Saeed
Co-PI: Dr. Moazur Rahaman - National Institute for Biotechnology and Genetic Engineering (NIBGE)
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 4,510,562
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: Prevalence of dengue virus (DENV) in Pakistan has resulted in frequent outbreaks of dengue fever (DF), dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Lack of proper vaccination for prevention and/or the scarcity of a specific medicaments to treatment DENV infection are the key reasons behind the significant and incremental morbidity and mortality in various regions of the country. This project aims to synthesise computationally designed and optimised small organic molecules that will be tested for their potential to inhibit the DENV protease activity. Successful completion of the project may provide several DENV inhibitors for the preclinical and clinical trials in future.

Title: Development of an Affinity Support to Facilitate Isolation and Structural Characterisation of Native Human Thymidylate Synthase for the Posttranslational Modifications and Their Role in Drug Resistance
PI: Dr. Muhammad Saeed
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: The fundamental aim of this project is to develop an affinity support to isolate native hTS from human cancer cell line, HCT116. It is based on using a substrate analogue/inhibitor of hTS with strong binding parameters as bait, and covalently linking it on a solid bead or resin.

Title: Discovering Etiology Based Strategies for the Prevention and Treatment of Estrogen-Induced Breast Cancer
PI: Dr. Muhammad Saeed
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 2,498,062
Project Initiated in: 2017
Duration: 36 Months
Category: Health
Description: Breast cancer is the one of the top leading causes of cancer-related deaths in Pakistan and worldwide. This project entails that estrogen-DNA adducts are capable of perturbing the cellular repair mechanisms by inhibiting the enzymatic activity of protein(s) involved in the DNA damage elimination pathway, and thus lead to the induction of cancer specific mutations. Main focus of this project is the identification, isolation and characterisation of such proteins, followed by designing the strategies for prevention and treatment of breast cancer by using the newly discovered protein(s) as therapeutic targets.

Title: Development of A Novel Cell-Based Screening Assay for Safely Testing Anti-Dengue Activity of Synthetic Compounds as well as the Indigenous Plant Extracts
PI: Dr. Muhammad Saeed
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Sciences
Description: The core focus of this project is on the development of a novel cell-based technique to validate the positive 'hits' from preliminary studies and screening a wide range of indigenous medicinal plants of Pakistan for antiviral activity in general. This project aims to propose an alternative to the PRNT assay, which can serve the same purpose in a much safer way. The proposed in vitro assay will be based on a human cell line (HEK293, BHK21 or similar), which will be stably transformed by using a plasmid. The plasmid would be recombinantly constructed to contain dengue pseudo-polyprotein (PPP), i.e. segments containing the DENV NS2B-NS3 protease, envelope (E), capsid (C), and non-structural (NS1, NS4, or NS5) proteins. Each segment will be arranged in tandem and separated by a dibasic amino acid (KK, RK, or RR) sequence, to be recognised and cleaved by the protease. When fully expressed, the plasmid would encode DENV pseudo-polyprotein (PPP), which will be processed and cleaved by the co-translated NS2B-NS3 protease. Thus, the cell lysate will contain the processed protein components and a very small amount of PPP, which can be identified by the western blot technique. However, inhibition of the protease activity by a compound would render the accumulation of un-processed PPP, and very small amounts of the component proteins. Development of this in vitro model will facilitate in fast and safe screening of small organic molecules, prepared from the natural plants or synthesised in lab, for their anti-dengue therapeutic effects.

Dr. Muhammad Zaheer
Department of Chemistry and Chemical Engineering, SBASSE
muhammad.zaheer@lums.edu.pk
+924235608465

Profile Dr. Muhammad Zaheer earned his MPhil degree from Quaid-i-Azam University. In 2009, he was awarded with HEC Overseas Scholarship for PhD studies in Germany. He completed his degree under the supervision of Prof. Dr. Rhett Kempe from the University of Bayrueth. During his PhD, he worked on the development of robust heterogeneous catalysts for sustainable chemistry applications including biomass transformation into fuels and chemicals. Dr. Zaheer published papers in the scientific journals of high impact like Chemical Society Reviews and Chemistry of Materials. He was a post-doctoral fellow at the Department of Inorganic Chemistry, University of Bayreuth before joining LUMS as an Assistant Professor. His research interests include the development of heterogeneous catalysts for the conversion of biomass to obtain fuels/chemicals, renewable energy generation/storage and green chemistry.

Selected Publications

- Rashid, J., Saleem, S., Awan, S. U., Iqbal, A., Kumar, R., Barakat, M. A., ... & Awad, M. (2018). Stabilized Fabrication of Anatase-TiO 2/FeS 2 (pyrite) Semiconductor Composite Nanocrystals for Enhanced Solar Light-mediated Photocatalytic Degradation of Methylene Blue. RSC Advances, 8(22), 11935-11945
- Eckardt, M., Zaheer, M., & Kempe, R. (2018). Nitrogen-doped Mesoporous SiC Materials with Catalytically Active Cobalt Nanoparticles for the Efficient and Selective Hydrogenation of Nitroarenes. Scientific Reports, 8(1), 2567
- Zaheer, M., & Kempe, R. (2015). Catalytic Hydrogenolysis of Aryl Ethers: A Key Step in Lignin Valorization to Valuable Chemicals. ACS Catalysis, 5(3), 1675-1684
- Zaheer, M., Hermannsdörfer, J., Kretschmer, W. P., Motz, G., & Kempe, R. (2014). Robust Heterogeneous Nickel Catalysts with Tailored Porosity for the Selective Hydrogenolysis of Aryl Ethers. ChemCatChem, 6(1), 91-95

Title: Designing Stable and Reusable Catalysts for the Development of a Hydrogen Battery from Biomass Derived Formic Acid
PI: Dr. Muhammad Zaheer
Co-PI: Dr. Shabnam Shahida - University of Poonch
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 6,358,980
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: The main objective of this project is to design catalysts that could, in the first step convert biomass to formic acid and in the second step, store or generate hydrogen whenever demanded for the generation of electricity. Successful completion of this project would help to manage agricultural waste and related biomass waste. It could also help to reduce carbon dioxide (greenhouse gas) from the atmosphere by its conversion into formic acid. It would be helpful in small scale (renewable) energy generation and storage. Local chemical industry can benefit from this project in terms of the renewable production of industrially important chemicals like methanol (hydrogenation product of carbon dioxide) thereby decreasing the annual import of chemicals.

Title: The Development of a Glycerol Fuel Cell for the Production of Electricity from Biodiesel Waste
PI: Dr. Muhammad Zaheer
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 818,480
Project Initiated in: 2017
Duration: 12 Months
Category: Energy
Description: This project aims to contribute towards the solution of current energy crisis in Pakistan. Pakistan State Oil has shown positive response to collaborate in terms of provision of crude glycerol for research and scholarships to the research students involved. The aim is to provide working opportunity to talented but economically less privileged students in this project. Special consideration will be given to female students in order to give them equal working opportunity.

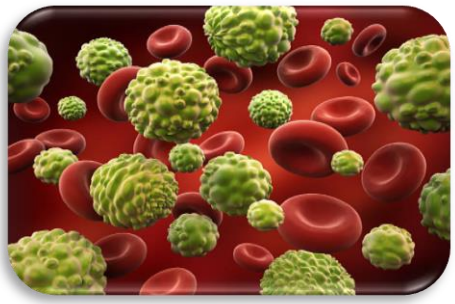
Title: Catalytic Conversion of Agricultural Waste into Potential Fuels and Chemicals
PI: Dr. Muhammad Zaheer
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 9,401,250
Project Initiated in: 2015
Duration: 36 Months
Category: Environment
Description: This projects focuses on the utilisation of chemical methods in order to derive chemicals from rice husk and potentially gears about its selective degradation to simple molecules, playing with these simple molecules to prepare chemicals of industrial importance including solvents, fuels (e.g., ethanol) building blocks of polymers (e.g., nylon, PET) and finally preparation of the materials by which the aforementioned processes can be achieved.

Dr. Rahman Shah Zaib Saleem
Department of Chemistry and Chemical Engineering, SBASSE
rahman.saleem@lums.edu.pk
+924235608215

Profile Dr. Rahman joined LUMS in 2012 and since then has been actively developing his drug discovery research group. He is interested in the synthesis of the libraries of novel molecules that could modulate various cellular proteins involved in the cell cycle [notably kinases (Aurora kinases), centrosome clustering, Phosphohistonase 3P, MDM2-p53,, AAA+ ATPase & 12-TM)], development of new methodologies to access novel scaffolds, novel ligands for nanoparticle and the isolation, characterisation and synthesis of the natural products of biological importance and food and toxicology. Earlier, he obtained his MSc in Chemistry from Government College University, Lahore, Pakistan with distinction (Gold Medal and Academic Role of Honour) in 2002 and MPhil in Chemistry in 2004. In 2006, he obtained a Fulbright scholarship for PhD in Chemistry at Michigan State University, USA and completed it in 2011.

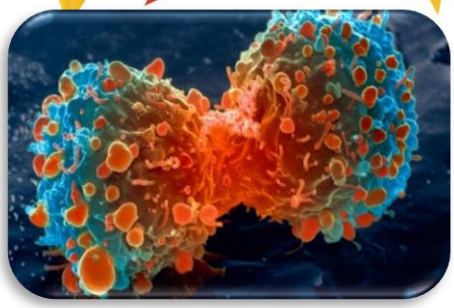
Selected Publications

- Asghar, S., Shahzadi, T., Alazmi, M., Gao, X., Emwas, A. H., Saleem, R. S., & Chotana, G. A. (2018). Iridium-Catalysed Regioselective Borylation of Substituted Biaryls. Synthesis
- Manzoor, S., Bilal, A., Khan, S., Ullah, R., Iftikhar, S., Emwas, A. H., ... & Faisal, A. (2018). Identification and characterization of SSE15206, a microtubule depolymerizing agent that overcomes multidrug resistance. Scientific reports, 8(1), 3305
- Rendekova, J., Vlasakova, D., Arsenyan, P., Vasiljeva, J., Nasim, M. J., Witek, K., ... & Saleem, Z. (2017). The Selenium-Nitrogen Bond as Basis for Reactive Selenium Species with Pronounced Antimicrobial Activity. Current Organic Synthesis, 14(8), 1082-1090.
- Saleem, R. S. Z., & Tepe, J. J. (2015). A concise total synthesis of hymenialdisine. Tetrahedron Letters, 56(23), 3011-3013

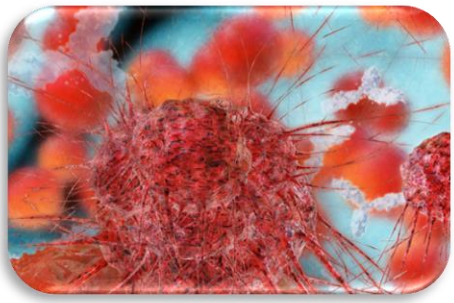


Title: Inhibition of Centrosome Clustering In Cancer Cells: An Approach To Selectively Eradicate Cancer Cells
PI: Dr. Rahman Shah Zaib Saleem
Co-PI: Dr. Amir Faisal
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 3,950,846
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: This project is about inhibition of centrosome clustering in the cancer cells. The purpose of this project is to develop a robust assay to screen organic compounds and natural product extract against the cancer cells. Furthermore, this project aims to prepare small organic molecules that could inhibit centrosome clustering and to explore the local flora of folk-lore anti-cancer importance to identify fractions and preferably the natural compounds with the ability to inhibit this clustering. This project will identify unique compounds that will inhibit centrosome clustering and potentially lead to therapeutic strategies for selective eradication of cancer cells.

Title: Natural Dye Based High Efficiency Dye-Sensitized Solar Cells
PI: Dr. Rahman Shah Zaib Saleem
Co-PI: Dr. Habib-ur-Rehman
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 6,426,324
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: The main objective of this project is to utilise naturally available dyes as efficient sensitizers in DSSCs. It is important to first identify best natural dyes in terms of solar efficiency. These dyes will then be analysed for their HOMO-LUMO alignment with electron transport layer (ZnO/TiO_2). In the next step, these dyes will be modified by attaching electron donors, electron acceptors or required linkers to better align their HOMO-LUMO with electron acceptor (TiO_2/ZnO) for improved sensitisation and efficient electron transfer. Finally, the efficiencies of these dyes will be compared with Ruthenium Dyes or cobalt complexes base DSSCs.



Title: Synthesis of Novel Selenium Containing Redox Modulators
PI: Dr. Rahman Shah Zaib Saleem
Co-PI: Prof. Dr. Claus Jacob - University of Saarland
Sponsor: German Pakistani Research Cooperation Programme (DAAD)
Funding Amount: PKR 780,769
Project Initiated in: 2016
Duration: 4 Months
Category: Sciences
Description: Cancer is the major cause of mortality in the world. Current therapies often suffer from severe primary and secondary side effects due to non-specificity. Modulation of redox balance is one such area that can be used to design selective, yet effective cancer drugs. This modulation can be done using organic or inorganic compounds carrying redox properties. The idea of multifunctional redox modulators is currently gaining momentum and there is a need to explore the chemical space to obtain new lead molecules for subsequent biological evaluation. This project focuses on preparing such compounds that will contain the inorganic part (selenium) conjugated to organic components. This project will involve unique chemical reactions allowing incorporation of selenium atom into the organic structures. It is expected that these compounds, upon biochemical testing, will offer superior physio-chemical properties and bioactivities, thus paving the way forward in developing redox modulators for cancer therapy.



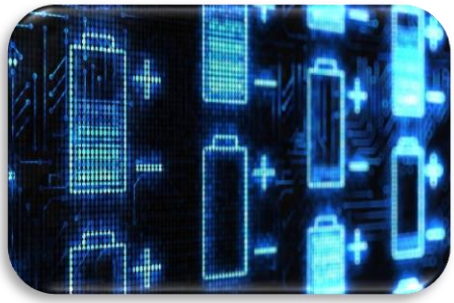
Title: Improving Current Cancer Therapy by Making Cancer Cells More Sensitive to Death Using Novel MDM2:P53 Inhibitors
PI: Dr. Rahman Shah Zaib Saleem
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: This research project involves development and optimisation of the synthetic route and cell based assays for analysis. The synthetic route will be used for the preparation of the library of these compounds. Then these compounds will be evaluated for their biological activity to develop structure activity relationship. This will then follow the time course studies for the expression of p53 in presence and absence of these compounds to see the ability of these compounds to stabilise p53. The overarching goal of this project is to synthesise a library of compounds and identify the compounds that can stabilise p53 in the cancer cells. This will be achieved through following synthesis of the organic compounds and their chemical characterisation, development of cell based assay for evaluation of these compounds, evaluation of these compounds via in vitro and in vivo assays and time course studies of the expression of p53 in presence and absence of these compounds.

Dr. Salman Noshear Arshad
Department of Chemistry and Chemical Engineering, SBASSE
salman.arshad@lums.edu.pk
+924235608478

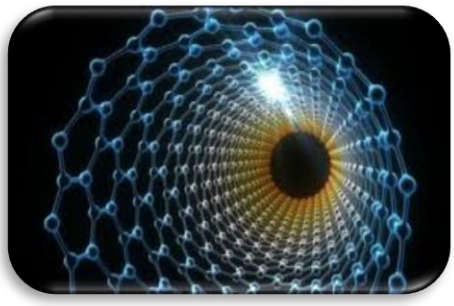
Profile Dr. Salman Noshear Arshad is an Assistant Professor of Chemistry at the Syed Babar Ali School of Science and Engineering. He did his BS in Metallurgy and Materials Engineering from GIK Institute of Engineering Sciences and Technology, Pakistan. He then went to South Korea for his Masters in Materials Science and Engineering from Korea Advanced Institute of Science and Technology (KAIST) under Korea Science and Engineering (KOSEF) fellowship. At KAIST he developed novel bottom-up methods to synthesise carbon nanotubes reinforced metal and ceramic nanocomposite materials with enhanced mechanical and multifunctional properties. On his return to Pakistan, he joined GIK Institute as Research Associate where he taught undergraduate courses in Materials Science and Engineering and continued his research on carbon nanotubes reinforced nanocomposites. Dr. Arshad was awarded Fulbright fellowship for his graduate studies at the University of Illinois at Urbana-Champaign (UIUC, USA). While at UIUC he completed another Masters in Aerospace Engineering and PhD in Materials Science and Engineering.

Selected Publications

- Ghafoor, S., Ata, S., Mahmood, N., & Arshad, S. N. (2017). Photosensitization Of Tio 2 Nanofibers By Ag 2 S With The Synergistic Effect Of Excess Surface Ti 3+ States For Enhanced Photocatalytic Activity Under Simulated Sunlight. Scientific Reports, 7(1), 255
- Dilpazir, S., Usman, M., Rasul, S., & Arshad, S. N. (2016). A Simple UV-Ozone Surface Treatment To Enhance Photocatalytic Performance Of Tio 2 Loaded Polymer Nanofiber Membranes. RSC Advances, 6(18), 14751-14755
- Mohsin, H., Sultan, U., Joya, Y. F., Ahmed, S., Awan, M. S., & Arshad, S. N. (2016, August). Development And Characterization Of Cobalt Based Nanostructured Super Hydrophobic Coating. In IOP Conference Series: Materials Science And Engineering (Vol. 146, No. 1, P. 012038). IOP Publishing

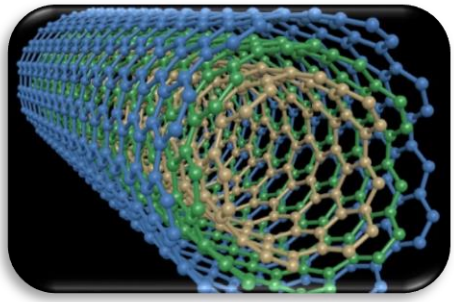


Title: Composite Carbon Nanofiber Based Nanostructured Electrodes for Enhanced Energy Storage in Lithium Ion Batteries
PI: Dr. Salman Noshear Arshad
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 6,071,998
Project Initiated in: 2018
Duration: 36 Months
Category: Energy
Description: Fossil fuels are rapidly depleting, which highlights the need for the development of low cost, scalable, durable, sustainable and efficient energy storage solutions. Lithium Ion Batteries (LIBs) have emerged as the most promising candidate due to higher specific energy capabilities and less discharge when compared to nickel-metal hydrides. This project aims to develop nanostructured composite materials as anodes for LIBs for enhanced performance. Successful execution of this project will create numerous job and investment opportunities that will positively contribute to economic development.



Title: Higher Capacity Lithium Ion Batteries Using Silicon/Carbon Composite Nanofiber Anodes
PI: Dr. Salman Noshear Arshad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: This project focuses on using both C and Si as a composite solution for improved electrochemical performance in modern Lithium Ion Batteries by maintaining structural integrity and electrical conductivity. The main objective of this project is the development of electrospun Si/C composite nanofibers as anode materials for LIBs and to improve the homogeneity and conductivity of fabricated Si/C composite nanofibers. The ultimate objective is the development of low cost and scalable battery materials for commercialisation.

Title: Nanofiber Based Membranes for Water Desalination Using Smart ZnO Nanostructures
PI: Dr. Salman Noshear Arshad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 930,000
Project Initiated in: 2018
Duration: 12 Months
Category: Water
Description: This project focuses on the development of middle porous membrane using polymer nanofibers embedded with smart ZnO nanostructures. It further aims to improve membrane performance, focusing on fouling, flux enhancement, small ion rejection and scaling by incorporating smart piezoelectric ZnO nanostructures in the middle porous layer and develop a lab-scale stand-alone desalination unit for performing batch experiments with NF membranes. This project will focus on the fabrication of the middle porous support by a unique and versatile electrospinning process. The ZnO nanostructures will be prepared using VLS and wet-chemical techniques, using the appropriate salts and reagents. The advantage of the process is that size, doping and defects can be easily controlled by tuning the process parameters. Nanostructures will be mixed in different concentrations and different methods of mixing will be tested. Post-synthesis heat treatment can be used to achieve the desired crystallinity and surface treatments.



Title: Surface Modulated Carbon Nanofibers for Enhanced Toughening in Nano-Composites
PI: Dr. Salman Noshear Arshad
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 13,587,209
Project Initiated in: 2016
Duration: 36 Months
Category: Sciences
Description: This research project aims to investigate the performance of carbon nanofiber reinforced polymer nanocomposites where the surface of the carbon nanofiber will be tailored to maximise its performance. These large scale nanocomposites will find applications as structural material, in automotive industry and as sensors etc.

DEPARTMENT OF COMPUTER SCIENCE

Dr. Asim Karim
Department of Computer Science, SBASSE
akarim@lums.edu.pk
+924235608205

Profile Dr. Asim Karim holds a BSc degree from UET Lahore and a Doctorate from Ohio State University (OSU). Before joining LUMS in 2002, he worked as a research associate in the Knowledge Engineering Lab at OSU. Dr. Karim is an internationally recognised researcher in the areas of data mining, machine learning, and applied artificial intelligence. He has authored over 50 articles at leading venues including two books and 19 journal articles. At LUMS, Dr. Karim has been instrumental in developing and strengthening the graduate programme in data mining and machine learning. He is the founding director of the Knowledge and Data Engineering Lab, which is the centre of his research activities. The lab's recent publication venues include ICDM, CIKM, PAKDD, and COLING. Dr. Karim has supervised four PhD graduates in the data mining/machine learning area.

Selected Publications

- Kamiran, F., Mansha, S., Karim, A., & Zhang, X. (2018). Exploiting reject option in classification for social discrimination control. [Article]. Information Sciences, 425, 18-33
- Anwar, A., Mansha, S., Kamiran, F., & Karim, A. (2016). Identification of Influential Users in Speech-Based Networks
- Mansha, S., Kamiran, F., Karim, A., & Anwar, A. (2016, October). A Self-Organizing Map for Identifying Influential Communities in Speech-based Networks. In Proceedings of the 25th ACM International on Conference on Information and Knowledge Management (pp. 1965-1968)
- Mansha, S., Babar, Z., Kamiran, F., & Karim, A. (2016, October). Neural Network Based Association Rule Mining from Uncertain Data. In International Conference on Neural Information Processing (pp. 129-136). Springer International Publishing
- Junejo, K. N., Karim, A., Hassan, M. T., & Jeon, M. (2016). Terms-based discriminative information space for robust text classification. Information Sciences, 372, 518-538

Title: End to End Deep Learning for Hierarchical Classification of Roman Urdu Short Text
PI: Dr. Asim Karim
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 920,000
Project Initiated in: 2018
Duration: 12 Months
Category: Education
Description: Urdu is the primary medium of communication in Pakistan. With the emergence of e-government practices, many public services tasks are automated. In 2010, the Government of Punjab started a project namely Citizens Feedback Monitoring Program (CFMP) which aims to get feedback from citizens via SMS on different public sector services and consequently improve those services. The SMS received under this project are then categorised into hierarchies such as Department, Sub-Department, and Class, where class is one of predefined 19 categories indicating whether it's an appreciation or corruption complaint etc. These SMS texts are predominately in Roman Urdu. The proposed project is mainly research based and is focused on CFMP dataset by the Government of Punjab which is collected from citizens. This project aims to develop state-of-the-art methods of deep learning to learn representations of informal Roman Urdu text and model it into hierarchical categorisation and develop a dataset that can act as benchmark to be used by future researchers to contribute towards performing different automated tasks on Roman Urdu text.

Title: Modelling and Normalizing Roman-Urdu Text for Automatic Processing
PI: Dr. Asim Karim
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 930,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: Roman-Urdu is widely used in online textual communications in Pakistan. From SMS messages to Twitter tweets, users compose predominantly Urdu content using English alphabets. This writing style has developed to the extent that serious communications like public service messages and advertisements are also being done in Roman-Urdu. Currently, there is no acceptable standard for Roman-Urdu writing, nor is there a reliable way of processing Roman-Urdu text for applications like event detection, topic modelling, and sentiment analysis. The goal of this project is to identify variants of the same word and map all those variants to its normal form. The prime objective is to focus on statistical natural language processing techniques to model and normalise Roman-Urdu text.

Title: An Open-Source Project for Accessible LaTeX-based Authoring and Presentation of Mathematical Documents
PI: Dr. Asim Karim
Co-PI: Dr. Suleman Shahid
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 12,525,099
Project Initiated in: 2016
Duration: 27 Months
Category: Sciences
Description: The primary purpose of this project is to develop ALAP, an integrated Accessible LaTeX-based Authoring and Presentation software for PVIs. ALAP will provide advanced math-to-speech and basic math-to-Braille capabilities. ALAP will be developed with open-source technologies to enable its widespread usability. As part of this project, existing technologies for accessible math will also be evaluated. The primary beneficiaries of this project are PVIs in general and those in Pakistan specifically, and educational and business organisations dealing with mathematical content.

Dr. Basit Shafiq
Department of Computer Science, SBASSE
basit@lums.edu.pk
+924235608366

Profile Dr. Basit Shafiq received his BS degree in Electronic Engineering from GIK Institute of Engineering Sciences and Technology, Pakistan, and received his MS and PhD degrees in Electrical and Computer Engineering from Purdue University, USA. He is currently an Assistant Professor in the Computer Science Department at LUMS. Dr. Shafiq's interests include information systems security and privacy, access-control management in distributed systems, Web services composition and verification, ontologies, and distributed multimedia systems. His research work resulted in several publications in well-renowned journals, including, IEEE Transactions on Knowledge and Data Engineering, ACM Transactions on Information and System Security, IEEE Transactions on Multimedia, IEEE Transactions on Service Computing, IEEE Computer, IEEE Communications Magazine, and Journal on Information and Computer Systems.

Selected Publications

- Afzal, A., Shafiq, B., Shamail, S., Elahraf, A., Vaidya, J., & Adam, N. R. (2018). ASSEMBLE: Attribute, Structure and Semantics based Service Mapping Approach for Collaborative Business Process Development. IEEE Transactions on Services Computing
- Asif, H., Talukdar, T., Vaidya, J., Shafiq, B., & Adam, N. (2016, November). Collaborative Differentially Private Outlier Detection for Categorical Data. In Collaboration and Internet Computing (CIC), 2016 IEEE 2nd International Conference on (pp. 92-101). IEEE
- Ghosh, D., Ae Chun, S., Shafiq, B., & Adam, N. R. (2016, June). Big Data-based Smart City Platform: Real-Time Crime Analysis. In Proceedings of the 17th International Digital Government Research Conference on Digital Government Research (pp. 58-66).
- Vaidya, J., Shafiq, B., Atluri, V., & Lorenzi, D. (2015). A Framework for Policy Similarity Evaluation and Migration Based on Change Detection. InNetwork and System Security (pp. 191-205). Springer International Publishing

Title: End-to-End Solution for Business Process Composition and Management (BP-Com)
PI: Dr. Basit Shafiq
Co-PI: Dr. Naveed Arshad, Dr. Shafay Shamail, Dr. Abdul Aziz
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 12,764,045
Project Initiated in: 2016
Duration: 24 Months
Category: Business and Innovation
Description: This project aims at improving efficiency and reducing cost for development, deployment, and management of business processes (BPs) for small and medium enterprises (SMEs). Specifically, the objective is to utilise the cloud-based services and resources for rapid development and deployment of BPs for SME organisations that cannot bear with the high cost of personnel and software/hardware resources for coding, administration, and hosting of their business processes.

Title: Information Sharing and Integration and Framework for Emergency Management and Response
PI: Dr. Basit Shafiq
Co-PI: Dr. Sohaib Ahmad Khan, Dr. Shahab M. Baqai
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 3,278,705
Project Initiated in: 2016
Duration: 24 Months
Category: Telecommunication
Description: The objective of the proposed work is to address the research and development challenges for development of a decision support system for emergency response planning and management. Such a system will enable shared situational awareness (SSA) and common operating picture (COP) among the relevant organisations (governmental, NGOs, private) for the purpose of providing effective decision support concepts at the operational and strategic levels during different phases of an emergency situation (prevention, response, and recovery.

Title: Codec - Composition and Management of E-Government Processes in the Cloud of Public Services
PI: Dr. Basit Shafiq
Co-PI: Dr. Shafay Shamail, Dr. Nabil Adam (Rutgers University)
Sponsor: U.S Agency for International Development (USAID)
External Collaboration: Rutgers University
Funding Amount: PKR 20,136,738
Project Initiated in: 2016
Duration: 24 Months
Category: Telecommunication
Description: The objective of the proposed work is to develop a middleware based system (called Codec) to support composition and management of e-government processes by utilising the services available in the Government Cloud or Public Cloud. The term Government Cloud is used to refer to the cloud infrastructure that hosts the e-government services provided by different government departments but managed by a single cloud service provider which may be a government department. Whereas, Public Cloud Infrastructure hosts services provided by commercial or non-governmental service providers (e.g., Amazon, Google). Together, both Government Cloud and Public Cloud form the 'Cloud of Public Services.'

Dr. Humaira Kamal
Department of Computer Science, SBASSE
humaira.kamal@lums.edu.pk
+924235608196

Profile Dr. Humaira Kamal obtained her PhD and MSc degrees in Computer Science from the University of British Columbia, Vancouver, Canada in 2013 and 2005, respectively. She is also a LUMS alumna and graduated at the top of her MSc class. She completed her undergraduate degree in Electrical Engineering from the University of Engineering and Technology, Lahore. Her area of research is High Performance Computing (HPC) and she works on developing systems and techniques that improve the performance, scalability and programmability of parallel computing systems. She aims to design and implement systems that have an impact in the HPC community and significantly contribute to the body of knowledge and the development of the country as a whole. Her research on Fine-Grain MPI (FG-MPI) was implemented with the view to enable technology transfer and it has been released as an open-source project. Her work on FG-MPI is well recognised in the MPI community and has received strong support from MPI experts at the Argonne National Laboratory (ANL) and the Parallel Computing Lab at Intel Corporation. She has worked with LUMS as a Teaching Fellow from 2000 to 2003 and 2005 to 2007. Prior to joining LUMS again, she was working with the University of British Columbia as Mitacs-Intel Postdoctoral Research Fellow.

Selected Publications

- N. Rosa, A. Wagner. And H. Kamal. Towards Lightweight Formal Development of MPI Applications. Communicating Process Architectures, 18 pages. Open Channel Publishing Ltd., England (August 2015)
- H. Kamal and A. Wagner. An Integrated Fine-Grain Runtime System for MPI. In Journal of Computing: Volume 96, Issue 4 (2014), Page 293-309
- S. Alam, H. Kamal and A. Wagner. A Service-oriented Scalable Dictionary in MPI. Communicating Process Architectures, 25 pages. Open Channel Publishing Ltd., England (August 2014)
- S. Alam, H. Kamal and A. Wagner. A Scalable Distributed Skip List for Range Queries.In the 23rd ACM Symposium on High Performance Parallel and Distributed Computing (HPDC14),June 2014

Title: Load Balancing of Irregular Applications through Fine-grain Processes
PI: Dr. Humaira Kamal
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 750,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: Load balancing of irregular applications is an important and challenging problem in a number of areas. Irregular applications require programming models that facilitate expression of fine grain parallelism, flexibility in work migration techniques and the ability to deal with varying workloads. Traditional parallel computing approaches for expressing parallelism in distributed memory systems do not match well to irregular problems. One of the reasons for this mismatch is the coarse-grained nature of problem partitioning in these approaches. The main objective of this project is to propose a different approach to load balancing by decoupling the application data from the compute processes. Instead of viewing data as passive entities, data will be modelled as light-weight MPI processes. The decoupling of data processes and compute processes is crucial in achieving dynamic load balancing through flexible composition of processes.

Dr. Ihsan Ayyub Qazi
Department of Computer Science, SBASSE
ihsan.qazi@lums.edu.pk
+924235608368

Profile Dr. Ihsan Ayyub Qazi received his BSc (Hons) degree from LUMS, with a double major in Computer Science and Mathematics, in 2005, and the PhD degree in Computer Science from the University of Pittsburgh, PA, in 2010. From 2010 to 2011, he was a Postdoctoral Research Fellow with the Centre for Advanced Internet Architectures, Australia. In 2009, he worked at BBN Technologies, Cambridge, Massachusetts USA on Global Environment for Network Innovations (GENI) project. His research interests are in computer networks and distributed systems and span cloud computing and data centres, high speed wireless networks, smart grids, and performance modelling of networked systems. His work has been published in top-tier networking journals, such as IEEE/ACM Transactions on Networking, as well as top-tier conferences (e.g., ACM SIGCOMM and IEEE INFOCOM).

Selected Publications

- Ilyas, M. S., Qazi, I. A., Rassool, B., & Uzmi, Z. A. (2016). Low-Carb: A practical scheme for improving energy efficiency in cellular networks. Computer Communications, 94, 72-84
- Ahmad, S., Haamid, A. L., Qazi, Z. A., Zhou, Z., Benson, T., & Qazi, I. A. (2016, November). A view from the other side: Understanding mobile phone characteristics in the developing world. In Proceedings of the 2016 ACM on Internet Measurement Conference (pp. 319-325). ACM
- Iftikhar, A. M., Dogar, F., & Qazi, I. A. (2016, November). Towards a Redundancy-Aware Network Stack for Data Centers. In Proceedings of the 15th ACM Workshop on Hot Topics in Networks (pp. 57-63). ACM
- Nishat, K., Javed, F., Salman, S., Yaseen, N., Fida, A., & Qazi, I. A. (2016, November). SlickFi: A Service Differentiation Scheme for High-Speed WLANs using Dual Radio APs. In Proceedings of the 12th International on Conference on emerging Networking EXperiments and Technologies (pp. 177-189). ACM

Title: A High Performance Cloud Data Centre Architecture Using Software-Defined Networks
PI: Dr. Ihsan Ayyub Qazi
Co-PI: Dr. Zartash Afzal Uzmi
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 5,612,842
Project Initiated in: 2015
Duration: 24 Months
Category: Technology
Description: The main focus of this project is to design and analyse a high performance cloud data centre network architecture using Software-Defined Networks (SDNs) to address critical challenges of performance and efficiency in such environments. Moreover, to design and analyse a scalable and low-complexity framework (including protocols and algorithms) for monitoring and managing cloud data centre resources, and implement a prototype and demonstrate the efficacy of the proposed scheme in achieving high performance. The proposed architecture has many advantages, including high performance due to its ability to manage cloud resources using a distributed control framework.

Title: A Service Differentiation Framework for Next-Generation WiFi Networks
PI: Dr. Ihsan Ayyub Qazi
Co-PI: Dr. Zartash Afzal Uzmi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 960,000
Project Initiated in: 2016
Duration: 12 Months
Category: Telecommunication
Description: The main objective of this project is to quantify the fundamental trade-off between network throughput and the QoS of real-time applications in high-speed WLANs, such as 802.11n, over a real WiFi testbed. The purpose of this research project is to design, analyse, implement and evaluate the performance of SlickFi, a service differentiation scheme for Wi-Fi networks.

Title: A QOS Differentiation Framework for Next-Generation High-Speed Wi-Fi Networks
PI: Dr. Ihsan Ayyub Qazi
Co-PI: Dr. Zartash Afzal Uzmi
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 2,660,242
Project Initiated in: 2017
Duration: 24 Months
Category: Telecommunication
Description: The main objective of this project is to design a Quality of Service (QoS) differentiation scheme for high-speed WiFi networks that simultaneously maximises the performance of real-time applications and network throughput. The proposed framework will allow real-time applications like Skype and Netflix to achieve high performance thereby improving user experience and it will allow larger number of users to effectively use a WiFi network than currently possible. The proposed design will be implemented in open source drivers in a backward-compatible manner so that all existing WiFi devices can benefit from the proposed research without requiring any changes in the WiFi standard.

Title: Design and Implementation of a Failure Resilient Network Load Balancer for Cloud Datacentres
PI: Dr. Ihsan Ayyub Qazi
Co-PI: Dr. Zartash Afzal Uzmi
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 18,844,518
Project Initiated in: 2017
Duration: 24 Months
Category: Technology
Description: The scope of the project is to design, implement, and evaluate a network load balancing solution (SLAB - Software Defined Agile Load Balancing) for large-scale DCs that is robust against different types of failures and remains efficient in the face of extreme burstiness and volatility of DC traffic. This project proposes SLAB (Software Defined Agile Load Balancing), a network load balancing architecture for data centres that uses recent advances in Software-Defined Networking (SDN) to achieve efficient, failure-resilient, agile, and deployable load balancing solution. SLAB has a fine-grained per-packet load balancing mechanism at the switches to evenly spread packets across multiple paths, a mechanism for detecting different types of failures (e.g., partial link failures and full link failures) and a SDN based logically centralised control plane for dynamically adapting load balancing in case of failures and topological asymmetries.

Title: On Optimal Load Balancing in Cloud Datacentres
PI: Dr. Ihsan Ayyub Qazi
Co-PI: Dr. Zartash Afzal Uzmi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 960,000
Project Initiated in: 2018
Duration: 12 Months
Category: Telecommunications
Description: With respect to DRIBS, this project will focus on a performance evaluation study. Performance evaluation of backpressure algorithms will be conducted to quantify the trade-off between delay performance and network throughput across different workloads, network topologies, traffic scenarios, and offered loads. This project will further focus on design and analysis of DRIBS and will also develop a mathematical model to prove the performance optimality of DRIBS. DRIBS will be implemented in the network simulator (ns2) and will conduct its comparison with state-of-the-art load balancing schemes.

Dr. Imdad Ullah Khan
Department of Computer Science, SBASSE
imdad.khan@lums.edu.pk
+924235608198

Profile Dr. Imdad Ullah Khan is an Assistant Professor of Computer Science at the Syed Babar Ali School of Science and Engineering, LUMS. He received his PhD in Computer Science from Rutgers, The State University of New Jersey. Prior to joining LUMS, Dr. Khan was an Assistant Professor at the department of Computer Science, in Umm Al-Qura University, KSA.

Selected Publications

- Beg, M., Ahmad, M., Zaman, A., Khan, I. (2018). Scalable Approximation Algorithm for Graph Summarization. In Pacific Asian Conference on Knowledge Discovery and Data Mining, (PAKDD)
- Tariq, J., Ahmad, M., Khan, I., Shabbir, M. (2017). Scalable Approximation Algorithm for Network Immunization. In Pacific Asia Conference on Information System, (PACIS)
- Shabbir, M., Jamshed, A., Khan, I., (2017). Affine Invariant Outlier Detection and Data Visualization. In Pacific Asia Conference on Information System, (PACIS)
- Farhan, M., Tariq, J., Zaman, A., Shabbir, M., & Khan, I. (2017). Efficient Approximation Algorithms for Strings Kernel Based Sequence Classification. In Advances in Neural Information Processing Systems (NIPS)
- Ahmad, M., Tariq, J., Shabbir, M., & Khan, I. (2017). Spectral Methods for Immunization of Large Networks. In Australasian Journal of Information Systems
- Abbas, S., Tariq, J., Zaman, A., & Khan, I. (2017). Sampling Based Efficient Algorithm to Estimate the Spectral Radius of Large Graphs. In 37th IEEE International Conference on Distributed Computing Systems Workshops (ICDCSW)

Title: A Course Enrolment Recommendation System: A First Phase In Educational Data Mining For Efficient Universities Decision Support System
PI: Dr. Imdad Ullah Khan
Co-PI: Dr. Naveed Arshad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 960,000
Project Initiated in: 2017
Duration: 12 Months
Category: Education
Description: The overall project aims to develop intelligent decision support system for universities in Pakistan to improve quality of education and efficiency of processes. The main objective is to develop efficient algorithms for mining and analysing large datasets from educational institutions and design an intelligent decision support system to aid admissions, instructions and student's guidance processes at universities. The purpose is to design a system that will aid students in making an informed decision regarding choosing elective courses, declaring major/minor and opting for a project in a particular area. This system will predict student's success in each of the available options using statistical analysis of students past record, current trends and course analytics.

Dr. Junaid Haroon Siddiqui
Department of Computer Science, SBASSE
junaid.siddiqui@lums.edu.pk
+924235608197

Profile Dr. Junaid Haroon Siddiqui is an Assistant Professor of Computer Science at the Syed Babar Ali School of Science and Engineering, LUMS. Previously, he received his PhD in Computer Science from University of Texas at Austin (UT Austin) and MS and BS Computer Science from FAST-NU National University of Computer and Emerging Sciences, Lahore, Pakistan. His experience includes 8 years of teaching at FAST-NU, LUMS, and UT Austin. His 7 years of industry experience includes working at Microsoft, Google, and various Pakistan based software houses. He is leading the Programme Analysis Group for research in using automated analysis for software reliability. His research interests include programme analysis using static and dynamic techniques in automatic software test generation and parallel and incremental techniques in scaling algorithms for multicore processors and the intersection of these domains.

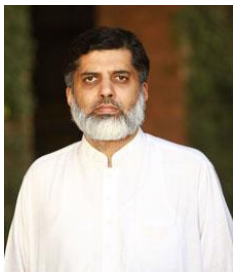
Selected Publications

- Siddiqui, J. H., Rauf, A., & Ghafoor, M. A. (2017). Advances in Software Model Checking. Advances In Computers
- Ayub, M. S., Rehman, W. U., & Siddiqui, J. H. (2017, October). Experience Report: Verifying MPI Java Programs Using Software Model Checking. In 2017 IEEE 28th International Symposium on Software Reliability Engineering (ISSRE) (Pp. 294-304). IEEE
- Ahmed, S., Khan, H., Siddiqui, J. H., Bitsch, J. Á., & Alizai, M. H. (2016, November). Incremental Checkpointing for Interruptible Computations: Poster Abstract. In Proceedings of the 14th ACM Conference on Embedded Network Sensor Systems CD-ROM (Pp. 350-351). ACM
- Rehman, W. U., Ayub, M. S., & Siddiqui, J. H. (2016, February). Verification of MPI Java Programs Using Software Model Checking. In Proceedings of the 21st ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (P. 55). ACM
- Ghafoor, M. A., Mahmood, M. S., & Siddiqui, J. H. (2016, April). Effective Partial Order Reduction in Model Checking Database Applications. Insoftware Testing, Verification and Validation (ICST), 2016 IEEE International Conference on (Pp. 146-156). IEEE

Title: Making Data Science Available to the Masses
PI: Dr. Junaid Haroon Siddiqui
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Sciences
Description: Data Science relies on Machine Learning to extract useful information from data. Machine Learning (ML) has revamped every domain of life as it provides powerful tools to build complex systems that learn and improve from experience and data. Our key insight is to solve a machine learning problem, data scientists do not invent a new algorithm each time, instead they evaluate range of existing models with different configurations and select the best one. This task is laborious, error prone, and drains a large chunk of project budget and time. This project proposes a novel framework inspired by programming by Sketching [10] and Partial Evaluation [6] to minimise human intervention in developing ML solutions. This project aims to share code and computation between different algorithms, and only partially evaluate configuration space of algorithms based on information gained from initial algorithm evaluations.

Title: Making IT Systems Resilient Using Automated Program Analysis
PI: Dr. Junaid Haroon Siddiqui
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 940,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: The motivation of this research is to use automated verification techniques to make widely deployed database management systems more resilient. This project proposes to use a state-of-the-art program analysis technique called symbolic execution and intends to extend symbolic execution to analyse complex information management systems.

Dr. Mian Muhammad Awais
Department of Computer Science, SBASSE
awais@lums.edu.pk
+924235608188



Profile Dr. Awais received his PhD from Imperial College, University of London. Prior to joining LUMS, Dr. Awais conducted European Union research and development projects for a UK based SME. His PhD work was related to the development of on-line models for parametric estimation of solid fuel-fired industrial boilers. Dr. Awais has also conducted research work on a class of iterative methods pertinent to Krylov subspaces for optimisation, such as the oblique projection and implicitly restarted model reduction methodologies.

Selected Publications

- Baig, M. M., Awais, M. M., & El-Alfy, E. S. M. (2017). A Multiclass Cascade of Artificial Neural Network for Network Intrusion Detection. Journal Of Intelligent & Fuzzy Systems, 32(4), 2875-2883
- Baig, M. M., Awais, M. M., & El-Alfy, E. S. M. (2017). Adaboost-Based Artificial Neural Network Learning. Neurocomputing, 248, 120-126
- Khalid, A., & Awais, M. M. (2015). Comparing Distance to Consensus of Collective Relations Using OWA Operators. Journal Of Intelligent And Fuzzy Systems, 28(4), 1647-1657
- Rana, Z.A., Mian, M.A., Shamail, S. (2015) Improving Recall Of Software Defect Prediction Models Using Association Mining: Knowledge-Based Systems
- Javaid, M. M., Yousaf, M. A., Sheikh, Q. Z., Awais, M. M., Saleem, S., & Khalid, M. (2015, November). Real-Time EEG-Based Human Emotion Recognition. In Neural Information Processing (Pp. 182-190). Springer International Publishing
- Baig, M. M., El-Alfy, E. S. M., & Awais, M. M. (2015, November). Learning Rule for Linear Multilayer Feedforward ANN by Boosted Decision Stumps. Inneural Information Processing (Pp. 345-353). Springer International Publishing

Title: Hand Held AI Based Crop Disease Diagnosis Tool for Farmers
PI: Dr. Mian Muhammad Awais
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Agriculture
Description: South Asian countries are amongst the largest producers of crops with favourable climate conditions and fertile soil. However, traditional agricultural mechanisms that are in place and inadequate effort has been put to exploit the usage of ICT for yield enhancement. One of the main problem being faced by the agricultural sector in Pakistan and in other developing countries is the delayed diagnosis of crop disease. Conventional methods for disease diagnosis in crops lead to less accurate and sometimes inefficient diagnosis, consequently leading to low productivity. In this project, three AI based systems for diagnosing the crop diseases will be developed and tested. The diagnostic system will be available to the farmer as an android application in the Urdu Language. The farmer will enter the either the description of plant condition as text or as an image to the system. The system will consequently suggest a possible disease. The system will be developed keeping in view the ease of use from the farmer's prospective. The main deliverable of the project will be smart phone mobile application fully usable for any farmer for efficient and timely diagnosis of crop disease. Initially this project will cater two main crops of Pakistan from cotton, rice, sugarcane or wheat. The proposed system will be tested in field by the farmers.

Dr. Mobin Javed
Department of Computer Science, SBASSE
mobin.javed@lums.edu.pk
+924235603338

Profile Dr. Mobin Javed is an Assistant Professor of Computer Science at the Syed Babar Ali School of Science and Engineering, LUMS. Her research focuses on Internet Security, Privacy, and Measurements. Prior to joining LUMS, she was a post-doc at ICSI, Berkeley. She completed her PhD from UC Berkeley in 2016, where she had the good fortune of being advised by Vern Paxson. She is a data enthusiast at heart, and enjoys the art of mining large-scale datasets to uncover interesting information that can enhance understanding of the state of internet and lead to better defences against internet threats. Dr. Mobin serves on the Technical Program Committee of various top-ranked conferences: Usenix Security, Privacy Enhancing Technologies Symposium (PETS) and the Internet Measurement Conference (IMC).

Selected Publications

- Bano, S., Richter, P., Javed, M., Sundaresan, S., Durumeric Z., Murdoch, S. J., Mortier, J., Paxson, V. (2018). Scanning the Internet for Liveness. ACM SIGCOMM Computer Communication Review
- Ho, G., Sharma, A., Javed, M., Wagner, D., Paxson, V. (2017). Detecting Credential Spearphishing in Enterprise Settings. 26th USENIX Security Symposium
- Jain, S., Javed M., Paxson, V. (2016). Towards Mining Latent Client Identifiers from Network Traffic. Privacy Enhancing Technologies Symposium
- Khattak, S., Fifield, D., Afroz, S., Javed, M., Sundaresan, S., Paxson, V., Murdoch, S. J., McCoy, D. (2016). Do You See What I see? Differential Treatment of Anonymous Users. Network and Distributed System Security Symposium
- Javed, M., Herley, C., Peinado, M., Paxson, V. (2015). Measurement and Analysis of Traffic Exchange Services. ACM Internet Measurement Conference

Title: Usenix Gift Award from Facebook for Research at LUMS
PI: Dr. Mobin Javed
Sponsor: Facebook
Funding Amount: PKR 1,050,000
Project Initiated in: 2018
Duration: 24 Months
Category: Technology
Description: This project aims to develop techniques for protecting enterprise users against the threat of spear-phishing attacks. Spear-phishing attacks are a special category of social engineering attacks, where the attacker poses as a seemingly trustworthy entity (with whom the victim has an established relationship), and tricks the victim into sharing their credentials. Working with the operational security team at the Lawrence Berkeley National Lab, the authors developed a spear-phishing detector leveraging a dataset of 360 billion emails from the lab's enterprise network. The initial work resulted in a Distinguished Paper Award at Usenix Security 2017, as well as this Facebook award to extend the work on building practically deployable detectors.

Dr. Muhammad Fareed Zaffar
Department of Computer Science, SBASSE
fareed.zaffar@lums.edu.pk
+924235608193

Profile Dr. Muhammad Fareed Zaffar is an Assistant Professor of Computer Science at the Syed Babar Ali School of Science and Engineering, LUMS. He holds a PhD in Computer Science from Duke University, with a specialisation in network and distributed systems security. Prior to joining LUMS, Dr. Zaffar worked at IBM and SRI International. He has provided technical assistance to the National Judicial Automation Commission (NJAC) in finding technology based interventions in order to facilitate transport and efficient management of the judicial system in Pakistan. Dr. Zaffar's research interests include network and distributed systems security as well as in networking, storage systems, computer architecture, as well as performance evaluation and distribution systems.

Selected Publications

- Tahir, R., Huzaifa, M., Das, A., Ahmad, M., Gunter, C., Zaffar, F., & Borisov, N. (2017, September). Mining on Someone Else's Dime: Mitigating Covert Mining Operations in Clouds and Enterprises. In International Symposium on Research in Attacks, Intrusions, and Defenses (pp. 287-310). Springer, Cham
- Farooqi, S., Zaffar, F., Leontiadis, N., & Shafiq, Z. (2017). Measuring and Mitigating OAuth Access Token Abuse by Collusion Networks
- Khaliq, A., Ravindran, R., Hussainy, S. F., Krishnan, V. V., Ambreen, A., Yusuf, N. W., & Chaudhry, M. N. (2017). Field evaluation of a blood based test for active tuberculosis in endemic settings. PloS one, 12(4), e0173359
- Amjad, H. A. R., Naeem, U., Zaffar, M. A., Zaffar, M. F., & Choo, K. K. R. (2016, June). Improving Security Awareness in the Government Sector. In Proceedings of the 17th International Digital Government Research Conference on Digital Government Research (pp. 1-7). ACM

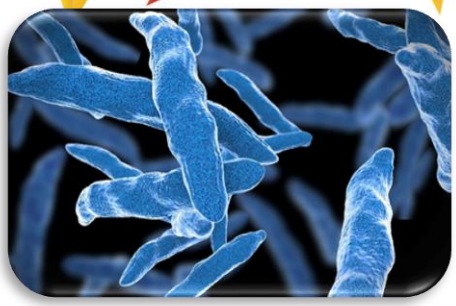
Title: Statistan
PI: Dr. Muhammad Fareed Zaffar
Co-PI: Dr. Tariq Mahmood Jadoon, Dr. Suleman Shahid
Sponsor: United States Institute of Peace (USIP)
Funding Amount: PKR 7,858,630
Project Initiated in: 2016
Duration: 16 Months
Category: Development Management
Description: In this project, Dr. Muhammad Fareed Zaffar under Technology for People Initiative (TPI), propose to develop an innovative data platform called Statistan: an open-access web tool that would allow users to visualise structured datasets using maps and charts along with a sub-platform that aims to stimulate a culture of civic engagement with data and research by tracking the mood of the country across different times and after historic events.

Title: Statistan and Moodistan
PI: Dr. Muhammad Fareed Zaffar
Co-PI: Dr. Suleman Shahid
Sponsor: Centre for Economic Research in Pakistan (CERP)
Funding Amount: PKR 1,885,410
Project Initiated in: 2016
Duration: 12 Months
Category: Development Management
Description: This project will focus on developing a two-part data innovation platform that aims to expose policymakers, young researchers, NGOs and the public to high quality data and research in useful, interesting and compelling ways as a means of increasing the demand and ability to use this information. The first platform, called Statistan, targets policymakers, researchers, journalists and NGOs to increase the availability of meaningful data and research on the specific issue areas in which they work. The second platform a mood analyser, Moodistan, which will be able to evaluate how different media agencies report same news items and how the citizens' mood can be gauged from it.

Title: Computational Modelling of Active Tuberculosis using Clinical, Immunological data
PI: Dr. Muhammad Fareed Zaffar
Co-PI: Dr. Imran Khan - University of California, Davis
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 960,000
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: The fundamental aim of this project is to integrate biomarker data, clinical data, and patient information by the use of computational modelling to improve TB healthcare capacity in Pakistan (and TB-endemic countries). The resulting models will not only improve understanding of the TB disease and its progression but also enable the development of rapid and cost-effective measures to detect TB allowing simultaneous, bench-top analysis of thousands of samples per day. Developing, testing and implementing automated diagnostic algorithms can be helpful in overcoming infrastructural and human-resource constraints in poorly resourced countries.

Title: Research on Portrayal of Masculinity in Electronic Media and Its Impact on Young People
PI: Dr. Muhammad Fareed Zaffar
Sponsor: Shirakat
Funding Amount: PKR 520,000
Project Initiated in: 2017
Duration: 6 Months
Category: Technology
Description: The objective of this project is to provide an empirically rich understanding of the cultural content of two of the most popular genres within Pakistani television, namely drama serials and the news. Media ratings were utilised to select 5 top rated dramas, a game show, 6 talk shows and 4 news channels. The project was funded by a local organisation: Shirakat—Partnership for Development. A number of distinct but interrelated research questions were investigated. What kinds of masculinities are prevalent within Pakistani electronic media? How are these masculinities related to each other? I.e. what are the power dynamics created or depicted between different kinds of men and masculinities? An analysis of media content was undertaken in light of the Australian sociologist Raewyn Connell's theory on 'Masculinities'. The narratives, images and politics propagated by these TV genres, with respect to masculinity (ies), were decoded through an anthropological and post-colonial lens. Common patterns in the depictions of men on screen were identified and elucidated through an illustration of how the representations constructed what it means to be a 'manly man'. The research detailed how these representations created and perpetuated hierarchies not just between men and women, but among men themselves.

Title: Prosecution Case Flow Management System
PI: Dr. Muhammad Fareed Zaffar
Sponsor: United Nations Office on Drugs and Crime
Funding Amount: PKR 3,400,000
Project Initiated in: 2018
Duration: 4 Months
Category: Technology
Description: Lack of accountability and transparency are major impediments in efforts to minimise delays, ensure due process of law and reduce backlogged cases in the criminal justice system of Pakistan. The prosecution department in KPK was setup under the Khyber Pakhtunkhwa Prosecution Service (Constitution, Functions and Powers) Act of 2005. With almost 7 years' experience in the development sector and a highly capable team, TPI (Technology for People Initiative) has an ambitious plan to redesign and develop the Case Flow Management System in KPK. The proposed system will be designed with two essential requirements in mind that includes a robust, scalable and secure case tracking mechanism that requires minimal changes to the existing workflows and a tamper-proof record management system that allows greater visibility into the current systems. Due to the involvement of various government departments, improving the institutional handshakes involved in the process and streamlining data-sharing can provide transparency in the system. Such a system can also facilitate monitoring responsibilities of existing bodies to help improve the quality of investigations, prosecutions and judgments.



Title: Computational Modelling of Active Tuberculosis Using Clinical, Immunological and Radiological Data
PI: Dr. Muhammad Fareed Zaffar
Co-PI: Dr. Aamer Ikram - Armed Forces Institute of Pathology, Dr. Michael Hogarth-University of California, Davis
Sponsor: U.S Agency for International Development (USAID)
External Collaboration: University of California, Davis
Funding Amount: PKR 312,000
Project Initiated in: 2018
Duration: 36 Months
Category: Health

Description: The scope of this project is to develop computational models of active tuberculosis (TB) using clinical, immunological and radiological data for improved diagnostics and link it to a Clinical Decision Support (CDS) at the point of care developed in this project. Tuberculosis (TB) remains one of the world's deadliest communicable diseases with an estimated 2 billion infected with the etiologic agent Mycobacterium tuberculosis (M. tb.). Of these, about ten percent develop active pulmonary TB (PTB) in their lifetime, leading to about 9 million new cases per year, and 1.5 million die each year. Extra pulmonary TB (ETB) accounts for about 10% of all TB cases, is often without pulmonary symptoms, and is difficult to diagnose. This project propose to use combined data from independent markers of disease (microbiology, radiology, clinical information, and immune biomarkers), analysed by computational methods to develop predictive modelling for TB detection. The algorithm(s) so developed will enable more accurate detection of TB, efficient electronic clinical data archiving and retrieval for physicians, and improved clinical work flow. This would result in a positive impact on building capacity for TB healthcare in endemic settings through "Clinical Decision Support (CDS)" system that is proposed to be developed and implemented in Pakistan.

Title: Measuring and Mitigating OAuth Access Token Abuse by Collusion Networks
PI: Dr. Muhammad Fareed Zaffar
Sponsor: Facebook
Funding Amount: PKR 879,900
Project Initiated in: 2016
Duration: 42 Months
Category: Telecommunication
Description: In this research project, Dr. Muhammad Fareed Zaffar and Dr. Zubair Shafiq discovered a major Facebook loophole. Together the dynamic team unfolded a collusion network formed on Facebook which is used to generate millions of fake likes and comments. The team endeavours to reduce the issue with the help of Facebook. The findings will be published at the 17th Internet Measurement Conference (IMC) in London.

Dr. Muhammad Hamad Alizai
Department of Computer Science, SBASSE
hamad.alizai@lums.edu.pk
+924235608479

Profile Dr. Muhammad Hamad Alizai completed his BSc Computer Engineering from UET Peshawar, and his MSc in Software Systems Engineering and PhD in EE and CS from RWTH Aachen University, Germany. Dr. Alizai has over 10 years of experience in Germany and Pakistan as a researcher, software engineer, and technical lead both in industrial and academic settings. He has authored a book, book chapters and published numerous scientific papers, several of them in top flight ACM SIG sponsored venues. He is experienced in leading innovative research projects in pervasive computing technologies such as Internet of things, sensor and delay tolerant networks, ICT4D, and mobile computing. He was employed as a software engineer in several European Union projects and has a wealth of experience in teaching/training cutting edge technologies and courses in theoretical and practical computer sciences at graduate, postgraduate and professional level. He is also a visiting researcher at alma mater - ComSys, RWTH Aachen, Germany - due to his post graduate research excellence.

Selected Publications

- Bhatti, N. A., Alizai, M. H., Syed, A. A., & Mottola, L. (2016). Energy Harvesting and Wireless Transfer in Sensor Network Applications: Concepts and Experiences. ACM Transactions on Sensor Networks (TOSN), 12(3), 24
- Khan, S. A., Moosa, M., Naeem, F., Alizai, M. H., & Kim, J. M. (2016). Protocols and Mechanisms to Recover Failed Packets in Wireless Networks: History and Evolution. IEEE Access, 4, 4207-4224
- Ahmed, S., Khan, H., Siddiqui, J. H., Bitsch, J. Á., & Alizai, M. H. (2016, November). Incremental Check pointing for Interruptible Computations: Poster Abstract. In Proceedings of the 14th ACM Conference on Embedded Network Sensor Systems CD-ROM (pp. 350-351). ACM
- Bhatti, N. A., Syed, A. A., & Alizai, M. H. (2015). Laser Based Energy Distribution Architecture for Decoupling Energy and Sensing Planes in WSN. International Journal of Distributed Sensor Networks, 2015
- Munawar, W., Alizai, M.H., Landsiedel, O., Wehrle, K. (2015) Modular Remote Reprogramming of Sensor Nodes, International Journal of Sensor Networks

Title: iCompute
PI: Dr. Muhammad Hamad Alizai
Co-PI: Prof. Klaus Wehrle - RWTH Aachen University
Sponsor: German Pakistani Research Cooperation Program (DAAD) | RWTH Aachen University
Funding Amount: PKR 15,033,409
Project Initiated in: 2016
Duration: 24 Months
Category: Technology
Description: Miniaturised self-powered devices are transforming the way we interact with everyday physical objects. These devices, as part of the Internet of Things (IoT), embed computing in the physical world and deliver their data over a low-power, wireless mesh network. As these devices become smaller and more numerous, possibly the next billion, plugging them in to provide power is unfeasible. Computing at such scales is thus difficult to realise until these devices either find their own energy, possibly by harvesting ambient sources or charged wirelessly from a remote location, excluding the need for intrusive power infrastructure. However, ambient and wireless energy sources are both intermittent and unpredictable. Thus there is a need to adapt computing and communication to this new constraint of unpredictable and intermittent supply of energy: this requires revisiting basic assumptions about system start up, state check pointing across activation cycles, discovering and communicating with neighbours, predicting future energy availability, and scheduling operations under energy uncertainty. The key idea of this project is to develop a new computing paradigm that will enable IoT devices to resume their operation, not restart from scratch, across different activation cycles.

Title: Intermittent Computing for the Intermittently Powered Internet of Things
PI: Dr. Muhammad Hamad Alizai
Co-PI: Dr. Tariq Mahmood Jadoon
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: The scope of this project is to study the challenges and implement a prototypical solution along the first dimension (system software) of IoT operation. The objective is to start a new research initiative at LUMS in this area, ultimately seeking funds from national and international funding agencies for further investigations along the other two dimensions.

Title: Error Tolerant Communication Stack in Low-Power Wireless Networks
PI: Dr. Muhammad Hamad Alizai
Co-PI: Dr. Laiq Hasan - UET Peshawar
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 3,453,108
Project Initiated in: 2017
Duration: 24 Months
Category: Telecommunication
Description: This project proposes to develop error tolerant wireless networking protocols specifically for intermittently power embedded networks. Existing protocols only process information if it is received correctly and drop it otherwise. The objective is to develop a network stack that is best suited for the volatile environment offered by such networks. The underlying idea is to create an adaptive communication environment that can tune the reliability requirements on the network.

Title: Extending the Cyber Physical Systems R & D Paradigm using Energy Transference
PI: Dr. Muhammad Hamad Alizai
Co-PI: Dr. Syed Affan Ahmed – Director Engineering, PLUMgrid Inc.
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 5,207,031
Project Initiated in: 2016
Duration: 21 Months
Category: Energy
Description: The objective of this project is to explore the capability of cyber-physical systems using in-network energy transference. Current embedded sensor and cyber-physical systems are severely limited by the availability of energy. This project intends to extend this capability by arguing a modified version of the Robin-Hood argument "take energy from the (energy)-rich and give it to the (energy)-poor".

Title: Old is Gold: Synthesizing Energy Efficient Use of Legacy Devices for Thermal Comfort in Older Buildings
PI: Dr. Muhammad Hamad Alizai
Co-PI: Dr. Tariq Mahmood Jadoon
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Energy
Description: The main objective of this project is to achieve human comfort and energy efficiency by enabling HVAC-like functionality in older buildings through aggregate usage of distributed air conditioning elements. This project has proposed to retrofit a Software Defined Air Conditioning system, namely SODAC, using the Internet-of-things (IoT) technology to transform the older building lot in the developing world to behave similarly to their modern and expensive HVAC based counterparts.

Title: Greenifying and Modernizing Legacy Buildings in the Developing World
PI: Dr. Muhammad Hamad Alizai
Co-PI: Dr. Ayesha Ali
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Economic Development
Description: Pakistan has a rapidly growing population, with a burgeoning fraction residing or working in urban buildings or industrial complexes. This population growth, along with aging building infrastructure, puts tremendous pressure on the supply of three basic resources: electricity, gas, and water. This project has proposed an Internet of Things (IoT) based approach that seeks to retrofit the current lot of buildings with an Integrated Resource Management (IRM) system. IRM can remove inefficiencies in the resource consumption and improve the safety and living standards of Pakistani citizens. The local conservation of resources directly results in a country wide better supply demand balance that provides economic respite (no need to buy additional resource to meet demand) and also keeps the citizens satisfied (demand being met at lower cost). The IRM's ability to enforce safe living standards and prevent fatal accidents indirectly provides socioeconomic benefit by maintaining a healthy and able workforce that contributes to the development of Pakistan. This proposal requires an initial survey to quantify inefficiencies in resource consumption at building level, followed by a prototype development and evaluation of the IRM solution that can curb these inefficiencies through preventive resource management.

Dr. Murtaza Taj
Department of Computer Science, SBASSE
murtaza.taj@lums.edu.pk
+924235603301

Profile Dr. Murtaza Taj earned his PhD and MSc degrees in Electronic Engineering and Computer Science from Queen Mary University of London (QMUL), United Kingdom, in 2009 and 2005, respectively. He received his BE (IT) Degree (with distinction) in Engineering from Hamdard University, Pakistan, in 2003. Currently, he is a Visiting Assistant Professor at Lahore University of Management Sciences, Pakistan. His research interests are object detection and tracking using multimodal sensors. He has served as a reviewer for the IEEE Transactions on Circuits and Systems for Video Technology and the International Workshop on Content-Based Multimedia Indexing.

Selected Publications

- Bajwa, R., Gilani, S. R., & Taj, M. (2016, June). 3D Architectural Modelling: Coarse-To-Fine Model Fitting On Point Cloud. In Proceedings of the 33rd Computer Graphics International (Pp. 65-68). ACM
- Nasir, A. K., Taj, M., & Khan, M. F. (2016). Evaluation of Microsoft Kinect Sensor for Plant Health Monitoring. IFAC-Papers Online, 49(16), 221-225
- Khalid, A. R., Hassan, A., & Taj, M. (2014, October). Efficient 2D Human Pose Estimation Using Mean-Shift. In Image Processing (ICIP), 2014 IEEE International Conference On (Pp. 3387-3391). IEEE
- Taj, M., Hassan, A., & Khalid, A. R. (2014). 2D Human Pose Estimation and Tracking in Non-Overlapping Cameras. In Human Behaviour Understanding in Networked Sensing (Pp. 261-281). Springer International Publishing
- Hassan, A., & Taj, M. (2014). 2D Articulated Human Pose Tracking: A Hybrid Approach. Paper Presented At The 2014 IEEE International Conference On Image Processing, ICIP 2014

Title: Enabling 3D Vision on Hand-held devices
PI: Dr. Murtaza Taj
Co-PI: Dr. Sohaib Ahmad Khan
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 9,193,137
Project Initiated in: 2016
Duration: 18 Months
Category: Computer Vision
Description: This research aims to change the way people do daily activities by developing more core vision technologies for embedded platforms. The purpose of this research is to enable technology for three key applications; group photo, art preservation and augmented sharing. Such application development can earn significant economic gains through sales in international market via online market places.

Title: To Support Preservation and Conservation of Buddhist Ruins of Takht Bhai Project
PI: Dr. Murtaza Taj
Sponsor: HAFO Construction and Production Company
Funding Amount: PKR 200,000
Project Initiated in: 2017
Duration: 16 Months
Category: Arts & Heritage
Description: This project involves scanning of the South West Block of Buddhist Ruins of Takht-i-Bahi in Mardan in two stages. The scanning is "To Support Preservation and Conservation of Buddhist Ruins of Takht Bhai Project" implemented by HAFO Construction and Production Company in collaboration with Directorate of Archaeology and Museum (DoAM),Khyber Pakhtunkhwa.

Title: Upper Indus Petroglyphs and Inscriptions In Northern Pakistan: A Partnership for Cultural Heritage Preservation and Promotion
PI: Dr. Murtaza Taj
Co-PI: Dr. Jason Neelis - Wilfrid Laurier University
Sponsor: Social Sciences and Humanities Research Council of Canada (SSHRC)
External Collaboration: Wilfrid Laurier University
Funding Amount: PKR 705,300
Project Initiated in: 2018
Duration: 22 Months
Category: Arts & Heritage
Description: Canadian, Pakistani and international collaborators aim to address urgent challenges of preserving cultural heritage, providing access to high-quality documentation, advancing scholarly and public understanding, and promoting cultural tourism by applying state-of-the-art 3D scanning technology and imaging techniques to sites with petroglyphs and inscriptions on the Upper Indus River and its tributary valleys. Development of an interdisciplinary partnership between archaeologists, information technology specialists, art historians, epigraphists, and philologists and between academic and non-academic partner institutions partner institutions, including the Royal Ontario Museum (ROM) and archaeology, museum, and tourism departments of Khyber-Pakhtunkhwa and Gilgit-Baltistan provinces in Pakistan, is necessary to pursue research goals of understanding the visual and written materials within contexts of cross-cultural exchanges in earlier periods and to foster broad awareness of the value of these materials for cultural heritage. This project will facilitate access to the extensive corpus of Upper Indus petroglyphs and inscriptions for both the scholarly community and the general public, digitalisation of valuable but underutilised research archives, and strategies for preservation of these threatened visual and written records.

Title: Spatio-Temporal Analysis of Satellite Imagery for Informed Policy Making
PI: Dr. Murtaza Taj
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: This research aims to rectify the current dearth of geographically referenced data by developing a tool which combines satellite imagery gathered over time of Punjab with relevant existing sources of data, to generate complete, up-to-date and historical information through spatial visualisations, in a platform refined for the formulation, analysis and monitoring of public policy. The proposed research will include identifying the differences in scatter of population settlements and infrastructure facilities over time through temporal change analysis of satellite images, matching existing data to ground realities through spatial data visualisations and developing a human centric technology based tool to view, analyse and interact with the hybrid map dataset. The primary objective of this project is open an avenue for more researches to be taken by multidisciplinary faculty members by utilising the comparison of spatial images overtime and identify or analyse the emerging dynamics of different parameters for better comprehension of resource allocation problems.

Dr. Naveed Arshad
Department of Computer Science, SBASSE
naveedarshad@lums.edu.pk
+924235608190

Profile Dr. Naveed Arshad completed his PhD from the University of Colorado at Boulder, USA. Before joining LUMS, he has worked with ABN AMRO Global IT Systems, Pakistan International Airline. He is a part of the Software Engineering Research Group (SERG) at LUMS which undertakes research in various areas of software engineering such as engineering of autonomic systems, conceptual modelling, large scale systems development, etc.

Selected Publications

- Ahmad, A., Subhani, M. J., & Arshad, N. (2017). A Strategy to Reduce Grid Stress through Priority-based Inverter Charging. Energy Procedia, 134, 555-566
- Ullah, H., Kamal, I., Ali, A., & Arshad, N. (2017). Investor Focused Placement and Sizing of Photovoltaic Grid-connected Systems in Pakistan. Renewable Energy
- Arshad, N., & Ali, U. (2017). An Analysis of the Effects of Residential Uninterpretable Power Supply Systems on Pakistan's Power Sector. Energy for Sustainable Development, 36, 16-21
- Tariq, Z. B., Khalid, Q., Ikram, J., & Arshad, N. (2017). An Approach to Operate High-powered Legacy Electrical Appliances on Small Scale Solar PV Systems. Renewable Energy, 104, 238-247
- Khalid, Q., Ikram, J., & Arshad, N. (2017). A Collaborative Approach to Operate High Powered Devices on Small-scale PV systems. Energy Procedia, 111, 895-903

Title: Towards Developing a Smart Electric Gird in Pakistan with 100% Renewable Energy Sources
PI: Dr. Naveed Arshad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Energy
Description: The main objective of this project is to develop a Deeply Intelligent Distribution System (DIDS) model of energy Demand Side Management (DSM) and Economic Dispatch (ED) using 100% renewable sources for electricity supply. In most renewable sources, electricity production is contributed from numerous smaller production units. The electricity produced from some renewable sources is intermittent and thus sometimes not really schedulable or controllable due to climatic and environmental factors. In this project, the goal is to comprehensively look at the electricity supply and demand in Pakistan with 100% renewable sources. This project aims to develop a simulation model to generate myriad number of renewable electricity supply and demand scenarios that can be tested using DIDS.

Title: Simulation Modelling, Analysis and Forecasting of Electricity Generation and Consumption in Pakistan Using System Dynamics Approach
PI: Dr. Imran Mahmood - National University of Science and Technology (NUST)
Co-PI: Dr. Naveed Arshad
Sponsor: U.S Agency for International Development (USAID) | National University of Science and Technology (NUST)
Funding Amount: PKR 2,980,200
Project Initiated in: 2016
Duration: 12 Months
Category: Energy
Description: The main objective of this research is to develop a macro-level dynamic simulation model for predicting electricity demand in Pakistan and to analyse the role of various means of electricity production (Fossil fuel, hydro, nuclear & renewable sources etc.) in Pakistan. The motive is to study and analyse different policies and regulations and other factors such as prices/tariffs and investments and capital in the demand and supply of the electricity to support future energy planning in Pakistan. This project has proposed the development of a hierarchical, multi-scale, multi-resolution SD model.

Title: A Smart Electric Gird in Pakistan with 100% Renewable Sources
PI: Dr. Naveed Arshad
Co-PI: Dr. ImdadUllah Khan, Dr. Rehab Khalid - University of Cambridge
Sponsor: Ignite (formerly National ICT R&D Fund Company)
External Collaboration: University of Cambridge
Funding Amount: PKR 26,841,599
Project Initiated in: 2017
Duration: 24 Months
Category: Energy
Description: The main focus of this project is to develop a Deeply Intelligent Distribution System (DIDS) model of energy Demand Side Management (DSM) using 100% renewable sources for electricity supply. Unlike traditional fossil fuel based sources where one huge power plant produces hundreds or even thousands megawatts of electricity, in most renewable sources the electricity production is contributed from numerous smaller production units. The electricity produced from some renewable sources is intermittent and thus sometimes not really schedulable or controllable due to climatic and environmental factors. In this proposal, the goal is to comprehensively look at the electricity supply and demand in Pakistan with 100% renewable sources. The plan is to develop a simulation model with which we can generate myriad number of renewable electricity supply and demand scenarios that can be tested using DIDS. This simulation model will be further supported by in-depth analyses of occupant energy use practices.

Title: Dealing with Uncertainties of Renewable Energy with Massive Small-Scale Energy Storage Systems
PI: Dr. Naveed Arshad
Co-PI: Dr. Mohammad Jahangir Ikram
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Energy
Description: Under this project, three million available UPSs in Pakistan will be used to deal with variabilities and uncertainties of the wind and solar energy. This kind of massive small scale energy buffer has not been utilised anywhere in the world today. Thus it requires a research effort to study the possibilities of inclusion of UPSs as energy storage for utility scale electricity systems. This research effort will look into making existing UPSs more efficient through better charging and discharging models, linking charging and discharging of a myriad number of UPSs with available renewable generation and to develop an initial cost benefit analysis of such massive small scale storage for utilities. The goal is to develop a complete model of inefficiencies present in the UPSs. The ultimate goal is to assess the usage of UPSs as large virtual store of energy to mitigate the variabilities and uncertainties of the renewable sources.

Dr. Suleman Shahid
Department of Computer Science, SBASSE
suleman.shahid@lums.edu.pk
+924235608192

Profile Dr. Suleman received his PhD in Human Computer Interaction in 2011 from Tilburg University, Netherlands and PDEng (Professional Doctorate in Engineering) in 2007 in User System Interaction program from Eindhoven University of Technology, Netherlands. Since 2015, he is working as an Assistant Professor at Lahore University of Management Sciences (LUMS). He has received numerous teaching awards throughout his career that depicts his proficiency in the field of research and academics.

Selected Publications

- Iqbal, M. Z., Shahid, S., & Naseem, M. (2017, October). Interactive Urdu Braille Learning System for Parents of Visually Impaired Students. In Proceedings of the 19th International ACM SIGACCESS Conference on Computers and Accessibility (pp. 327-328). ACM
- Pereira, M. S., de Lange, J., Shahid, S., & Swerts, M. (2017). A Perceptual and Behavioural Analysis of Facial Cues to Deception in Interactions between Children and a Virtual Agent. International Journal of Child-Computer Interaction
- Krüger, M., Ahmad, S. S. O., & Shahid, S. (2017). Investigating the Requirements of an Online Emergency Response Platform. Paper presented at the ACM International Conference Proceeding Series
- Aziz, Z., Nadeem, I., & Shahid, S. (2017). A Digital Intervention for Measuring Infants' Growth in the Developing Context. Paper presented at the ACM International Conference Proceeding Series
- Riaz, W., Durrani, H., Shahid, S., & Raza, A. A. (2017). ICT Intervention for Agriculture Development: Designing an IVR System for Farmers in Pakistan. Paper presented at the ACM International Conference Proceeding Series
- Abid, A., & Shahid, S. (2017). Helping Pregnant Women in the Rural Areas of Pakistan Using a Low-cost Interactive System. Paper presented at the ACM International Conference Proceeding Series

Title: Designing Digital Aids for Children with Autism in Pakistan
PI: Dr. Suleman Shahid
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Health
Description: The aim of this project is to design technological aids that assist autistic children (4 to 8 years old) in Pakistan to improve their verbal communication skills. More specifically, this project aims at developing two different but related solutions for teaching autistic children their native language i.e. Urdu. The core focus of this project will be the development of a mobile application platform that will consist of four modules. One of the key objectives of this project is to understand the need of such technology in Pakistan, as no digital solution has been developed to rehabilitate the autistic kids in the Pakistani context. Another goal is to design a comprehensive mobile application platform to improve the language skills of autistic children in Pakistan, thus helping them to come to the mainstream society.

Title: PeaceTech Exchange (PTX) Workshops in Pakistan
PI: Dr. Suleman Shahid
Sponsor: PeaceTech Lab
Funding Amount: PKR 12,008,278
Project Initiated in: 2016
Duration: 12 Months
Category: Education
Description: The fundamental objective of this project was to organise and implement a series of PeaceTech Exchange (PTX) workshops in Pakistan. PTX workshops are three to five day, highly interactive conferences in which participants are brought together with local technology experts to explore ways to apply technology to peace building. PeaceTech Exchanges also foster project design - guiding participants in how to define their problems, developing solutions, and creating projects that implement technologies learned at the workshop.

Title: Inventorying and Documentation of the Collection at Taxila Museum
PI: Dr. Suleman Shahid
Co-PI: Dr. Murtaza Taj
Sponsor: United Nations Educational, Scientific and Cultural Organization (UNESCO)
Funding Amount: PKR 1,475,250
Project Initiated in: 2017
Duration: 8 Months
Category: Arts & Heritage
Description: In the past few years museums all over the globe have begun to realise the possibilities provided by mobile technologies for attracting new visitors and enhancing the museum experience for the already active audience. The fact that the majority of museum visitors have their own mobile device with them means that instead of investing in expensive hardware, museums can tap into the visitors' own resources. Harnessing the potential of mobile technology, Technology for People Initiative seeks to develop and introduce an interactive smartphone application for the Taxila Museum. This custom-built application will detail the salient characteristics of a selection of artefacts, while presenting this information in compelling new ways. The application will serve to enhance the interpretative potential of the museum, by providing a multimedia database, supplying information to visitors through structured texts, images, and audio. By introducing the application in the museum, this project aims to improve the average time spent by visitors in the museum. The application will include general information on the museum and three of its main galleries, namely the Gandhara Gallery (entrance gallery), the Stucco and Terra Cotta Gallery (containing religious artefacts) and the Household Objects, Tools and Weapons Display.

Title: Designing Digital Aids to Improve the Urdu Reading Skills of Dyslexic Children in Pakistan
PI: Dr. Suleman Shahid
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 900,000
Project Initiated in: 2017
Duration: 12 Months
Category: Health
Description: This project aims at identifying the problems that arise due to dyslexia, proposing a solution to the problems caused by dyslexia and then identifying which solution works best. The first part of this project will focus on identifying the problems faced by Pakistani children while reading and writing in Urdu. Once the problems are known, after conducting basic (user) research, the project aims to propose and implement cost-effective digital solutions to only support the diagnosis process but also to help children in improving their Urdu reading skills. The project then aims to keep track of the progress made by the dyslexics during the course of taking the exercises designed for them. The core focus of this project will be developing a multiplatform (mobile + web) application that will consist of a module for screening dyslexia in Urdu, a module for teachers (and parents) for designing easy to read books with necessary tools, constraints and features to design them, a gamified module for children where they can read carefully designed eBooks, a number playful and interactive features where dyslexics can exercise reading to improve their reading skills and a progress tracker to keep track of the activities and progress of parents, teachers and children along with reward badges to make the progress gamified. The proposed system and intervention will not only be useful for Dyslexic children but can also be used as a general purpose aid to increase the interest of children in Urdu.

DEPARTMENT OF ELECTRICAL ENGINEERING

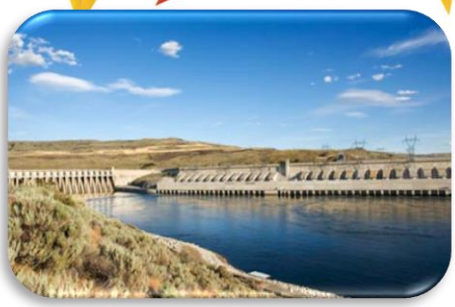
Dr. Abubakr Muhammad
Department of Electrical Engineering, SBASSE
abubakr@lums.edu.pk
+924235608132

Profile Dr. Abubakr received his PhD in Electrical Engineering from Georgia Institute of Technology (2005). As a graduate student, he also got a Master's degree in Mathematics (2005) and a Master's degree in Electrical Engineering (2002) from Georgia Tech. He completed his BSc in Electrical Engineering from the University of Engineering & Technology Lahore, Pakistan (2000). Before joining LUMS, he has taught and done research as a postdoctoral fellow at McGill University Canada (2007-2008) and at the University of Pennsylvania, USA (2006-2007). Dr. Muhammad does fundamental research at the interface of systems engineering, applied mathematics and applied physics, on various problems in robotics, and distributed sensing, network dynamics and quantum information sciences. His interests span the study of connections and complexity in large-scale distributed networks, topological methods for information discovery in massive data sets and communication, computation & control issues in the physics of information. He has also worked and consulted for the industry on the design of air traffic control systems, radar & sonar systems, communication equipment and medical instrumentation. His current research focuses on the development of cyber-physical systems for development and critical infrastructures in Pakistan, in particular issues related to water.

Selected Publications

- Wescoat, J. L., Siddiqi, A., & Muhammad, A. (2018). Socio-Hydrology of Channel Flows in Complex River Basins: Rivers, Canals, and Distributaries in Punjab, Pakistan. Water Resources Research, 54(1), 464-479
- Ahmad, Z., Pasha, M. A., Ahmad, A., Muhammad, A., Masud, S., Schappacher, M., & Sikora, A. (2017, September). Performance Evaluation of IEEE 802.15. 4-Compliant Smart Water Meters for Automating Large-Scale Waterways. In Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), 2017 9th IEEE International Conference on (Vol. 2, pp. 746-751). IEEE
- Manzoor, T., Rovenskaya, E., & Muhammad, A. (2017). Structural Effects and Aggregation in a Social-Network Model of Natural Resource Consumption. IFAC-Papers Online, 50(1), 7675-7680
- Khan, M. M., Ali, H., Berns, K., & Muhammad, A. (2016, October). Road Traversability Analysis using Network Properties of Roadmaps. In Intelligent Robots and Systems (IROS), 2016 IEEE/RSJ International Conference on (pp. 2960-2965). IEEE
- Riaz, W., Ahmad, Z., & Muhammad, A. (2016). A Smart Metering Approach towards Measuring Flows in Small Irrigation Outlets. Procedia Engineering, 154, 236-242
- Muhammad, A., Haider, B., & Ahmad, Z. (2016). IoT Enabled Analysis of Irrigation Rosters in the Indus Basin Irrigation System. Procedia Engineering, 154, 229-235

Title: DyMASH (Dynamic Mapping and Sampling for High Resolution Hydrology)
PI: Dr. Abubakr Muhammad
Sponsor: German Pakistani Research Cooperation Program (DAAD)
Funding Amount: PKR 8,124,019
Project Initiated in: 2017
Duration: 24 Months
Category: Water
Description: This project proposes to tackle some outstanding challenges related to monitoring of surface water resources in the Indus basin using robotics technologies. The difficulties in collection of water samples from remote or inaccessible locations, the challenges in continued structural monitoring of natural and engineered resources and the need to incorporate high-resolution sensor data into hydrodynamic models has prompted to propose robotic sensing solutions. The objective is to develop and deploy semi-autonomous sensor floats that will produce surveys of water channels using standard techniques of simultaneous mapping and localisation.



Title: Using Water Resources Systems Analysis to Guide Transboundary Kabul River Water Partnership
PI: Dr. Abubakr Muhammad
Sponsor: LEAD Pakistan
Funding Amount: PKR 402,250
Project Initiated in: 2017
Duration: 6 Months
Category: Water
Description: This project intends to build a case for a benefit-sharing approach through basin-wide integrated water resource management. Transboundary water cooperation and management yields dividends for poor and vulnerable people. When parties to the water resources agree to cooperate meaningfully and manage water infrastructure amicably, everyone, including those communities who can avoid damages from water-related disasters, benefits. Moreover, in resolving water conflicts, delays in the development of water infrastructure can be avoided, resulting in savings that can be used for the development plans. The benefit-sharing approach provides a strategic framework to transform the transboundary water challenge into an opportunity. The objective of this project is to develop a case for a cooperative benefit-sharing arrangement for Kabul River based on robust scientific analysis, to strengthen linkages among cross-border stakeholders of Kabul River Basin to build trust and confidence for cooperative water resource management and to sensitize and build the capacity of local stakeholders for an optimized water resource management framework for Kabul River Basin.

Title: Nestle-Water Smart Agriculture (WSA)
PI: Dr. Abubakr Muhammad
Sponsor: Consortium
Funding Amount: PKR 5,000,000
Project Initiated in: 2017
Duration: 24 Months
Category: Water
Description: Under this Project, LUMS will explore research ideas with Nestle teams to pilot technological innovations related to precision agriculture technologies (Water Sense Project), studying water-energy consumption patterns in dairy farms and enhancing safety in milk transportation. Joint proposals for external funding will be developed that will leverage industry-academia partnerships and scale up successful pilot projects. LUMS will hold two seminars around water Issues with a speaker from Nestle on the panel to highlight Nestlé's work in agricultural business innovation.

Title: Measuring Disruptions to the Biogeochemical Cycle in Agriculture Using Atmospheric Dynamics and Chemical Transport Models (ADCTM)
PI: Dr. Abubakr Muhammad
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,500
Project Initiated in: 2018
Duration: 12 Months
Category: Agriculture
Description: Using atmospheric pollution as a proxy for human interference, this project aims to understand the magnitude and extent of its impact on agriculture production at particular sites in northern and south central Punjab. This project will collect trace gas, particle concentrations, and weather information over agriculture and forested areas using air pollution sensors mounted on an unmanned aerial vehicle. The recorded observation will be compared against air pollutant concentration fields simulated by a widely used atmospheric dynamics and chemical transport model (ADCTM). The analysis will provide an estimate of how accurately does the ADCTM captures the spatial (horizontal and vertical) and temporal distribution (day and night) of gases and particles, and the appropriateness of using it for assessing the impacts of pollution on agriculture productivity. The project will open new avenues of research into earth sciences and in the use of technology to help answer scientific questions via novel data collection mechanisms.

Title: National Centre for Robotics & Automation (NCRA) Agricultural Robotics Lab
PI: Dr. Abubakr Muhammad
Co-PI: Dr. Ahmad Kamal Nasir, Dr. Mian Muhammad Awais, Dr. Murtaza Taj
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 100,888,000
Project Initiated in: 2018
Duration: 36 Months
Category: Technology
Description: The primary goal of this project is to promote and demonstrate the use of automation driven technologies to assist Pakistani farmers in improving production process and increasing efficiency. The proposed lab shall be involved in developing indigenous robotics and automation solutions in the context of our local socio-economic settings. While the agriculture sector encompasses multiple aspects of markets, transportation infrastructure, energy and industrial value addition, this proposal keeps focus on what happens on the agricultural field only. The national lab will enable the efficient utilisation of water on-farm and in bulk irrigation delivery by advanced monitoring and control tools, enhance the crop monitoring and yield prediction capabilities of government organisations and private industry by working out the right combinations of manual monitoring, in-situ sensors, satellite remote sensing, UAVs and other airborne sensing platforms. The proposed lab aims to setup a state-of the-art national precision agriculture facility, with a focus on agricultural robotics and automation, and a clear path from scientific problem solving to technology roll-out for each theme.

Title: Technical Studies on "Climate Change Adaptation through use of Water and Climate Informatics"
PI: Dr. Abubakr Muhammad
Sponsor: Global Change Impact Studies Centre
Funding Amount: PKR 750,000
Project Initiated in: 2018
Duration: 5 Months
Category: Environment
Description: The key objective of this project is to collect hydrological information for improved agricultural water management as an enabler for broader climatic informatics. The paper aims to find out how intensely a basin or sub-basin should be instrumented to build reliable early warning systems for short-time scale disasters (e.g. flash floods) and long-time scale disatsers (e.g. droughts).

Title: Use of Air Quality Measurements and Land-Atmosphere Models to Support the Development of Winter Smog Mitigation Strategies
PI: Dr. Abubakr Muhammad
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 8,446,843
Project Initiated in: 2018
Duration: 18 Months
Category: Environment
Description: The proposed research is aimed at acquiring an improved understanding of environmental conditions that will lead to an increase in air pollution levels, and to suggest an emission control strategy that protects public health. Gas and aerosol concentration increase substantially during winter season, disrupting economic activity and posing a danger to public health. This project leverages advanced technologies and past experiences of the project team such as the use of drones for air quality sensing, supercomputers for running computer models of land-atmospheric interactions and policy frameworks to tackle a complex environmental and societal problem. This project will provide concrete scientific evidence for informed policy options related to smog mitigation and help test various hypothesis regarding winter smog sources.

Title: Water Informatics and Technology - Centre of Water Research at LUMS
PI: Dr. Abubakr Muhammad
Sponsor: Nestle
Funding Amount: PKR 10,000,000
Project Initiated in: 2015
Duration: 60 Months
Category: Development Management
Description: Pakistan is facing rapid large-scale environmental changes unleashed by climate change; historical forces driven by social, political and demographic changes; and global transitions triggered by new technologies and changes in living style. The impact of these changes is felt most in the water sector in poor management of irrigation networks, depleting groundwater, deterioration in water quality, poor sanitation and difficulties in preservation of eco-systems. Engineers, Scientists, Economists and Policymakers must pay attention to understanding these issues in developing new technologies, solutions and institutions under integrated frameworks for tackling the governance issues of participatory management, water entitlements and accountability. In this context, the aim of this project is to establish an interdisciplinary centre for research on water at LUMS with a particular focus on areas of systems analysis and hydro-informatics.

Dr. Ahmad Kamal Nasir
Department of Electrical Engineering, SBASSE
ahmad.kamal@lums.edu.pk
+924235608486

Profile Dr. Ahmad Kamal Nasir is the Director of Engineering Laboratory at LUMS and he is an Assistant Professor (IPFP) of Electrical Engineering at LUMS. He received his PhD in Mobile Robotics in 2014 from University of Siegen, Germany on Cooperative SLAM. As a graduate student, he also obtained two masters degrees in Mechatronics from Uni-Siegen and UET Lahore. Before that, he completed his B.Sc. in Mechanical Engineering from UET Lahore, Pakistan. He has also worked in industry as a Product Development Manager at the Research and Development Department of MicroTech Industries, Lahore, Pakistan. In 2014, he joined LUMS and affiliated with CYPHYNETS, the Laboratory for Cyber Physical Networks and Systems at LUMS. He does research in mobile ICs, computer vision and embedded control systems. Dr. Nasir's students are developing visual-inertial navigation devices and control systems for aerial robots.

Selected Publications

- Nasir, A. K., Taj, M., & Khan, M. F. (2016). Evaluation of Microsoft Kinect Sensor for Plant Health Monitoring. IFAC-Papers OnLine, 49(16), 221-225
- Hassaan, O., Nasir, A. K., Roth, H., & Khan, M. F. (2016). Precision Forestry: Trees Counting in Urban Areas Using Visible Imagery based on an Unmanned Aerial Vehicle. IFAC-Papers Online, 49(16), 16-21
- Nasir, A. K., Roth, H. (2012). Pose Estimation by Multisensor Data Fusion of Wheel encoders, Gyroscope, Accelerometer and Electronic Compass. 1st IFAC Conference on Embedded Systems, Computational Intelligence and Telematics in Control
- Nasir, A. K., Hsino, A., Hartmann, K., Chen, C., Roth, H. Heterogeneous Capability Multi-Robots Cooperative Framework. 1st IFAC Conference on Embedded Systems, Computational Intelligence and Telematics in Control, 2012 Würzburg, Germany
- Nasir, A. K., Hille, C., Roth, H. (2012). Data Fusion of Stereo Vision and Gyroscope for Estimation of Indoor Mobile Robot Orientation. 1st IFAC Conference on Embedded Systems, Computational Intelligence and Telematics in Control
- Nasir, A. K., Hille, C., Roth, H. (2012). Plane Extraction and Map Building Using a Kinect Equipped Mobile Robot. Workshop on Robot Motion Planning: Online, Reactive, and in Real-time, IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2012, Vilamoura, Algarve, Portugal
- Chen, C., Chai, W., Nasir, A. K., Roth, H. (2012). Low Cost IMU Based Indoor Mobile Robot Navigation with the Assist of Odometry and WiFi Using Dynamic Constraints. IEEE Position Location and Navigation Symposium, Myrtle Beach, South Carolina, USA

Title: Precision Forestry: GreenDrone-Deforestation and Forest Degradation Estimation using an Unmanned Aerial Vehicle
PI: Dr. Ahmad Kamal Nasir
Co-PI: Dr. Mian Muhammad Awais, Prof. Hubert Roth - University of Siegen, Germany,
Sponsor: German Pakistani Research Cooperation Program (DAAD) | University of Siegen, Germany
Funding Amount: PKR 9,016,218
Project Initiated in: 2015
Duration: 24 Months
Category: Robotics

Description: This research cooperation focuses on the installation of a long-term research cooperation between the University of Siegen and the Lahore University of Management Sciences. The joint research collaboration will explore the possibilities of development of low-cost robotic systems for aerial mapping of forests using Unmanned Aerial Vehicles (UAV(s)) in order to estimate carbon sink and/or stock in forest vegetation.

Title: Development of a Low Cost High Resolution Aerial Mapping System for Carbon Sequestration: Potential of Trees In and Around Lahore City
PI: Dr. Ahmad Kamal Nasir
Co-PI: Dr. Mian Muhammad Awais
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 965,000
Project Initiated in: 2015
Duration: 12 Months
Category: Robotics
Description: The proposed research project will explore possibilities of the development of low-cost robotic systems for aerial mapping of areas using Unmanned Aerial Vehicles (UAV(s)) in order to estimate carbon sink and/or stock and vegetation. The system can be used as a monitoring, reporting and verification tool for Reducing carbon Emission of Deforestation and forest Degradation (REDD). Since the research topic has a big impact on the environmental sustainable development, therefore, we focus of the project would also be to evaluate the possibilities to apply it for bigger funds such as United Nation REDD+ Programme.

Title: Development of a Long Endurance Hybrid UAV for Agricultural and Forestry Applications
PI: Dr. Ahmad Kamal Nasir
Co-PI: Dr. Mian Muhammad Awais
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Agriculture
Description: The main objective of this project is to explore the possibilities of indigenous development of a long endurance system for aerial mapping using a hybrid Unmanned Aerial Vehicles (UAV). The proposed system shall be able to vertically take-off and land autonomously within confined spaces. Furthermore, it can also be used to survey large forest areas in order to manage forest resources. The goal of this research project is development of a high resolution but inexpensive autonomous aerial mapping system to survey large areas. The outcome of the research work can be used by government departments and private farm owners to remotely gather the field data such as crop health, water stress index, soil analysis, and metrological condition for agricultural fields and forest areas.

Dr. Farasat Munir
Department of Electrical Engineering, SBASSE
farasat.munir@lums.edu.pk
+924235608466

Profile Dr. Farasat Munir received his BS in Electrical Engineering from University of Engineering and Technology, Lahore, Pakistan. Following that he worked in the industry in the field of Image processing, Machine vision, and Communication system design. He later received the Fulbright scholarship and went to Georgia Institute of Technology, Atlanta, USA, where he earned his Masters and PhD in Electrical Engineering. His PhD work focused on the design of highly sensitive and selective biosensors for cancer diagnosis and prognosis. After PhD, he joined Emory University, USA as a Postdoctoral Fellow where he worked on the design of a biomedical system for radiation compatible ultrasonic image acquisition and processing. Since 2014 he is working as an Assistant Professor in the Department of Electrical Engineering, SBASSE. At LUMS, his focus is on multidisciplinary experimental research involving areas of Physics, Electrical Engineering and Biomedical Engineering. His research interests include Biosensors, Biomedical Instrumentation, MEMS, RF and Microwave Circuits and Microelectronic Fabrication. He has published in several peer reviewed international journals and conferences.

Selected Publications

- Omer, M., & Munir, F. (2016). Interference Cancellation for Higher Harmonics of Supply-Modulated Efficient RF Power Amplifier Systems. International Journal Of Microwave And Wireless Technologies, 1-11
- Ramamurthy, S., Bhatti, P., Munir, F., Ng, T., Applegate, K., Tridandapani, S. (2015). A Novel Technology for Automatically Obtaining Digital Facial Photographs Near-Simultaneously With Portable Radiographs. Journal Of Digital Imaging 28 (3), 259-263
- Wathen, A., Hunt, W., Munir, F., David, K. S., Maloney, J. G., Westafer, R. S. (2012). Thin-Film Bulk Acoustic Wave Delay Line. US Patent App. 13/530,029

Title: Through Wall Intrusion Detection System with WiFi for Security Applications
PI: Dr. Farasat Munir
Sponsor: Public Sector Organisation
Funding Amount: PKR 990,000
Project Initiated in: 2016
Duration: 12 Months
Category: Telecommunication
Description: The purpose of this research is to build an extremely novel surveillance systems, which goes way beyond the current systems offering 360 degree field of view, night time visions, vision through the walls and around corners, along with wide area mapping, easy deployment, and reduced infrastructure layouts. The objective of the plan is to use radio waves based sensing to perform intrusion monitoring and detection over large open and close spaces.

Title: Wide Area Surveillance System for Security and Infrastructure Monitoring Via a Sophisticated Radio Channel Modelling and Detection System
PI: Dr. Farasat Munir
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 5,328,074
Project Initiated in: 2017
Duration: 36 Months
Category: Technology
Description: The main objective of this project is develop a novel low cost wide area surveillance system for monitoring of secured facilities or large infrastructures. It aims to develop a platform which will employ radio waves for sensing the environment by modelling and detecting minute changes in the radio channel due to the changing environment. Under the current social conditions of increased terrorism activities such a system which is low cost and widely deployable can prove to be a game changer. In the future, the proposed system can be developed further to suit medical applications such as tumour detection and for agricultural applications such as crop monitoring and canal silt monitoring.

Title: Research and Development of Low Cost Ventilator
PI: Dr. Farasat Munir
Sponsor: Central Park Medical College
Funding Amount: PKR 1,612,000
Project Initiated in: 2016
Duration: 12 Months
Category: Health
Description: The principal aim of this project is to come up with a design of low cost ventilator which can be mass produced and deployed in Pakistan. The approach in this design is to use off the shelf components to come up with a prototype in the shortest possible time. The objective is to develop the hardware potion of mechanical ventilator that aids in breathing patients in various modes of ventilation and to develop software for the precise control of delivered breaths to the patients under various modes of ventilations.

Title: Research and Development of Deep Learning Based High Resolution Imaging Using Radio Waves.
PI: Dr. Farasat Munir
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Sciences
Description: This project is an undertaking into a scientific and technological quest for employing Deep Neural Networks based enhanced imaging using WiFi signals as the radio waves source. Several sensing systems using commercial off the shelf (COTS) devices have been recently demonstrated that primarily aim to provide localisation information of active devices. Such systems are broadly classified as Radio Frequency (RF) sensing systems. Advanced and challenging problems for RF sensing lie in the domain of inverse scattering for reconstructing Super Resolution images of the environment illuminated by multiple RF wave sources. The fundamental goal of this project is to develop hardware and software solution that enable high resolution mapping of environment using COTS WiFi Equipment. For this purpose, within the scope of this proposal, a system for OFDM based wireless communication radio systems will be developed. The aim is to explore, understand and develop scholarship on the theoretical and practical aspects of high resolution imaging using RF waves.

Dr. Hassan Abbas Khan
Department of Electrical Engineering, SBASSE
hassan.khan@lums.edu.pk
+924235608356

Profile Dr. Hassan Abbas Khan received a BEng Degree in Electronic Engineering from GIKI, Pakistan in 2005. From 2005 to 2010, he was with School of Electrical Engineering, The University of Manchester, UK where he first received his MSc (with distinction) and then PhD in Electrical and Electronic Engineering. His doctorate thesis was on characterisation of GaAs and InP based devices for optoelectronic applications. His current work is on the research and development of solar cells through low cost techniques and optimised conversion and transmission of the generated energy to diversify power systems.

Selected Publications

- Nasir, M., Jin, Z., Khan, H., Zaffar, N., Vasquez, J., & Guerrero, J. M. (2018). A Decentralized Control Architecture applied to DC Nanogrid Clusters for Rural Electrification in Developing Regions. IEEE Transactions on Power Electronics
- Cheema, C. D. M., Shah, K. S., Khan, H. A., & Zaffar, N. A. (2017, October). Design and Analysis of Isolated Boost Converter for Microgrid Applications. In Industrial Electronics Society, IECON 2017-43rd Annual Conference of the IEEE (pp. 2431-2436). IEEE
- Hamza, M., Shehroz, M., Fazal, S., Nasir, M., & Khan, H. A. (2017, July). Design and Analysis of Solar PV Based Low-power Low-voltage DC microgrid Architectures for Rural Electrification. In Power & Energy Society General Meeting, 2017 IEEE (pp. 1-5). IEEE
- Rana, A. S., Nasir, M., & Khan, H. A. (2017). String Level Optimization on Grid-tied Solar PV Systems to Reduce Partial Shading Loss. IET Renewable Power Generation

Title: Conversion Kit for UPS to A Pseudo-Hybrid Converter with Scalable Architecture for Neighbourhood Level Distribution Capability
PI: Dr. Hassan Abbas Khan
Co-PI: Mr. Nauman Ahmad Zaffar, Dr. Syed Husain Imran Jaffery - NUST
Sponsor: National University of Science and Technology (NUST) | U.S Agency for International Development (USAID)
Funding Amount: PKR 3,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: The main objective of this project is to develop a low cost, high efficiency, scalable system which will ensure optimal utilisation of Solar PV panels with energy utilisation in a flexible manner with provision of sharing with neighbours to allow maximum utilisation for usage diversity. The purpose is to develop a cost-effective scalable Solar Integrator (SI) unit that utilises solar energy to charge UPS batteries and thus effectively lowers this huge load from the national grid. The scope of this project includes design, prototyping and detailed testing of the solar integrator. Technology development as a part of this project will be productised by a start-up or an established company which could further the role of local industry in power electronics based technologies.

Title: Solar Photovoltaic Integrated Hybrid Distribution Architecture for Next Generation Buildings
PI: Dr. Hassan Abbas Khan
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Energy
Description: The main theme of this project is to develop a prototype of hybrid AC/DC distribution architecture. The purpose of this project is to develop novel hybrid distribution architecture via AC/DC micro grid for efficient building level distribution in new-generation buildings with a goal of self-sufficient with lower reliance on utility grids. This work will expand the role of building industry in weak grid environments for efficient, reliable and clean power generation and utilisation and will lay foundations for implementation of future smart zero energy buildings in the country through intelligent power electronics infrastructure.

Title: Solar PV Based Local Energy Network (Enernet) For Rural Electrification
PI: Dr. Hassan Abbas Khan
Co-PI: Mr. Nauman Ahmad Zaffar
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Energy
Description: In order to provide low-cost sustainable electricity to rural occupants, this project aims at developing a new Internet of Energy (ENERNET) system with low-cost electric energy generation (entirely through solar energy), delivery and management system through DC grid infrastructure with a viable opportunity for communities to produce their own electricity on self-help basis. This idea allows integration of multiple solar generation in individual houses to be used for community applications on need basis or in pre-defined scenarios. A communication layer overseas the entire bi-directional exchange of energy and thresholds the power usage as needed. The possibility of electricity theft is negligible as every node is monitored through a central system. The technology developed in this work will be scalable and could further be used for designing urban solutions in the system, for the future, in multiple backup and UPS like applications. Moreover, the formulated network of energy can be integrated with national grid to increase flexibility.

Title: Decentralized Electric Power Delivery Model for Rural Electrification in Pakistan
PI: Dr. Hassan Abbas Khan
Co-PI: Mr. Nauman Ahmad Zaffar, Dr. Husnain Fateh Ahmed
Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 2,331,034
Project Initiated in: 2016
Duration: 24 Months
Category: Energy
Description: The main objectives of this project are to study both the feasibility of DC microgrids in Pakistan and to study the dynamics of the take-up of new technology and its effects on the socio-economic wellbeing and aspirations of off-grid communities. A solar microgrid in the context of Pakistan, will present a completely novel disruption to traditional behaviour. The prime focus of the project is to study both its direct socioeconomic impact in rural communities, its rate of take up, based on interventions on pricing mechanisms and by making the design schematics open source, the effect of lowered RnD fixed costs on market viability.

Dr. Ijaz Haider Naqvi
Department of Electrical Engineering, SBASSE
ijaznaqvi@lums.edu.pk
+924235608305

Profile Dr. Ijaz Haider Naqvi received his B.Sc. Electrical Engineering from University of Engineering & Technology Lahore (2003), Masters in Radio Communications from SUPELEC Paris (2006) and PhD in Electronics and Telecommunications from IETR-INSA Rennes, France (2009). He has been a recipient of the prestigious ministerial scholarship of French Ministry of Research to pursue his PhD and HEC overseas scholarship for his Masters. Dr. Ijaz has several years of research experience in the wireless communications and wireless sensor networks. His current research focuses on ultra-wideband communications, system level aspects in wireless sensor networks and RF optimisation and network management issues in wireless mobile networks.

Selected Publications

- Qureshi, H. N., Naqvi, I. H., & Uppal, M. (2017, September). Massive MIMO with Quasi Orthogonal Pilots: A Flexible Solution for TDD Systems. In Vehicular Technology Conference (VTC-Fall), 2017 IEEE 86th (pp. 1-6). IEEE
- Butt, F. A., Naqvi, I. H., & Riaz, U. (2017, September). MIMO Radars with Orthogonal Waveforms: A Novel Approach for Enhanced Performance under Swerling Targets. In Vehicular Technology Conference (VTC-Fall), 2017 IEEE 86th (pp. 1-5). IEEE
- Maqsood, B., & Naqvi, I. H. (2017, September). Sub-Nyquist Rate UWB Indoor Positioning Using Power Delay Profile and Time of Arrival Estimates. In Vehicular Technology Conference (VTC-Fall), 2017 IEEE 86th (pp. 1-5). IEEE
- Minhas, U. I., Naqvi, I. H., Qaisar, S., Ali, K., Shahid, S., & Aslam, M. A. (2017). A WSN for monitoring and event reporting in underground mine environments. IEEE Systems Journal
- Ali, K., & Naqvi, I. H. (2016, April). EveTrack: An Event Localization and Tracking Scheme for Wsns in Dynamic Environments. In Wireless Communications and Networking Conference (WCNC), 2016 IEEE (Pp. 1-6). IEEE

Title: Validation and Testing of Next Generation MIMO Radar Systems
PI: Dr. Ijaz Haider Naqvi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: In this project, the main objective is to move a step closer toward a test bed for research on next generation radars. There is a consensus among the scientific community that the multi-antenna system is the technology that would be used in next generation radar systems. The purpose is to implement MIMO functionality to improve the capacity of the radar with regards to the quality of target information. This project intends to investigate novel signal processing algorithms for MIMO radars and prototype it using high frequency RF equipment like Vector Signal generator and digitizer etc. Radar technology is improving rapidly. The proposed project would contribute towards the development of the next generation radar systems with a reduced cost and time.

Title: Millimetre-wave Techniques for 5G Mobile Communications
PI: Dr. Ijaz Haider Naqvi
Sponsor: Carleton University
Funding Amount: PKR 411,058
Project Initiated in: 2016
Duration: 12 Months
Category: Telecommunication
Description: In this project, the fundamental objective is to investigate the use of 3D beamforming in the millimetre wave communication channel as a potential solution for 5G systems requiring both high latency and high reliability at the same time. Since there's a lot of spectrum available in the millimetre wave range (30 to 300GHz), achieving high data rate should also not be a concern for such systems. However signals in this range experience an order of magnitude increase in path loss as compared to conventional microwave systems. In this project, the aim is to investigate hybrid schemes in a massive MIMO system where some of the available dimensions used for achieving diversity would give a huge boost to the reliability of the message.

Title: Development DSSS System Using RFNoC
PI: Dr. Ijaz Haider Naqvi
Sponsor: Public Sector Organization
Funding Amount: PKR 150,000
Project Initiated in: 2017
Duration: 8 Months
Category: Telecommunication
Description: This project focuses on development of direct sequence spread spectrum for a point to point wireless link by sharing computational resources with FPGA and host-PC. This project uses 3rd generation USRP X310 as receiver and USRP 2922 as transmitter. The implementation uses modern data-aided communication and uses the known preamble at the receiver which helps in synchronisation of frequency/phase offsets and estimation of channel.

Title: First Physician: Smart Disease Diagnostic System
PI: Dr. Ijaz Haider Naqvi
Sponsor: LUMS Faculty Initiative Fund (FIF)
External Collaboration: Pakistan Kidney and Liver Institute and Research Centre (PKLI) | Volunteer Force against Hepatitis Transmission (VFAHT)
Funding Amount: PKR 999,600
Project Initiated in: 2018
Duration: 12 Months
Category: Health
Description: In this project, First Physician, a smart disease management system for both patients and doctors has been proposed. The proposed automatic disease diagnosis systems would make use of machine learning techniques; a software application which would act as a first physician you would consult. Depending on the availability of the information, it would provide suggestions with variable degree of confidence on your health. It would be a warning system that would guide you which doctor you should consult or which type of tests are required to further the diagnosis. For the doctors, this can serve as a pre-diagnosis step at the hospitals and save their time as they are heavily overburdened. Once the doctors have suggested the diagnostic tests, the results of those tests would again be entered in the software and now since more information is available, the solution would be able to give its diagnosis with much improved confidence. It would also act as a tool to prevent howlers which are very common in our public hospitals because of the scarcity of doctors, untrained staff and inherent difficult nature of the job.

Title: Design and Development of an RF Coverage Optimization System using Spatio-Temporal Mobile User Densities and Autonomic Network Management Approach
PI: Dr. Ijaz Haider Naqvi
Co-PI: Dr. Ahmad Shabbar Kazmi
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 9,080,000
Project Initiated in: 2016
Duration: 21 Months
Category: Telecommunication
Description: The aim of this project is to develop a prototype SW application for data measurement, transmission, storage and analysis of the spatio-temporal user information for system capacity enhancement purposes in mobile networks, to test the developed prototype application in the field and to motivate the industry to use this system for performance enhancement of call and network services through industrial partners.

Dr. Mohammad Jahangir Ikram
Department of Electrical Engineering, SBASSE
jikram@lums.edu.pk
+924235608201

Profile Dr. Jahanghir Ikram received his PhD in Electrical Engineering from the University of Manchester, UK in March 1992. Before joining LUMS in 2000, Dr. Ikram was a consultant in Asian Development Bank assisted Technical Education Project, developing curricula for Computer Technology and Information Technology. Dr. Ikram has also taught in the Electrical Engineering Department at the University of Engineering and Technology, Lahore for several years where he was involved in many funded research projects by different organisations and companies, including a project by Philips TriMedia Division, USA, working on implementation of a Speech algorithm in their TrimEdia processor. In winter 2002, he visited the University of Illinois at Chicago (UIC) as a Visiting Scholar to do research in the Multimedia Communication Laboratory.

Selected Publications

- Khalid, Q., Ikram, M. J., & Arshad, N. (2017). Harvesting Maximal PV Energy with Fine Grained Energy Distribution: An Alternative to Traditional PV Systems in Buildings. Energy and Buildings, 148, 355-365
- Khalid, Q., Ikram, J., & Arshad, N. (2017). A Collaborative Approach to Operate High Powered Devices on Small-scale PV systems. Energy Procedia, 111, 895-903
- Tariq, Z. B., Khalid, Q., Ikram, J., & Arshad, N. (2017). An Approach to Operate High-powered Legacy Electrical Appliances on Small Scale Solar PV systems. Renewable Energy, 104, 238-247
- Khalid, Q., Arshad, N., & Ikram, J. (2015, November). Poster: Maximizing Renewable Energy Usage in Buildings using Smart Energy Switching Platform. In Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems (pp. 401-402). ACM
- Ali, S. M., Naveed, M., Javed, F., Arshad, N., & Ikram, J. (2015). DeLi2P: A User Centric, Scalable Demand Side Management Strategy for Smart Grids. Paper presented at the SMARTGREENS 2015 - 4th International Conference on Smart Cities and Green ICT Systems, Proceedings

Title: Li-Ion Battery Unit As Replacement of Lead-Acid Batteries for Existing and New Storage Based Electrical Systems.
PI: Dr. Mohammad Jahangir Ikram
Co-PI: Dr. Hassan Abbas Khan, Mr. Nauman Ahmad Zaffar
Sponsor: Higher Education Commission (HEC)
External Collaboration: Sozo Group of Companies | Lahore Chamber of Commerce and Industry
Funding Amount: PKR 13,816,000
Project Initiated in: 2018
Duration: 24 Months
Category: Sciences

Description: The main focus of this project is to design and develop a Li-ion battery pack (prototype) which could replace any Lead-acid battery in all major storage based systems in Pakistan (UPS, Renewables and Telecom BTS solutions). Battery technology is a complex field and the product i.e. battery is always a sub-component of a larger system that integrates in a unique way to both draw energy during the discharge cycle and store energy during the charging cycle. The charging and discharging cycles of the batteries differ for different battery chemistry and replacement of Lead-acid batteries with Li-ion batteries is not as straight forward as matching the terminal characteristics of voltage, current and capacity. It requires design of an intermediate power processing interface that can simultaneously address the requirements of both the electrical system and the internal battery processes for both safety and durability. The proposed product includes development of a Battery Unit (BU), Power Processing Unit (PPU) and Battery Management System (BMS) to allow effective migration of storage based systems to newer Li-Ion based batteries that provide the same interface as the legacy Lead-acid batteries.

Dr. Momin Ayub Uppal
Department of Electrical Engineering, SBASSE
momin.uppal@lums.edu.pk
+924235608112

Profile Dr. Momin Uppal received his BS degree in Electronic Engineering with highest distinction from GIK Institute of Engineering Sciences and Technology, Pakistan, in 2002. He then received his MS and PhD degrees in Electrical Engineering from Texas A&M University, College Station, in 2006 and 2010, respectively. Dr. Uppal spent the summers of 2009 at NEC Labs of America, Inc., Princeton, New Jersey as a Research Assistant, and the summers of 2012 at Texas A&M University Qatar as a Visiting Researcher and has been associated with the LUMS School of Science and Engineering (SSE) since October 2010.

Selected Publications

- Sohaib, S., & Uppal, M. (2018). Full-Duplex Compress-and-Forward Relaying Under Residual Self-Interference. IEEE Transactions on Vehicular Technology, 67(3), 2776-2780
- Din, F. U., Chattha, J. N., Ullah, I., & Uppal, M. (2017, October). A Layered Detect-Compress-and-Forward Coding Scheme for the Relay Channel. In Personal, Indoor, and Mobile Radio Communications (PIMRC), 2017 IEEE 28th Annual International Symposium on (pp. 1-5). IEEE
- Mazher, K., Farooq, U. B., Chattha, J. N., & Uppal, M. (2017). A Practical Layered Multiplexed-Coded Relaying Scheme for Wireless Multicast. IEEE Transactions on Vehicular Technology
- Pasha, M. A., Uppal, M., Ahmed, M. H., Rehman, M. A., & Altaf, M. A. B. (2017, June). Towards Design and Automation of Hardware-Friendly NOMA Receiver with Iterative Multi-User Detection. In Proceedings of the 54th Annual Design Automation Conference 2017 (p. 60). ACM
- Chattha, J. N., & Uppal, M. (2017, May). Relay-Aided Non-Orthogonal Multiple Access with Noisy Network Coding. In Communications (ICC), 2017 IEEE International Conference on (pp. 1-6). IEEE

Title: Non-Orthogonal Multiple-Access for 5G Networks: Theory, Design, Prototyping, and Experimental Evaluation
PI: Dr. Momin Ayub Uppal
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 4,065,374
Project Initiated in: 2017
Duration: 36 Months
Category: Telecommunication
Description: The main objective of this project is to develop novel physical-layer NOMA strategies for 5G networks. Drawing insights from information theoretical analysis, the purpose is to develop next-generation NOMA schemes that are effective, robust, energy-efficient, and practically feasible. In addition to evaluating the developed strategies using extensive simulations, a distinguishing feature of the project will be its strong emphasis on experimental prototyping and evaluation using software-defined radios.

Title: Design of a Channel Emulator for a Jet Aircraft
PI: Dr. Momin Ayub Uppal
Sponsor: Public Sector Organization
Funding Amount: PKR 150,000
Project Initiated in: 2017
Duration: 9 Months
Category: Sciences
Description: The objective of this project is the design and graphical-user interface based implementation of a channel emulator for aeronautical communication with tuneable parameters such as carrier frequency, bandwidth and aircraft velocity, which completely characterises the channel for air-ground, air-air and ground-air links throughout the flight of the aircraft. The main outcomes will be, design of configuration software running on a pc and a simulator incorporating the algorithms. The configuration software will configure different parameters among which are centre frequency and platform speed. At the end this simulator will be tested over USRP devices.

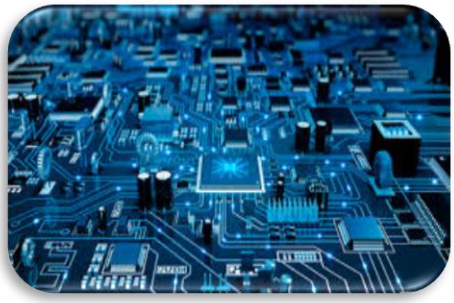
Dr. Muhammad Adeel Ahmed Pasha
Department of Electrical Engineering, SBASSE
adeel.pasha@lums.edu.pk
+924235608359

Profile Dr. Muhammad Adeel Pasha received his BSc Electrical Engineering degree from UET Lahore in 2004 and his M.S. Research in Embedded Systems degree from University of Nice Sophia-Antipolis in 2007. He then received a merit scholarship from government of France to continue his research work and received his PhD degree from University of Rennes-1 in 2010. His research interests include low-power micro-architecture, energy-efficient WSN node platforms, hardware specialisation & electronic design automation tools, LED-based optical communication & localisation, and smart power grid (algorithms and hardware development).

Selected Publications

- Ahmed, A., Pasha, M. A., Ahmad, Z., Masud, S., & Sikora, A. (2017, September). Energy Efficient Sensor Network Routing (EESNR) Protocol for Large Distributed Environmental Monitoring Applications. In Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), 2017 9th IEEE International Conference on (Vol. 2, pp. 740-745). IEEE
- Ahmad, Z., Pasha, M. A., Ahmad, A., Muhammad, A., Masud, S., Schappacher, M., & Sikora, A. (2017, September). Performance Evaluation of IEEE 802.15. 4-Compliant Smart Water Meters for Automating Large-Scale Waterways. In Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), 2017 9th IEEE International Conference on (Vol. 2, pp. 746-751). IEEE
- Ijaz, R., & Pasha, M. A. (2017, September). Area-Efficient and High-Throughput Hardware Implementations of TAV-128 Hash Function for Resource-Constrained IoT devices. In Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), 2017 9th IEEE International Conference on (Vol. 2, pp. 832-835). IEEE

Title: GreenComm: Toward Developing an Energy-Efficient Platform for Internet of Things (IoT)-Enabled Devices
PI: Dr. Muhammad Adeel Ahmed Pasha
Co-PI: Dr. Momin Ayub Uppal
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 930,000
Project Initiated in: 2016
Duration: 12 Months
Category: Energy
Description: System-level energy trade-offs have already been studied in other wireless communication paradigms such as WSN systems and hardware acceleration of computational subsystem has shown great promise in bringing down the overall system energy. The same idea should be explored in a relatively less explored area of IoT where computational challenges are more severe than simple WSN. The prime objective of the project is to eventually be an important step towards developing energy efficient platforms for future IoT-enabled devices (such as embedded industrial sensors, actuators, smart-phones, tablets, personal health-monitoring devices, etc.)



Title: Framework for High-level Power Estimation of Embedded Soft-Core Processors
PI: Dr. Muhammad Adeel Ahmed Pasha
Co-PI: Dr. Shahid Masud
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 615,695
Project Initiated in: 2017
Duration: 18 Months
Category: Technology
Description: In this project a setup will be designed to estimate the power consumption of a software code at higher abstraction level. It aims at reducing the time and difficulty involved in software power estimation while at least maintaining the accuracy also provided by the existing software tools. The research and the developed framework will benefit the Embedded Systems designers and code writers. This project will increase the knowledge base of Embedded Systems and Computer Aided Design (CAD) tools in Pakistan. It will add a new tool in the domain of Embedded Systems and will be beneficial for both students and researchers alike.

Title: Automated Testbed for Spatially Distributed Wireless Real Time Monitoring System of Large Scale Waterways AutoTest Wireless Water (ATWW)
PI: Dr. Muhammad Adeel Ahmed Pasha
Co-PI: Dr. Shahid Masud, Prof. Dr. Axel Sikora - University of Offenburg
Sponsor: German Pakistani Research Cooperation Program (DAAD)
External Collaboration: University of Offenburg
Funding Amount: PKR 8,140,498
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: Water Level Monitoring helps to increase the efficiency of water distribution and management. In Pakistan, the world's largest irrigation system which covers 90.000 km of channels needs to be monitored and managed on different levels. The irrigated agriculture of Pakistan mainly depends on the Indus River System and its tributaries. The need for improvement in efficiency and productivity of the irrigation water has become one of key issues for the irrigation and the agriculture sector. The proposed research project will involve setup of a hardware based emulation and test environment for wireless sensor nodes that can be used in the laboratory at HSO and provisioning of interfaces to control the network nodes from automated test scripts. It further includes provisioning of interfaces for monitoring the communication and energy states of the spatially distributed network nodes.

Dr. Muhammad Awais Bin Altaf
Department of Electrical Engineering, SBASSE
awais.altaf@lums.edu.pk
+924235608490

Profile Dr. Muhammad Awais Bin Altaf has joined LUMS as an Assistant Professor-Tenure Track in the Department of Electrical Engineering, SBASSE. Dr. Altaf obtained his PhD in Interdisciplinary Engineering and MSc in Microsystems Engineering from Masdar Institute of Science and Technology, Abu Dhabi in 2016 and 2012, respectively. He developed an energy efficient machine-learning based feature extraction and classification processor for epileptic seizure detection sensor with transcranial stimulation. His research is focused on low power bio-medical sensors and processors with special focus on mixed signal circuits. He was an Exchange PhD student during Fall 2015 in Massachusetts Institute of Technology (MIT), USA. Dr. Altaf completed his BS in Electrical Engineering from University of Engineering and Technology in 2008. From November 2012 to June 2013, he was a Digital Design Engineer Intern at Design Solutions, Global Foundries in Dresden, Germany where he was working on the implementation of digital test chips of 20 and 14nm technology. Dr. Altaf is a recipient of IEEE SSCS Pre-doctoral Achievement Award (2016). Prior to joining LUMS, he was associated with Masdar Institute of Science and Technology, Abu Dhabi as Research Assistant. His research interests include Next Generation of Biomedical Electronic Devices, Low Energy Design SoC and Energy Efficient Digital/Analog Circuits.

Selected Publications

- Saadeh, W., Altaf, M. A. B. (2018). A Wearable Neuro-Degenerative Diseases Classification System using Human Gait Dynamics. Springer
- Saadeh, W., Altaf, M. A. B., Alsuradi, H., and Yoo, J. (2017). A 1.1mW Ground Effect-Resilient Body-Coupled Communication Transceiver with Pseudo OFDM for Head and Body Area Network. IEEE Journal of Solid State Circuits (JSSC), vol. 52, no. 10, pp. 2690-2702
- Saadeh, W., Altaf, M., Alsuradi, H., and Yoo, J. (2017). A Pseudo OFDM with Miniaturized FSK Demodulation Body Coupled Communication Transceiver for Binaural Hearing Aids in 65nm CMOS. IEEE Journal of Solid State Circuits (JSSC), vol. 52, no. 3, pp 757- 768
- Altaf, M. A. B., Yoo, J. (2016) A 1.83μJ/Classification, 8-Channel Patient-Specific Epileptic Seizure Classification SoC using Non-Linear Support Vector Machine. IEEE Trans. Biomed. Circ. Syst. (TBioCAS), vol. 10, no. 1, pp. 49-60
- Zhang, C., Altaf, M. A. B., Yoo, J. (2016). Design and Implementation of an On-Chip Patient-Specific Closed-Loop Seizure Onset and Termination Detection System," IEEE Journal of Biomedical and Health Informatics (JBHI), vol. 20, no. 4, pp. 996-1007

Title: An Infrared Sensor Based Non-Contact Non-Invasive Early Breast-Cancer Screening Device
PI: Dr. Muhammad Awais Bin Altaf
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 810,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: This project aims to develop a safe handheld noninvasive, non-contact home screening device which can be effective in early breast cancer detection The detection mechanism will be based on infrared sensor reflection mounted on the handheld device along with machine learning based processor to achieve high detection rate and low false positive. To develop the above system, the project is divided into the development of 3D Model of breast along with malignant layer in MATLAB, algorithm development based on machine learning for the breast cancer detection based on developed model and initial Prototype Development with Infrared Sensor and Processing platform.

Dr. Muhammad Imran Cheema
Department of Electrical Engineering, SBASSE
imran.cheema@lums.edu.pk
+924235608467

Profile Dr. Imran Cheema obtained his PhD in Electrical Engineering with emphasis on Photonics Systems from McGill University, Montreal, Canada in 2013. During the PhD research, he developed novel theoretical and experimental techniques for bio-optical sensing applications. He received his BS and MS in Electrical Engineering from UET Lahore and University of Colorado, Boulder USA, respectively. He also worked as an Optical Engineer in Oerlikon Optics Inc., USA after his MS. During his industrial experience, he worked on laser based RGB head up display units, infrared lasers, and laser based miniature projectors for cell phones.

Selected Publications

- Cheema, M. I., Kirk, A. G. (2013). Accurate Determination of the Quality Factor and Tunnelling Distance of Axisymmetric Resonators for Bio Sensing Applications. Optics express, 21(7), 8724-8735
- Cheema, M. I., Mehrabani, S., Hayat, A. A., Peter, Y. A., Armani, A. M., & Kirk, A. G. (2012). Simultaneous Measurement of Quality Factor and Wavelength Shift by Phase Shift Microcavity Ring Down Spectroscopy. Optics express, 20(8), 9090-9098
- Cheema, M. I., Shi, C., Armani, A. M., & Kirk, A. G. (2014). Optimizing the Signal to Noise Ratio of Microcavity Sensors. IEEE Photonics Technology Letters, 26(20), 2023-2026
- Cheema, M. I., & Kirk, A. G. (2015). Analytical Expressions for Waveguide-coupled Phase Shift Microcavity Ring Down Spectroscopy. JOSA B, 32(2), 355-362

Title: A Rapid and Portable Optical Sensor Array for Detection of Salinity, Fluoride, and Arsenic in Water
PI: Dr. Muhammad Imran Cheema
Co-PI: Dr. Falak Sher
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 6,368,125
Project Initiated in: 2017
Duration: 30 Months
Category: Water
Description: The main objective of this project is to develop an optical sensor array. In the proposed sensor, light from laser sources will be coupled into three fiber cavities. The light from each cavity will be detected by a separate detector followed by a microcontroller to display the result. The sensor will also be extensively tested in the standard laboratory setting with state-of-the-art equipment available at Pakistan Council of Research in Water Resources (PCRWR) Lahore. This process will provide a real time, accurate, sensitive, and portable water sensor array.

Title: Towards a Real Time TB Optical Biosensor Based Upon a Combination of Raman and Cavity Ring Down Spectroscopy
PI: Dr. Muhammad Imran Cheema
Co-PI: Dr. Muhammad Sabieh Anwar
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: The main theme of this research project is to build a prototype instrument that is applying Raman spectroscopy and CRDS to analyse gaseous or liquid samples particularly organic compounds. This project will be a stepping stone towards combining expertise of engineers and professionals in health care sector for solving health problems faced by our society. This project will be extended to other liquid phase applications including detection of fake antibiotics (a major problem of our society) and determination of milk fat in an environmental safe way (a problem currently faced by Nestle Pakistan).

Title: Milk Contamination Sensor Based on Optical Fiber Cavity Ring Down Spectroscopy
PI: Dr. Muhammad Imran Cheema
Co-PI: Dr. Alper Kiraz Koç University, Istanbul, Dr. Rahman Shah Zaib Saleem
Sponsor: Pakistan Science Foundation (PSF)
Funding Amount: PKR 3,997,688
Project Initiated in: 2017
Duration: 24 Months
Category: Agriculture
Description: The fundamental aim of this project is to develop an optical sensor that will employ principle of phase shift cavity ring down spectroscopy (PS-CRDS) in optical fiber cavities for rapid AFM1 detection in milk. The major outcome of this highly interdisciplinary project is to demonstrate an easy to use optical sensor that provides AFM1 detection in a solution without the aid of specialised laboratory personnel. This sensor will provide real time AFM1 detection with minimum sensitivity of 50ng/L. Moreover, it is anticipated that the research activity will lead towards a universal solution that can be extended to other applications, such as detecting drinking water contamination due to bacteria and arsenic.

Title: Portable Optical Sensor for Rapid, Non-Invasive and On-Site Diagnosis of Tuberculosis (TB)
PI: Dr. Muhammad Imran Cheema
Co-PI: Dr. Zarfishan Tahir - Institute of Public Health (IPH)
Sponsor: Ignite (formerly National ICT R&D Fund Company)
External Collaboration: Institute of Public Health (IPH)
Funding Amount: PKR 31,813,655
Project Initiated in: 2018
Duration: 34 Months
Category: Technology
Description: The overall goal of the project is to develop an easy to use non-invasive optical sensor that provides immediate TB diagnosis without the aid of specialised laboratory personnel and is easily portable to remote areas where hospitals are not available. Moreover, the research activity should lead towards a commercialisable solution. The project is highly interdisciplinary as it involves electrical engineers, biologists, biochemists, and medical specialists. It is anticipated that the project will lead towards a device similar to a commercial glucometer that can be easily operated by non-specialists.

Title: Free Space Optical Cavities for Detecting Milk Contamination
PI: Dr. Muhammad Imran Cheema
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Technology
Description: This proposal will be a steppingstone towards developing portable sensor for milk testing. In collaboration with Nestle, the present proposal will be focused towards development of an optoelectronic sensor for detecting only milk powder adulteration, a major current adulteration challenge faced by the Nestle Pakistan. Presently, no detection scheme exists which can determine MPA in milk samples rapidly, accurately, and out of lab settings. Therefore, there is a need for a portable, reliable, real time, and cost-effective instrument that can detect MPA at Nestle milk collection points. The present proposal is geared towards development of such a device using free space optical cavities. In this project, a MPA sensing instrument will be developed by applying optical cavity ring down spectroscopy (CRDS). CRDS is a well-established technique in gaseous phase and commercialised instruments exist for gas monitoring in various applications.

Dr. Muhammad Tahir
Department of Electrical Engineering, SBASSE
tahir@lums.edu.pk
+924235608423

Profile Dr. Muhammad Tahir received the Bachelor of Science in Electrical Engineering in 2007 from University of Engineering and Technology, Lahore and the Master of Science in Electronic Engineering in 2009 from Politecnico di Torino, Italy. In April 2013, he obtained his PhD degree also from Politecnico di Torino, Italy in the field of Electronics and Telecommunication. His research activity is focused on the development of novel algorithms for satellite navigation receiver technology. His research interests include receiver baseband signal processing algorithm design and development, Bayesian signal processing, detection and estimation theory, channel coding in communication networks, machine learning and sequential Monte Carlo methods.

Selected Publications

- Tahir, M., Khurram, U. M., & Salman, A. (2015, October). GNSS Carrier Tracking Loop: Stability Analysis and Some Improvements. In 2015 IEEE International Conference on Signal and Image Processing Applications (ICSIPA) (pp. 16-21). IEEE
- Mazher, K., Tahir, M., & Ali, K. (2016, March). GNSS Pseudorange Smoothing: Linear vs Non-linear Filtering Paradigm. In 2016 IEEE Aerospace Conference (pp. 1-10). IEEE
- Tahir, M., & Mazher, K. (2016). Singular Spectrum Based Smoothing of GNSS Pseudorange Dynamics
- Ahmed, H., & Tahir, M. (2016, May). Terrain-Based Vehicle Localization Using Low Cost MEMS-IMU Sensors. In 2016 IEEE 83rd Vehicular Technology Conference (VTC Spring) (pp. 1-5). IEEE

Title: A Low Cost, High Accuracy and Improved Integrity Cooperative Driver Assistance Platform for Enhancing Traffic Safety and Road Networks Efficiency
PI: Dr. Muhammad Tahir
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 2,171,283
Project Initiated in: 2017
Duration: 24 Months
Category: Telecommunication
Description: The proposed research aims to develop a platform to be deployed inside vehicles which are connected with each other over a wireless link. In this cooperative scenario, each vehicle can sense and perceive its environment more intelligently and can alert the drivers about a possible event. This event could be safety critical e.g. chance of a collision with nearby vehicle or could be efficiency critical e.g. traffic jam in next roundabout. The main objective is to propose a low cost, highly accurate solution with an extra degree of robustness in the form of integrity and reliability of all the information.

Title: Acoustically Green Zones: Design and Development of an Active Sound Control System for Acoustic Noise Reduction in both Open And Closed Spaces
PI: Dr. Muhammad Tahir
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 910,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: This project aims to develop a working system and related theory for acoustic quiet zone generation by cancelling undesirable noise and acoustic interference over a volumetric region in open or closed spaces. Traditional systems towards acoustic noise reduction attenuate the noise power in some finite points in space where acoustic field is measured hence their application to real world scenarios is very limited. The system developed from this project is expected to underpin the future development of acoustic signal processing research and will have a broad-range of applications, such as reduction of noise inside cars, creation of individual quiet zones in passenger planes and mitigation of acoustic noise made by industrial plants to neighbouring suburbs *etc.* The outcomes from this project will also have economic importance as it can reduce the health risk posed to people working or living in noisy environments.

Title: KneeBEAT: A Wearable Device for Quantitative Assessment of Human Knee Joint Health Based on Acoustical Emission Measurements
PI: Dr. Muhammad Tahir
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 990,000
Project Initiated in: 2017
Duration: 12 Months
Category: Health
Description: The aim of this research project is to develop a wearable prototype solution for effective monitoring of human knee health. Sounds produced by the knee likely depend on the angle of the bones, severity of degradation, lubrication and wear of cartilage. The proposed solution relies on these acoustical emissions from human knee during complex motion patterns. These sounds will be recorded by a contact microphone inside wearable solution along with motion sensors to measure the orientation of knee during each sound event. These recorded signals will then be used by advanced developed signal processing algorithms to extract relevant information from them and classify them according to knee pathology for effective diagnosis and monitoring of knee health.

Dr. Nadeem Ahmad Khan
Department of Electrical Engineering, SBASSE
nkhan@lums.edu.pk
+924235608203

Profile Dr. Nadeem Khan received his PhD from the Eindhoven University of Technology. Dr. Khan Joined LUMS in May 2002. Earlier, he worked at Streaming Networks (Pvt) Ltd, Islamabad where he performed several projects related to image processing and video compression in the context of multimedia products. His PhD research work was on minimal training dependent and robust text recognition systems. This research work and rest of his graduate study have been in close association with Philips, especially with its facilities of Philips Research Lab (LEP), France, Centre for Manufacturing Technology, The Netherlands and Philips International Institute, The Netherlands.

Selected Publications

- Abbas, W., & Khan, N. A. (2017, October). A Discriminative Spectral-temporal Feature Set for Motor Imagery Classification. In Signal Processing Systems (SiPS), 2017 IEEE International Workshop on (pp. 1-6). IEEE
- Ahmad, M. A., Ayaz, Y., Jamil, M., Omer Gillani, S., Rasheed, M. B., Imran, M., Javaid, N. (2015). Comparative Analysis of Classifiers for Developing an Adaptive Computer-assisted EEG Analysis System for Diagnosing Epilepsy. BioMed Research International, 2015
- Ahmad, M. A., Majeed, W., & Khan, N. A. (2014). An Alive Electroencephalogram Analysis System to Assist the Diagnosis of Epilepsy. Paper presented at the European Signal Processing Conference
- Ahmad, M. A., Majeed, W., & Khan, N. A. (2014). Advancements in Computer Aided Methods for EEG-based Epileptic Detection. Paper presented at the BIOSIGNALS 2014 - 7th Int. Conference on Bio-Inspired Systems and Signal Processing, Proceedings; Part of 7th Int. Joint Conference on Biomedical Engineering Systems and Technologies, BIOSTEC 2014

Title: Adaptive Intelligent Epilepsy Management System
PI: Nadeem Ahmad Khan
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 893,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: This project aims to investigate various claims made in literature regarding seizure prediction and to make best technologies available indigenously. Moreover, the project intends research in introducing adaptivity to such system with respect to patients and devices used and to advance the research in forecasting and summarisation of abnormal neuronal activity. The fundamental aim of this research is to combine signal processing techniques with new emerging neuro-evolutionary algorithms for efficient prediction and forecasting of epileptic seizures leading to the development of low cost and user friendly tools to assist neurologist and patient for management and treatment of epilepsy.

Title: 4 Class Motor Imagery Classification
PI: Dr. Nadeem Ahmad Khan
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 80,000
Project Initiated in: 2015
Duration: 12 Months
Category: Technology
Description: This project aims to use brain signals acquired through EEG. For a common man, this project aims to drive a robotic arm or a RC controlled car using brain signals. The signals will be acquired using headsets available in the market. These signals will then be processed using different techniques and the processed signals will then be run through a classifier and the classification accuracy will be measured. We will use different classifiers until we get the desired accuracy. A real life use of this technology is for the patients of ALS. These patients cannot move their limbs but using this technology they can move prosthetic limbs just like a real part.

Mr. Nauman Ahmad Zaffar
Department of Electrical Engineering, SBASSE
nauman.zaffar@lums.edu.pk
+924235608311

Profile Mr. Nauman Ahmad Zaffar received his BS (1990) and MS (1991) in Electrical Engineering from University of Pennsylvania. He then continued his work at the Electro-Optic / Magneto-Optic Labs at the University on development of a high-resolution frequency swept microwave diversity imaging system in multiple simultaneous bands from 2GHz-60GHz. His areas of work include understanding business needs, proposing and designing solutions and carrying out development, rollout and support lifecycle of the solutions in the domains of Electric Utilities, Telecom and Manufacturing. He has worked with Techlogix to establish and extend practice areas of Business Process Management, ERP implementation, Enterprise Architecture and Software Product Engineering. Mr. Nauman joined LUMS School of Science and Engineering (SSE) in 2010 as full-time faculty member in the Department of Electrical Engineering.

Selected Publications

- Saifee, M. B., Javed, M. U., Sohaib, M., & Zaffar, N. A. (2017, October). PSIM Modelling and Hall Sensors Based Adaptive Control of Switched Reluctance Motor Drive for EV Applications. In Industrial Electronics Society, IECON 2017-43rd Annual Conference of the IEEE (pp. 2133-2137). IEEE
- Anees, M., Awais, M., Tariq, N. B., & Zaffar, N. (2017, October). Scalable Hydrokinetics Power Generation Network for Rural Electrification. In Industrial Electronics Society, IECON 2017-43rd Annual Conference of the IEEE (pp. 2675-2680). IEEE
- Cheema, C. D. M., Shah, K. S., Khan, H. A., & Zaffar, N. A. (2017, October). Design and Analysis of Isolated Boost Converter for Microgrid Applications. In Industrial Electronics Society, IECON 2017-43rd Annual Conference of the IEEE (pp. 2431-2436). IEEE
- Bharmal, M. A., Akbar, S. Q., Noor, S., Farooq, R., & Zaffar, N. A. (2017, October). Hydrokinetic Powered Irrigation Network Automation: A Scalable Architecture for the Enablement of Real-Time Automated Decentralized Control of the Irrigation Water Delivery System in Developing Countries. In Energy Conversion Congress and Exposition (ECCE), 2017 IEEE (Pp. 4773-4779).

Title: Strategic Consulting Phase 2
PI: Mr. Nauman Ahmad Zaffar
Sponsor: Microtech Industries (Pvt) Ltd
Funding Amount: PKR 600,000
Project Initiated in: 2016
Duration: 5 Months
Category: Energy
Description: The project involves holding regular discussions between MicroTech and Mr. Nauman Ahmad Zaffar on Smart grids, Advanced Metering Infrastructure, structuring of the company for hardware, firmware and software requirements of AMI and on dealings and discussions with strategic clients of MicroTech as and when the need arises.

Title: Measurement of Noise Levels in LT Distribution Network of LESCO to Assess Viability of Broadband over Power Line Communication (BPL)
PI: Mr. Nauman Ahmad Zaffar
Sponsor: Huawei
Funding Amount: PKR 2,000,000
Project Initiated in: 2016
Duration: 2 Months
Category: Telecommunications
Description: This project proposes to undertake the assessment of noise level and signal propagation on the LT network at carefully sampled and selected locations on the distribution network that will cover the diversity of load, operating conditions and variations in the network. These nodes will be chosen to match the points where previous phase assessment was done for NB-PLC network to ensure a judicious comparison. The work will be divided into two phases. First phase will cover the measurement of noise levels under ambient and different load conditions. The second phase will work with a subset of locations to insert modulated PLC signal conforming to the signals produced by standard Huawei BPL modem based transmitters.

Title: Design and Implementation of Brushless DC Motors
PI: Dr. Nauman Ahmad Zaffar
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 80,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: The aim of this project is to design and implement a driving circuit for a DC brushless motor which is already used in some hybrid and fully electric cars. The final deliverable will be an electric car, with variable speed drive, regenerative braking and the ability to charge the batteries from the grid. All the components will be a showcase of the applications of power electronics, such as variable frequency drives and AC-DC converters. Electricity is one such solution being already in use in the automobile industry to accelerate sustainable transport. This aspect of the electric cars makes it one viable solution to the existing energy crisis, especially in the developing countries where non-renewable energy sources are short and a need for much greener fuel reserve is in demand. However, there is a lot of development to be done before electric vehicles become mainstream.

Title: Grid Tied Solar Micro Inverter with Inverse Power Factor Correction
PI: Dr. Nauman Ahmad Zaffar
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 70,000
Project Initiated in: 2016
Duration: 12 Months
Category: Energy
Description: The aim of the project is to design and create a single phase grid tied solar micro-inverter with inverse power factor correction by making use of nested control loops MPPT and current shaping algorithms. In a country like Pakistan which suffers from massive load-shedding and where there is ample sunlight for at least 9 months of the year, solar enemy could play a crucial role in solving the energy crisis. If the attempt to reduce the size of the micro-inverter sufficiently to incorporate it into the panel is successful then the installation cost of solar panels will be reduced significantly and will enable the masses to benefit from this green technology.

Title: An Integrated System for Power Flow Control & Load Management
PI: Dr. Nauman Ahmad Zaffar
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 70,000
Project Initiated in: 2016
Duration: 12 Months
Category: Energy
Description: Under this Project, a platform has been designed and implemented where energy is obtained from the local grid as well as a solar panel. Perturb and observe algorithm is used for Maximum Power Point Tracking (MPPT) to charge a battery using a Single Ended Primary Inductor Converter (SEPIC).Furthermore, a DC/AC Dual flyback inverter has been designed and implemented, which has been used to derive household based loads up to 100W such as incandescent bulbs. Moreover, a variable frequency drive has also been simulated and realised with V/f control for soft starting to enable motor loads to run at intermittent energy resources such as UPS. Furthermore, a Programmable Logic Controller (PLC) has been programmed to act as a master controller for the integrated system. The system has been made intelligent in a manner that real time values of critical parameters are sensed by interfacing analogue circuitry with the PLC. The PLC also provides actuation by maintaining the values of these parameters within a defined range. A Human Machine Interface (HMI) has also been interfaced with the PLC for providing User Interface. Real time monitoring of all critical parameters has also been provided, both locally on an HMI and remotely through web interface.

Title: Introduction of Li-Ion Batteries in Pakistan
PI: Mr. Nauman Ahmad Zaffar
Co-PI: Dr. Hassan Abbas Khan
Sponsor: Sozo Group of Companies
Funding Amount: PKR 500,000
Project Initiated in: 2017
Duration: 2 Months
Category: Energy
Description: This project includes developing a business plan for the proposed introduction of Li-Ion batteries in Pakistan. The proposal will contain the need and demand assessment of battery storage solutions and the relative merits of Li-Ion based batteries compared to the traditional lead-acid batteries. Conversion kits and Li-Ion battery packs will be designed that can provide seamless integration with existing electrical systems that employ battery based storage. In addition, the area of re-configurable power processing units will be explored that may allow new and better solutions to existing power processing front-ends connected to the new storage units.

Title: Development of a Retrofit Li-Ion Battery System for Lead-Acid Batteries
PI: Mr. Nauman Ahmad Zaffar
Co-PI: Dr. Hassan Abbas Khan, Dr. Mohammad Jahangir Ikram
Sponsor: Sozo Group of Companies
External Collaboration: Lahore Chamber of Commerce and Industry
Funding Amount: PKR 2,710,000
Project Initiated in: 2017
Duration: 7 Months
Category: Energy
Description: The aim of this project is to develop the prototype system for Sozo. As part of the effort, LUMS will architect and design conversion kits of Li-Ion battery packs that can provide seamless integration with existing electrical systems that employ battery based storage. In addition, the area of reconfigurable power processing units will be explored that may allow new and better solutions to existing power processing frontends connected to the new storage units.

Dr. Nauman Zafar Butt
Department of Electrical Engineering, SBASSE
nauman.butt@lums.edu.pk
+924235608414

Profile Dr. Nauman Zafar Butt did his PhD in Electrical Engineering from Purdue University in 2008 and B.S. in the same field from University of Engineering & Technology, Lahore in 2002. From 2008 to 2012, he was a member of technical staff in Semiconductor Research & Development Centre (SRDC) in IBM Microelectronics Division, Hopewell Junction, New York. Dr. Butt's research interests include investigating physics and technology of microelectronic and optoelectronic devices through theory, compact modelling, simulations and experiments. His PhD thesis was on computational study of scaling and radiation damage in nanoscale memory devices. In IBM, he has been involved in the development of embedded DRAM and dense SRAM devices in 32nm and 14nm SOI technology.

Selected Publications

- Iqbal, S., Imran, H., Qasim, U. B., & Butt, N. Z. (2017, September). Design of High Performance Graphene/Silicon Photodetectors. In Simulation of Semiconductor Processes and Devices (SISPAD), 2017 International Conference on (Pp. 205-208). IEEE
- Imran, H., Iqbal, S., Farooq, A., & Butt, N. Z. (2017, September). Computational Modelling Of Hybrid Graphene/Quantum Dot Photodetectors. In Simulation of Semiconductor Processes and Devices (SISPAD), 2017 International Conference on (pp. 201-204). IEEE
- Imran, H., Abdolkader, T. M., & Butt, N. Z. (2016). Carrier-Selective Nio/Si and Tio 2/Si Contacts for Silicon Heterojunction Solar Cells. IEEE Transactions On Electron Devices, 63(9), 3584-3590
- Nauman, A. (2016, November). Stacked Switched Capacitor Architecture Using Electrolytic Capacitors for Size Reduction. In Power India International Conference (PIICON), 2016 IEEE 7th (Pp. 1-5). IEEE
- Saad, R., & Butt, N. Z. (2016). Role of Carrier Mobility and Band Alignment Engineering on the Efficiency of Colloidal Quantum Dot Solar Cells

Title: Graphene Based Microfluidic Biosensors for Early Detection of Breast Cancer
PI: Dr. Nauman Zafar Butt
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 950,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: The main objective of this project is to develop and optimise a graphene (atomic sheet of carbon atoms) based biosensor for early detection of breast cancer. The broader vision of this project is to open up a highly interdisciplinary area of research on biosensors and microfluidics at SBASSE where scientists and engineers could work together to improve the health care diagnostics and drug development in the country. The goal of this project is to investigate a new type of lab on a chip microfluidic sensor which incorporates one of the emerging nanomaterials called graphene.

Title: Lab on a Chip Microcytometer to Count Immune Cells for TB Detection
PI: Dr. Nauman Zafar Butt
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Health
Description: This proposal aims to develop a biochip for precise diagnosis of extra pulmonary tuberculosis (TB) – a type of TB which shows very little symptoms until it becomes fatal. The biochip will implement a differential cell counter to electrically count CD4 T cells (a type of cells in immune system that are impaired or altered with TB infection). The chip will integrate a pair of microelectrodes that will measure the electrical impedance of the blood cells flowing inside the microfluidic channels. Each cell will introduce its own electrical pulse in the impedance signal and will be hence counted. The proposed work will be a big step towards establishing a multidisciplinary research in lab on chip devices at LUMS.

Title: Optimization of Contacts for Silicon Solar Cell Technology for Efficiency Enhancement
PI: Dr. Nauman Zafar Butt
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 727,000
Project Initiated in: 2015
Duration: 12 Months
Category: Technology
Description: This project aims to design the contacts that eliminate the aforementioned problems by exploring alternate materials such as emerging transparent conducting oxides. An optimal cell structure with alternate contacts will be demonstrated for commercial silicon solar cells. The project involves physics based modelling to identify the material/physical requirements for an optimal contact. The model based design will then be fabricated using the equipment available at Syed Babar Ali School of Science and Engineering, LUMS. Finally, the fabricated solar cells will be characterised using optical and electrical measurements and the results will be compared with the benchmark commercial solar cell.

Dr. Naveed Ul Hassan
Department of Electrical Engineering, SBASSE
Naveed.hassan@lums.edu.pk
+924235608331

Profile Dr. Naveed Ul Hassan received his B.E. degree in Avionics Engineering from the College of Aeronautical Engineering (CAE), Risalpur, Pakistan, in 2002 and his M.S. and PhD degrees in Electrical Engineering, with specialisation in digital and wireless communications, from the Ecole Superieure d'Electricite (Supelec), Gif-sur-Yvette, France, in 2006 and 2010, respectively. In 2011, he joined as an Assistant Professor at the Department of Electrical Engineering, Syed Babar Ali School of Science and Engineering, LUMS. Since 2012, he has also been a visiting Assistant Professor at Singapore University of Technology and Design (SUTD), Singapore during the months of June-August. He has several years of research experience and has authored/co-authored numerous research papers published in refereed international journals and conference proceedings.

Selected Publications

- Bashir, N., Sardar, H. S., Nasir, M., Hassan, N. U., & Khan, H. A. (2017, June). Lifetime Maximization of Lead-Acid Batteries in Small Scale UPS and Distributed Generation Systems. In Powertech, 2017 IEEE Manchester (Pp. 1-6). IEEE
- Hassan, N. U., Tushar, W., Yuen, C., Kerk, S. G., & Oh, S. W. (2017). Guaranteeing Qos Using Unlicensed TV White Spaces for Smart Grid Applications. IEEE Wireless Communications, 24(2), 18-25
- Hassan, N. U., Yuen, C., & Atique, M. B. (2017, May). Exploiting Qos Flexibility for Smart Grid and Iot Applications Using TV White Spaces. In Communications (ICC), 2017 IEEE International Conference on (Pp. 1-6). IEEE
- Wang, X., Yuen, C., Hassan, N. U., an, N., & Wu, W. (2017). Electric Vehicle Charging Station Placement for Urban Public Bus Systems. IEEE Transactions On Intelligent Transportation Systems, 18(1), 128-139
- Rehman, A., Bashir, N., Hassan, N. U., & Yuen, C. (2016, November). Impact of Home Appliances on the Performance of Narrow-Band Power Line Communications for Smart Grid Applications. In Region 10 Conference (TENCON), 2016 IEEE (Pp. 3511-3514). IEEE
- Jin, J., Xu, Y., Khalid, Y., & Hassan, N. U. (2016). Optimal Operation of Energy Storage with Random Renewable Generation and AC/DC Loads. IEEE Transactions On Smart Grid
- Chai, B., Tushar, W., Hassan, N. U., Yuen, C., & Yang, Z. (2016, November). Managing Energy Consumption in Buildings through Offline and Online Control of HVAC Systems. In Region 10 Conference (TENCON), 2016 IEEE (Pp. 3368-3373). IEEE

Title: Location Based Services (LBS) for Mobile Devices
PI: Dr. Naveed Ul Hassan
Co-PI: Dr. Muhammad Adeel Ahmed Pasha
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 10,231,432
Project Initiated in: 2016
Duration: 18 Months
Category: Telecommunication
Description: This project aims at developing two prototype LBS applications for LUMS campus. The first application, targets the campus-wide display of relevant POIs and outdoor navigation. The second application will be specific to LUMS library building. The objective is to develop scalable LBS prototype systems where changing the databases which contain location maps (indoor, outdoor, fingerprinting), POIs, product information etc. would result in a new application for any specific location.

Title: Towards Energy Efficient Commercial Buildings through Consumer Behaviour Considerations Using Internet of Things (Iot) and Machine-To-Machine (M2M) Platforms
PI: Dr. Naveed Ul Hassan
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Energy
Description: The main objective of this project is to use IoT and cloud-enabled M2M communication platforms for the development of a scalable and easily deployable building energy management system for commercial buildings that provide easy interface and connectivity. The purpose is to integrate human tracking techniques to link energy usage with individual consumers and then perform energy management and predictions based on human activity. This system will help to quantify the amount of wasted energy and its impact on overall energy bill, effectiveness of behaviour change interventions and identification of challenges and opportunities for further improvements.

Title: Targeting Consumer Behaviour for Resource Optimization in Buildings Using Internet of Things and Machine to Machine Communications
PI: Dr. Naveed Ul Hassan
Co-PI: Dr. Muhammad Irfan Khattak - Gomal University
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 3,972,404
Project Initiated in: 2017
Duration: 18 Months
Category: Energy
Description: In recent years, Internet of Things (IoT) and Machine-to-Machine (M2M) communication platforms have gained tremendous popularity and research interest. The objective of this project is to use IoT and cloud-enabled M2M communication platforms for the development of a scalable and easily deployable resource conservation and management system for buildings. This project aims to develop novel control and scheduling algorithms for resource management and a user interface to engage consumers. The most important feature of this project will be the provision of customised feedback to individual consumers in order to encourage behaviour change towards resource conservation. This project will provide a platform that would allow us to determine resource wastage and identify important behaviour change interventions for resource conservation in buildings.

Title: TV White Space Spectrum Exploration & Testbed for Internet of Things (IoT) Applications
PI: Dr. Naveed Ul Hassan
Co-PI: Dr. Momin Ayub Uppal
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: In this project, using control theoretic frameworks, real time algorithms will be developed that would allow SNOs to achieve various trade-offs between operational cost and QoS provisions in order to sustain their operations according to IoT application demands. With digital switchover, these algorithms would prove valuable in the development of successful business models for SNOs and in reducing the cost of data communication for IoT applications. The survey of TVWS spectrum will also be helpful in generating policy recommendations and guidelines for TVWS spectrum regulatory framework in Pakistan.

Dr. Shahid Masud
Department of Electrical Engineering, SBASSE
smasud@lums.edu.pk
+924235608199

Profile Dr. Shahid Masud did his B.Sc. Electrical Engineering from EME College, Rawalpindi, Pakistan in 1990, MSc in Electronics from the University of New South Wales, Sydney, Australia in 1992 and PhD in Electrical Engineering from Queen's University, Belfast, UK in 1999. He has been a recipient of prestigious AIDAB EMSS scholarship (Australia) and Commonwealth scholarship (UK). He was a senior design engineer at Amphion Semiconductor Ltd. (later Conexant / NXP Semicondutor) before joining LUMS in 2002. His research interests include design and implementation of DSP Systems and computer architecture.

Selected Publications

- Ahmed, A., Pasha, M. A., Ahmad, Z., Masud, S., & Sikora, A. (2017, September). Energy Efficient Sensor Network Routing (EESNR) Protocol For Large Distributed Environmental Monitoring Applications. In Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), 2017 9th IEEE International Conference on (Vol. 2, Pp. 740-745). IEEE
- Ahmad, Z., Pasha, M. A., Ahmad, A., Muhammad, A., Masud, S., Schappacher, M., & Sikora, A. (2017, September). Performance Evaluation of IEEE 802.15. 4-Compliant Smart Water Meters for Automating Large-Scale Waterways. In Intelligent Data Acquisition And Advanced Computing Systems: Technology And Applications (IDAACS), 2017
- Pasha, M. A., Gul, U., Mushahar, M., & Masud, S. (2017). A Simulation Framework for Code-Level Energy Estimation of Embedded Soft-Core Processors.
- Yousaf, A., & Masud, S. (2016, April). Stochastic Model Based Dynamic Power Estimation Of Microprocessor Using Imperas Simulator. In Systems Conference (Syscon), 2016 Annual IEEE (Pp. 1-8). IEEE

Title: Automated Testbed for Spatially Distributed Wireless Real Time Monitoring System of Large Scale Waterways Auto Test Wireless Water (ATWW)
PI: Dr. Shahid Masud
Co-PI: Dr. Muhammad Adeel Ahmed Pasha, Prof. Dr.-Ing. Axel Sikora - University of Offenburg,
Sponsor: German Pakistani Research Cooperation Program (DAAD) | University of Offenburg
Funding Amount: PKR 8,140,498
Project Initiated in: 2016
Duration: 24 Months
Category: Technology
Description: In Pakistan, the world's largest irrigation system which covers 90,000 km of channels needs to be monitored and managed on different levels. The need for improvement in efficiency and productivity of the irrigation water has become one of key issues for the irrigation and the agriculture sector. Monitoring of the waterways is a key element for efficient and fair water distribution. After specific prototypes in hardware and software for energy efficient wireless sensor nodes have been developed in the project.

Title: A Re-Configurable System-on-Module for Industrial Controls with IEEE 1588 IP Core Demonstrator
PI: Dr. Shahid Masud
Co-PI: Dr. Shahbaz Assad
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 35,379,531
Project Initiated in: 2017
Duration: 24 Months
Category: Telecommunication
Description: The main idea of this project is to come up with a System-on-Module (SoM) Intellectual Property (IP) that can fit into a wide range of FPGA based electronic systems as there are hundreds of modern applications that rely on FPGAs as main computing elements. In this project an in-house reconfigurable SoM will be developed that can integrate into any existing embedded system resulting in upgrading the computing resources in terms of processing speed, processing elements (PE), memory and user IOs.

Dr. Wala Salem Mustafa Saadeh
Department of Electrical Engineering, SBASSE
wala.saadeh@lums.edu.pk
+924235608495

Profile Dr. Wala Saadeh has joined LUMS as Assistant Professor-Tenure Track in the Department of Electrical Engineering - (SBASSE).Dr. Saadeh obtained her PhD in Interdisciplinary Engineering and MSc in Microsystems Engineering from Masdar Institute of Science and Technology, Abu Dhabi in 2016 and 2012, respectively. Her current research focus is on ultralow energy Body Area Network (BAN) transceiver for wearable healthcare. She developed a low-energy BAN transceiver for binaural hearing aid for long-term continuous monitoring. She is a recipient of IEEE International Circuits and Systems (ISCAS) 2015 best paper award (Bio CAS Track) and ISCAS 2015 runner-up best student paper award. During her Master studies, she developed a high efficiency LED driver circuit for Heart Rate Monitoring based on Pulse Oximetry. Dr. Saadeh completed her BS degree from Yarmouk University, Jordan. From January to June 2013, she was a Test-Chip intern at Test-Chip Integration team, Global Foundries in Dresden, Germany where she performed quality assurance tests on advanced nodes for DFM. Prior to joining LUMS, she was associated with Masdar Institute of Science and Technology, Abu Dhabi as Research Assistant. Her research interests include Wearable Biomedical Devices, Low Power DC-DC Converters and Energy Efficient Digital/Analog Circuits

Selected Publications

- Saadeh, W., Altaf, M. A. B. (2018). A Wearable Neuro-Degenerative Diseases Classification System using Human Gait Dynamics. Springer
- Saadeh, W., Altaf, M. A. B., Alsuradi, H., and Yoo, J. (2017). A 1.1mW Ground Effect-Resilient Body-Coupled Communication Transceiver with Pseudo OFDM for Head and Body Area Network. IEEE Journal of Solid State Circuits (JSSC), vol. 52, no. 10, pp. 2690-2702
- Saadeh, W., Altaf, M. A. B., Alsuradi, H., and Yoo, J. (2017). A Pseudo OFDM with Miniaturized FSK Demodulation Body Coupled Communication Transceiver for Binaural Hearing Aids in 65nm CMOS. IEEE Journal of Solid State Circuits (JSSC), vol. 52, no. 3, pp 757- 768
- Abubakar, S. M., Saadeh, W., Altaf, M. A. B. (2018). A Wearable Long-Term Single-Lead ECG Processor for Early Detection of Cardiac Arrhythmia. IEEE/ACM Design, Automation and Test in Europe pp. 961-966
- Saadeh, W., Altaf, M. A. B., Butt, S. A. (2017). A Wearable Neuro-Degenerative Diseases Classifier System based on Gait Dynamics. IEEE/IFIP Very Large Scale Integration (VLSI-SoC) pp. 1-6

Title: Energy-Efficient Patient-Specific Sleep Classifier for Alzheimer Patients
PI: Dr. Wala Salem Mustafa Saadeh
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 800,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: The main objective of this project is to develop a system for the prediction/early detection of potential Alzheimer patients based on their sleep patterns. This project proposes a patient specific wearable device for on sensor processing based on a single EEG channel to detect the sleep stage for early detection of potential Alzheimer patient. The project will involve development of EEG-based novel sleep stage classification algorithm and low power and small form factor implementation. Since the target goal is to develop a wearable device, therefore, the power-and-area should be as minimise to achieve the long-time battery life and small form factor.

Dr. Wasif Tanveer Khan
Department of Electrical Engineering, SBASSE
wasif.tanveer@lums.edu.pk
+924235608471

Profile Dr. Wasif Tanveer Khan received the B.Sc. degree in Electrical Engineering from the University of Engineering and Technology, Lahore, Pakistan, in 2005, the M.S. and PhD degrees in Electrical and Computer Engineering from the Georgia Institute of Technology, Atlanta, USA in 2010 and 2014, respectively. From January 2006 to December 2008, he was a Lecturer with the National University of Computer and Emerging Sciences-FAST, Lahore, Pakistan. He was awarded M.S. Leading to PhD Fulbright scholarship, in 2008. In 2009, he joined Professor John Papapolymerou's research group "Microwave Circuit Technology" at the Georgia Institute of Technology. Since January 2015, he has been working as an Assistant Professor at the Department of Electrical Engineering, LUMS.

Selected Publications

- Ali, A., Hamza, M., & Khan, W. T. (2017, October). Smallest Form Factor, High Performance 2–18 Ghz Cavity-Backed Archimedean Spiral Antenna. In Antennas and Propagation (ISAP), 2017 International Symposium on (Pp. 1-2). IEEE
- Awais, M., Ahmad, W., Khaliq, H. S., & Khan, W. T. (2017, October). A Novel Ultra-Wideband Quasi-Yagi Antenna for Millimetre Wave Applications. In Antennas and Propagation (ISAP), 2017 International Symposium on (Pp. 1-2). IEEE
- Khan, I., Qureshi, M. I., Rehman, M. U., & Khan, W. T. (2017, November). Long Range Wireless Power Transfer via Magnetic Resonance. In Progress in Electromagnetics Research Symposium-Fall (PIERS-FALL), 2017 (Pp. 3079-3085). IEEE
- Ahmad, W., Qureshi, M. I., & Khan, W. T. (2017, November). A Highly Efficient Tri Band (GSM1800, Wifi2400 and Wifi5000) Rectifier for Various Radio Frequency Harvesting Applications. In Progress in Electromagnetics Research Symposium-Fall (PIERS-FALL), 2017 (Pp. 2039-2044). IEEE
- Awais, M., Khaliq, H. S., & Khan, W. T. (2017, November). A Novel Dual-Band Millimetre-Wave Antenna for Automotive Radar and Multi-Gigabit Wireless Communications. In Progress in Electromagnetics Research Symposium-Fall (PIERS-FALL), 2017 (Pp. 2802-2807). IEEE

Title: MM- Wave Integration and Embedded Antennas in System-In-Package
PI: Dr. Wasif Tanveer Khan
Sponsor: Sony
Funding Amount: PKR 15,756,909
Project Initiated in: 2015
Duration: 58 Months
Category: Technology
Description: The aim of this consultancy project is to conduct and supervise research activities related to the mm-wave integration and embedded antennas System-in-Package planned within the framework of the mm-wave System-in-Package project. In particular, the focus of the consultancy is simulation and evaluation of proposed novel antenna / integration designs using a full-wave EM simulator and organisation of weekly-based video conference meetings. This mega project is divided into eight phases. Phases are termed as work package. The combined duration and allocated funds of all the phases are stated above.

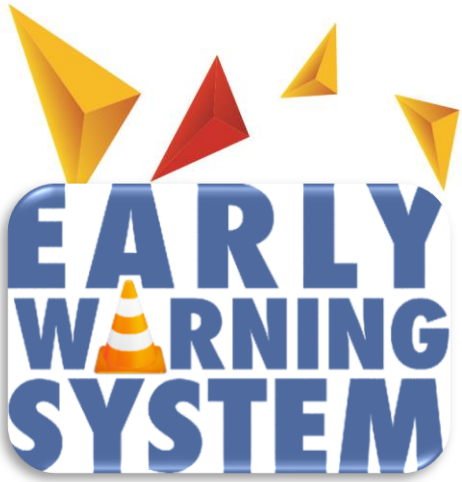
Title: Design and Development of RF front-end of a UHF Band Software Defined Radio
PI: Dr. Wasif Tanveer Khan
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: The objective of the proposed research is to indigenously develop an RF-frontend of a Software Defined Radio in the UHF band and develop the research base to carry out research in the area of RF and Microwave front-end design in the future. Since RF and microwave is an elusive research area in Pakistan, given the complexity of the task to be undertaken, the professional development of students, which are well-versed with the electronic design and hardware prototyping, is a foreseeable outcome of this project.

Title: Design and Simulate Miniaturized and Highly Efficient T/R Modules for Phased Array Radar (phase 1)
PI: Dr. Wasif Tanveer Khan
Sponsor: Public Sector Organisation
Funding Amount: PKR 990,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: The project is divided into three main phases. It will take 3 years to complete the project. At the end of the project, there will be indigenously developed highly efficient, low cost and miniaturized T/R modules, which will be integrated in Ground-based Air surveillance radar. The objective is to develop beam-forming circuitry(6 bit phase shifters, 6 bit attenuators, down conversion circuitry, pre-driver amplifiers) integrated on a Single Silicon chip and high power amplifiers, LNAs and T/R switch will be designed using GaN and GaAs technology.

Title: Design a Miniaturized Spiral Antenna for Ultra-wideband (2-18 GHz) Applications
PI: Dr. Wasif Tanveer Khan
Sponsor: Re-engineering With Research (RWR) Private Ltd.
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Telecommunication
Description: The proposed antenna approximate circular spiral at higher frequencies and then gradually transforms its geometry into square spiral at lower frequencies. Due to rapid progress in computer and personal communication systems, the need for integration of more than one communication systems into a single compact module has increased.

Title: Design and Development of UHF/VHF Band Software Defined Radio
PI: Dr. Wasif Tanveer Khan
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 13,999,000
Project Initiated in: 2017
Duration: 24 Months
Category: Technology
Description: The proposed research and development project aims to indigenously develop a complete prototype of software defined radio and lay down the research base to carry out R&D activities in this domain in future. The project will be completed as a joint collaboration between the academia and industry and has great prospects of being commercialised. At the end of the project a low-cost, indigenously developed and fully functional RF Front-end of VHF/UHF SDR (30-512 MHz) will be developed by LUMS and integrated with the digital/base-band section developed by CARE.

Title: GPS Interference Mitigation
PI: Dr. Wasif Tanveer Khan
Sponsor: National Engineering and Scientific Commission (NESCOM)
Funding Amount: PKR 14,250,000
Project Initiated in: 2016
Duration: 18 Months
Category: GIS
Description: The main objective of this project is to develop pre-correlation and post-correlation mitigation to mitigate interference or jamming. Post-Correlation techniques deal with signals after being digitised and achieve 20dB of rejection by using different signal processing algorithms. However, these techniques are only effective against narrowband interferers. Pre-correlation techniques, on the other hand, can be employed for broadband as well as narrowband interference mitigation.



Title: Development of a Low-Cost Paper-based Wireless Early Warning System using Ink-jet Printed Carbon Nanotube Loaded Antenna-based Sensors for Detecting Gases and Improvised Explosive Devices (IEDs)
PI: Dr. Wasif Tanveer Khan
Co-PI: Dr. Ijaz Haider Naqvi
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 10,855,379
Project Initiated in: 2017
Duration: 30 Months
Category: Technology
Description: The main objective of this project is to develop an accurate and efficient target localisation scheme, similar to GPS triangulation scheme, to accurately detect and locate a potential threat wirelessly. The purpose is to develop optimised energy solution to meet the power requirements of the proposed system and achieve the goal of making zero-power sensors. The proposed research project will allow the security personnel in Pakistan and around the globe to identify and locate a potential IED threat at a distance wirelessly enabling them to take preventive measures before an unfortunate accident happens. This will help to save many precious lives and avoid the destruction caused by such incidents. The Ink-jet printing technology will have far reaching effects in the infrastructure and economic development of Pakistan. Using this technology, many other low-cost applications in the form of smart skin, smart packaging, smart textiles and RFID enabled sensors can be developed for IoT applications, which will greatly improve the cognitive intelligence and knowledge of the environment around us in real time and will greatly help us in making Pakistan a smarter and safe place to live.

Title: Design and Development of Filter Bank
PI: Dr. Wasif Tanveer Khan
Sponsor: Public Sector Organization
Funding Amount: PKR 1,500,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: In common radio communications, a wide bandpass filter is used after antenna to pass the desired band of communication and reject others. This approach, however, is prone to failure of communication in case of hostile environments where a hostile interferer may jam the communication. In such circumstances, narrowband pass filters, accompanied with frequency hopping techniques, are required. 'Narrowness' of these filters set the basis of frequency selectivity which means the more selective the system is, the more rejection a 'close' interferer undergoes. In this research project, a multiphase approach is adopted to design an indigenous RF filter bank. The proposed project plan is divided into three sequential phases. Each phase will contribute to next phase. This project has proposed to make 4, 8 and 16 channel RF filter banks in phase 1, 2 and 3 respectively. Successful completion of these phases will lead to the development of even narrower band filters.

Title: Design and Development of a Rotibot (An Automated machine/appliance to cook bread/chapatti roti)
PI: Dr. Wasif Tanveer Khan
Sponsor: Higher Education Commission (HEC)
External Collaboration: Venture Capital
Funding Amount: PKR 12,550,000
Project Initiated in: 2018
Duration: 24 Months
Category: Technology
Description: The objective of the proposed project is to develop an indigenous low-cost automated machine/appliance to cook chapatti/roti to bring convenience in the life of millions of people. We call it Rotibot. Almost anyone who loves to eat rotis and doesn't like to cook it will benefit from this machine; this includes working women, their husbands, and students in the country and abroad, expatriates etc. This product will take flour, water and oil as an input and it would knead the flour, make the dough, flatten the dough and cook the roti automatically. Roughly more than Rs 1.5 Billion people use rotis/chapatti as part of their staple food. Cooking roti requires lot of preparation; kneading flour, making dough and then cooking the roti requires significant amount of effort and time.

Title: Design and Development of Hybrid Solar and multi band RF Energy Harvesting Solution for Wirelessly Powering up IoT Devices
PI: Dr. Wasif Tanveer Khan
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2018
Duration: 12 Months
Category: Energy
Description: This research project proposes to develop an efficient hybrid Multi Band RF+ Solar energy harvesting technology to wirelessly charge or power-up battery-less swarm of wireless sensors networks, which will find myriad of applications in IoT based applications related to health, agriculture, and environmental sensing etc. The ultimate goal of the project is to wirelessly power IoT devices to be used for environmental sensing, agriculture farms and biomedical sensors by using RF+Solar energy harvesters. We can make wireless battery-less sensor nodes of WSN as an application of IoT. Sensor and controller nodes shall be floating (not connected to battery) and will be using same signals for communication as well as power. Other than powering low power devices RF energy harvester and small solar cells modules can be used to improve the battery-life of battery operated devices.

Dr. Zartash Afzal Uzmi
Department of Electrical Engineering, SBASSE
zartash@lums.edu.pk
+924235608202

Profile Dr. Zartash Uzmi received his PhD in Electrical Engineering from Stanford University, California in 2002. His graduate research focused on Multi-user Detection for CDMA systems in which he devised schemes and algorithms for practical implementation of multi-user detectors. He has held positions at Nokia Research Centre, Bell Laboratories, and Hewlett Packard Company. He is a part of the LUMS faculty since 2002. At LUMS, his research is focused on scalable network design for wide-area deployments and wireless applications.

Selected Publications

- Mushtaq, A., Ismail, A. K., Wasay, A., Mahmood, B., Qazi, I. A., & Uzmi, Z. A. (2015). Rethinking Buffer Management in Data Centre Networks. Paper Presented At The Computer Communication Review
- HIlyas, M. S., Raza, S., Chen, C. C., Uzmi, Z. A., & Chuah, C. N. (2014). RED-BL: Evaluating Dynamic Workload Relocation for Data Centre Networks. Computer Networks, 72, 140-155
- Nisar, A., Kashaf, A., Uzmi, Z. A., & Qazi, I. A. (2015, November). A Case for Marrying Censorship Measurements with Circumvention. In Proceedings of the 14th ACM Workshop on Hot Topics in Networks (p. 2). ACM
- Khattak, S., Javed, M., Khayam, S. A., Uzmi, Z. A., & Paxson, V. (2014, November). A Look at the Consequences of Internet Censorship through an ISP Lens. In Proceedings of the 2014 Conference on Internet Measurement Conference (pp. 271-284). ACM
- Ilyas, M. S., Qazi, I. A., Rassool, B., & Uzmi, Z. A. (2016). Low-Carb: A Practical Scheme For Improving Energy Efficiency In Cellular Networks. Computer Communications, 94, 72-84

Title: A Scalable Platform for Internet Censorship Measurements
PI: Dr. Zartash Afzal Uzmi
Co-PI: Dr. Ihsan Ayyub Qazi, Prof. Vern Paxson
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 960,000
Project Initiated in: 2016
Duration: 12 Months
Category: Telecommunications
Description: The aim of the project is to carry out three important tasks related to C-Saw: (a) To design and implement C-Saw and carry out a public release of the built software, (b) Design techniques to analyse censorship data from the C-Saw platform to detect different types of censorship and improve C-Saw's design, and (c) Collect Internet censorship measurements from C-Saw users and carry out a longitudinal study of Internet censorship and its impact on various stakeholders.

Title: Internet Security and Privacy Lab
PI: Dr. Zartash Afzal Uzmi
Co-PI: Dr. Junaid Haroon Siddiqui, Dr. Muhammad Fareed Zaffar, Dr. Mobin Javed
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 91,390,000
Project Initiated in: 2018
Duration: 36 Months
Category: Technology
Description: The purpose of this project is to set-up a lab (namely Internet Security and Privacy Lab) affiliated with the National Centre for Cyber Security to perform technology innovation and policy intervention to keep the infrastructure, applications, systems, and consumers secure from cyber threats. The lab will be focused on the construction of a set of core technologies to protect information systems (hardware, software, data and services) from unauthorised access, misuse or abuse. The proposed lab will provide fundamental advances in cyber defence to limit the ability of adversaries to compromise networks, improve security planning, vulnerability management, and outlining incident response activities.

Title: Retaining the Free Web: Serving Relevant Ads with User Privacy
PI: Dr. Zartash Afzal Uzmi
Co-PI: Dr. Ihsan Ayyub Qazi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 980,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: This project proposes the design and development of Advention, a networking software system that retains user privacy while allowing advertisers to serve relevant ads. Under this project, measurement methodology will be designed for quantifying the decrease in ad relevance when users employ anonymity tools like Tor and the consequent impact on advertisers. This project will focus on designing a system for serving relevant ads while retaining user privacy and will carry out its implementation on a real web browser. It will conduct an extensive evaluation of Advention on a range of popular websites to quantify the impact on users and advertisers.

Dr. Zubair Khalid
Department of Electrical Engineering, SBASSE
zubair.khalid@lums.edu.pk
+924235608477

Profile Dr. Zubair received his B.Sc. in Electrical Engineering from the University of Engineering & Technology (UET), Lahore, Pakistan in 2008. He received his PhD in Engineering from the Australian National University of Canberra, Australia in August 2013. Previously, he was working as an Assistant Professor in the Electrical Engineering Department, UET Lahore. Prior to that, he worked as a Research Fellow (Postdoc) with Prof. Rodney A. Kennedy in the Research School of Engineering, Australian National University (ANU), Canberra, Australia. He was awarded University Gold Medal and Industry Gold Medals from Siemens and Nespak for overall outstanding performance in Electrical Engineering during the undergraduate studies.

Selected Publications

- Nafees, W., Khalid, Z., Kennedy, R. A., & Mcewen, J. D. (2017, July). Optimal-Dimensionality Sampling On the Sphere: Improvements and Variations. In Sampling Theory and Applications (Sampta), 2017 International Conference on (Pp. 87-91). IEEE
- Sattar, Y., Khalid, Z., & Kennedy, R. A. (2017, March). Robust Reconstruction of Spherical Signals with Finite Rate of Innovation. In Acoustics, Speech and Signal Processing (ICASSP), 2017 IEEE International Conference On (Pp. 4024-4028). IEEE
- Khalid, Z., Kennedy, R. A., & Durrani, S. (2017, March). Improving the Spatial Dimensionality of Gauss-Legendre and Equiangular Sampling Schemes on the Sphere. In Acoustics, Speech and Signal Processing (ICASSP), 2017 IEEE International Conference On (Pp. 4531-4535). IEEE
- Nafees, W., Khalid, Z., & Kennedy, R. A. (2017, May). Signal Analysis on the Ball: Design of Optimal Basis Functions with Maximal Multiplicative Concentration in Spatial and Spectral Domains. In Systems, Signals and Image Processing (IWSSIP), 2017 International Conference On (Pp. 1-5). IEEE
- Khalid, Z., Durrani, S., Kennedy, R. A., Wiaux, Y., & Mcewen, J. D. (2016). Gauss-Legendre Sampling On the Rotation Group. IEEE Signal Processing Letters, 23(2), 207-211

Title: Development of Anisotropic, Fast, Robust and Sparse Spherical Signal Processing Methods with Application to Hydrology and Diffusion Tensor Imaging
PI: Dr. Zubair Khalid
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 1,991,883
Project Initiated in: 2017
Duration: 24 Months
Category: Sciences
Description: The main objective of this project is to develop advanced algorithms that exploit the anisotropy and sparsity of signals to improve the signal recovery accuracy, reduction complexity, provide the capability to deal with huge data sets, and permit real time processing. This project develops the theory and tools which permit the processing of spherical signals and through collaboration engage with leading national and international research efforts.

Title: Development of Algorithm and Prototype Hardware for Estimation of Crease Geometry using Image Processing and Computer Vision Technique
PI: Dr. Zubair Khalid
Sponsor: Tetra Pak
Funding Amount: PKR 1,353,000
Project Initiated in: 2017
Duration: 18 Months
Category: Computer Vision
Description: The main focus of this project is to develop algorithm and prototype hardware for the estimation of crease geometry using image processing and advanced signal processing methods. The developed algorithm will be generating depth profile of the crease on the paperboard. The project will contribute to the development of the research area through building a long-term research and development capability.

Title: Development of Algorithms and Hardware for Innovative Features for Digital Vending Machines
PI: Dr. Zubair Khalid
Sponsor: Digital Retail
Funding Amount: PKR 590,000
Project Initiated in: 2017
Duration: 2 Months
Category: Technology
Description: This project is focused on design of algorithms and prototype hardware for the development of innovative features for digital vending machines. The project will be carried out in collaboration with Digital Retail Pvt Ltd (DR). DR is involved in developing, selling and operating Digital Vending machines in Pakistan. DR wants to build some innovations in its vending machines. These innovations may potentially enhance the experience of the users of the vending machines by capturing customer data and using it to make decisions and performing appropriate actions. Digital Retail will put one or two machine(s) into operation within LUMS premises and give access to the project team during the course of the project.

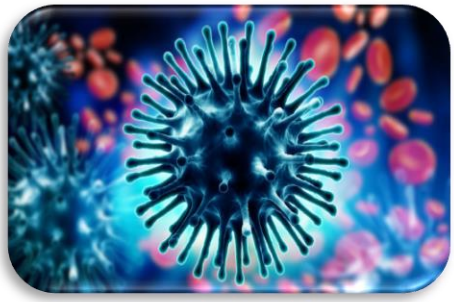
DEPARTMENT OF MATHEMATICS

Dr. Adnan Khan
Department of Mathematics, SBASSE
adnan.khan@lums.edu.pk
+924235608015

Profile Dr. Adnan Khan was awarded his PhD from Rensselaer Polytechnic Institute in NY in 2007. His thesis was titled 'Parameterization for Some Multiscale Problems in Biology and Turbulence.' The work involved studying approaches to coarse graining of multiscale systems with applications to turbulent diffusion and protein dynamics. Prior to his doctoral work, he obtained a BE in Electrical Engineering from NED University of Engineering & Technology, Karachi in 1998 and an MS in Applied Mathematics from the University of Delaware in 2002. His current research interests involve modelling and analysis of biological systems, multiscale modelling and asymptotic analysis. Prior to joining LUMS, Dr. Khan has taught at the Rensselaer Polytechnic Institute and University of Delaware. Besides his usual academic interests, he is also interested in reading on a variety of topics including economics, philosophy, and history and world literature.

Selected Publications

- Khan, A., & Imran, M. (2018). Optimal Dosing Strategies against Susceptible and Resistant Bacteria. Journal of Biological Systems, 1-18
- Imran, M., Malik, T., Ansari, A. R., & Khan, A. (2016). Mathematical Analysis of Swine Influenza Epidemic Model with Optimal Control. Japan Journal Of Industrial And Applied Mathematics, 1-28
- Kakalia, S., & Khan, A. (2016). Oxygen Saturation of Children in Pakistan's High Mountain Pastoral Communities. Archives of Disease In Childhood, Archdischild-2016
- Ahmad, M. D., Usman, M., Khan, A., & Imran, M. (2016). Optimal Control Analysis of Ebola Disease with Control Strategies of Quarantine and Vaccination. Infectious Diseases Of Poverty, 5(1), 72
- Imran, M., Khan, A., Ansari, A. R., & Hussain Shah, S. T. (2016). Modelling Transmission Dynamics of Ebola Virus Disease. International Journal Of Biomathematics
- Khan, A., Naveed, M., Dur-e-Ahmad, M., & Imran, M. (2015). Estimating the Basic Reproductive Ratio for the Ebola Outbreak in Liberia and Sierra Leone. Infectious Diseases Of Poverty, 4(1), 13



Title: Use of Isolation and Multi Vaccination for Control of Influenza
PI: Dr. Adnan Khan
Co-PI: Dr. Sultan Sial
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 720,000
Project Initiated in: 2016
Duration: 12 Months
Category: Health
Description: The main objective of this project is to assess the factors that can enhance or inhibit the spread of the flu, in particular disease caused by strains of Influenza a virus in Pakistan. Effective methods of inhibiting the spread include vaccination and isolation of infected individuals. Using deterministic ODE based models, the correlation of the model variables with the dissemination of the diseases, is going to be assessed. The purpose is to develop a mathematical model for transmission dynamics of the disease, when there are two prevalent stains. In particular, this project will cater the effects of isolation and multi vaccination on the spread of the Flu.

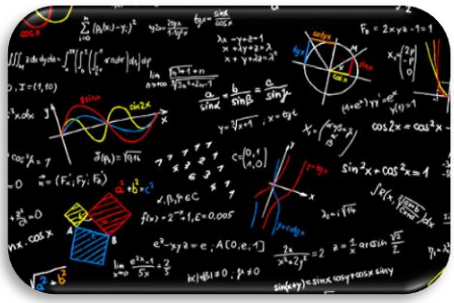
Dr. Ali Ashher Zaidi
Department of Mathematics, SBASSE
ali.zaidi@lums.edu.pk
+924235608017

Profile Dr. Ali Ashher Zaidi obtained a PhD in Applied Mathematics from Massey University, New Zealand in 2015 where he also served as Postdoctoral fellow. Dr. Zaidi has an impressive track record of delivering talks and has several awards and recognitions to his credit, some of which include: First prize for his talk on 'Solutions to an advanced functional partial differential equation of the pantograph-type' at the second INMS postgraduate student conference 2014. He received a second prize for his talk on 'A size structured cell growth model' at the first INMS postgraduate student conference 2013.

Selected Publications

- Van Brunt, B., Almalki, A., Lynch, T., & Zaidi, A. (2018). On A Cell Division Equation with a Linear Growth Rate. The Anziam Journal, 1-20
- Efendiev, M., van Brunt, B., Wake, G. C., & Zaidi, A. A. A Functional Partial Differential Equation Arising In a Cell Growth Model with Dispersion. Mathematical Methods In The Applied Sciences

Title: An Asymmetric Cell Division Model with Dispersion
PI: Dr. Ali Ashher Zaidi
Co-PI: Prof. Dr. Messoud Efendiev - Helmholtz centre Munich
Sponsor: German Pakistani Research Cooperation Program (DAAD)
External Collaboration: Helmholtz centre Munich
Funding Amount: PKR 919,208
Project Initiated in: 2018
Duration: 13 Months
Category: Sciences
Description: This project proposes to solve an initial-boundary value problem that involves a Partial Differential Equation (PDE) with a functional term. The problem arises in a cell division model where the growth is assumed to be stochastic and the mode of division of cells is asymmetric. The project intends to find analytically the exact solution to the PDE and study the long-time asymptotic behaviour of solutions. Size structured cell growth models have remained an area of great interest to biologists and mathematicians. This is because these models provide vital information to biologists about the evolution of the number density of cells by size (as measured by DNA content). Mathematically, such models usually entail an initial-boundary value problem involving a partial differential equation (PDE) with a functional term. The presence of functional terms in the PDE creates complexity which requires deeper analysis.



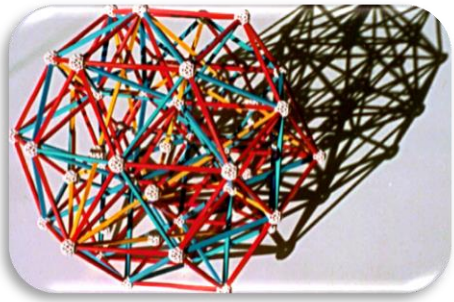
Title: A Cell Growth Model with Asymmetric, Minimum Cell Size Division
PI: Dr. Ali Ashher Zaidi
Co-PI: Prof Graeme Wake - Massey University, Auckland
Sponsor: International Math Union (IMU)
External Collaboration: Massey University, Auckland
Funding Amount: PKR 557,047
Project Initiated in: 2018
Duration: 11 Months
Category: Sciences
Description: This project intends to strengthen and generalise the work of van-Brunt et al. to the case of binary asymmetric division of cells. Although van-Brunt et al. established the existence of an eigenvalue for the symmetric, minimum cell size division, they did not show that this eigenvalue is unique. Also, they did not show that, for the case of symmetric, minimum cell size division, the separable solution they obtained is in fact an SSD solution, i.e. a large time attracting solution towards which solutions converge exponentially in time. This project intends to bridge the gap identified.

Dr. Muhammad Imran Qureshi
Department of Mathematics, SBASSE
imran.qureshi@lums.edu.pk
+924235608285

Profile Dr. Muhammad Imran Qureshi has obtained his D.Phil. in Mathematics from the University of Oxford, UK in 2011 and an MSc in Mathematics from the Quiad-i-Azam University in 2006. Prior to joining LUMS in 2013, he served at COMSATS, Islamabad. Previously, he has held visiting positions at the International Centre of Theoretical Physics, Italy and Freie Universitat Berlin, Germany. Dr. Qureshi's research interest are in algebraic geometry and its connections with Combinatorics, Representation theory and String theory. He mainly works on the biregular classification of polarised algebraic varieties.

Selected Publications

- Brown, G., Kasprzyk, A. M., & Qureshi, M. I. (2018). Fano 3-Folds in Format, Tom and Jerry. European Journal Of Mathematics, 4(1), 51-72
- Qureshi, M. I. (2017). Polarized 3-Folds In A Codimension 10 Weighted Homogeneous F4 Variety. Journal Of Geometry And Physics
- Qureshi, M. I. (2016). Computing Isolated Orbifolds In Weighted Flag Varieties.Journal Of Symbolic Computation
- Qureshi, M. I. (2015). Constructing Projective Varieties in Weighted Flag Varieties-II. Mathematical Proceedings Of Cambridge Philosophical Society , Cambridge University Press, Pp. 193-209



Title: Geometry and Topology of Weighted Flag Varieties and Their Complete Intersections
PI: Dr. Muhammad Imran Qureshi
Co-PI: Dr. Haniya Azam
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 1,634,658
Project Initiated in: 2017
Duration: 24 Months
Category: Sciences
Description: The aim of this proposed research is to discover some new Gorenstein formats in order to be able to construct polarised orbifolds in higher co-dimension. This project could play an important role in making productive research collaborations at home and abroad, and also beneficial for young researchers/ students.

Dr. Shaheen Nazir
Department of Mathematics, SBASSE
shaheen.nazir@lums.edu.pk
+924235608250

Profile Dr. Shaheen Nazir has received her PhD degree from Abdus Salam School of Mathematics, GC University, Lahore. She has worked as Postdoctoral fellow at Abdus Salam International Centre for Theoretical Physics, Italy. Before joining LUMS, she has been associated with National University of Computer & Emerging Sciences (NUCES-FAST), Lahore. Dr. Nazir has several publications in leading international journals. Her research interests include Algebraic Topology, Algebraic Geometry, Combinatorial Geometry and Combinatorial Commutative Algebra.

Selected Publications

- Nazir, S., Torielli, M., & Yoshinaga, M. (2014). On The Admissibility of Certain Local Systems. Topology And Its Applications, 178, 288-299
- Nazir, S., H. Iqbal (2014). On Semi-Φ_H And STRONGLY $\Log-\Phi_H$-' Convexity, Stud. Univ. Babe¸S-Bolyai Math. 59, No. 2, 141–154
- Nazir, S., Z. Raza. On The Elliptic Curves Arising From 4-Bar Mechanism, Rocky Mountain Journal Of Mathematics" Vol.42, No. 4 (2012)1359-1365
- Nazir, S., M. Yoshinaga. On The Connectivity of the Realization Spaces of Line Arrangements, Ann. Sc. Norm. Super. Pisa Cl. Sci. (5) Vol. XI (2012), 921-937
- Nazir, S., A.Iqbal, Z. Raza, Z. Saleem. Generalizations Of Nekrasov-Okounkov Identity, Annals Of Combinatorics, December 2012, Volume 16, Issue 4, Pp 745-753

Title: Shellability of Simplicial Complexes and Multi-complexes
PI: Dr. Shaheen Nazir
Co-PI: Dr. Imran Anwar
Sponsor: Higher Education Commission (HEC)
External Collaboration: CIIT, Lahore
Funding Amount: PKR 1,499,189
Project Initiated in: 2018
Duration: 23 Months
Category: Education
Description: The aim of this project is to give new algebraic criterion for the shellability of a simplicial complex in the perspective of facet ideal theory. As the connection of facet ideal associated to a simplicial complex is more apparent as compare to the Stanley-Reisner ideal. It is also worth noting that the algebraic properties of shellable simplicial complex in the context of facet ideal theory are unknown till date. Therefore, this project intends to explore the shellable simplicial complexes algebraically in the light of obtained algebraic criterion. Afterwards, the results will be extended for the shellability of multicomplexes as well.

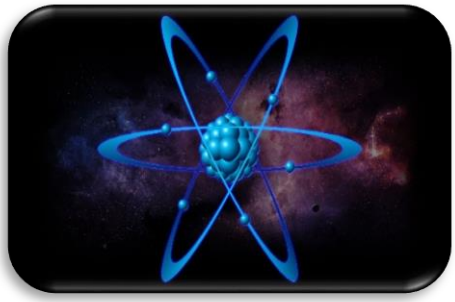
DEPARTMENT OF PHYSICS

Dr. Adam Zaman Chaudhry
Department of Physics, SBASSE
adam.zaman@lums.edu.pk
+924235608338

Profile Dr. Adam Zaman Chaudhry obtained his PhD in Physics from the National University of Singapore (NUS) in 2013 and continued working there as a Postdoctoral fellow before joining LUMS in August 2014. He is an Assistant Professor at the Department of Physics, LUMS. His research interests span the field of Atomic, Molecular and Optical Physics and also its Theoretical aspects. He is an active researcher in the area of quantum physics and related fields and his research focuses on harnessing the power of realistic quantum systems.

Selected Publications

- Chaudhry, A. Z. (2017). The Quantum Zeno and Anti-Zeno Effects with Strong System-Environment Coupling. Scientific Reports, 7(1), 1741
- Aftab, M. J., & Chaudhry, A. Z. (2017). Analysing The Quantum Zeno And Anti-Zeno Effects Using Optimal Projective Measurements
- Chaudhry, A. Z. (2016). A General Framework For The Quantum Zeno And Anti-Zeno Effects
- Chaudhry, A. Z. (2015). Detecting the Presence of Weak Magnetic Fields Using Nitrogen-Vacancy Centres. Physical Review A - Atomic, Molecular, And Optical Physics, 91(6)
- Tan, D. Y., Chaudhry, A. Z., & Gong, J. (2015). Optimization of the Environment for Generating Entanglement and Spin Squeezing. Journal Of Physics B: Atomic, Molecular And Optical Physics, 48(11)
- Chaudhry, A. Z. (2014). Utilizing Nitrogen-Vacancy Centres to Measure Oscillating Magnetic Fields. Physical Review A - Atomic, Molecular, And Optical Physics, 90(4)



Title: Open Quantum Systems beyond the Born-Markov Regime
PI: Dr. Adam Zaman Chaudhry
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 1,872,324
Project Initiated in: 2017
Duration: 36 Months
Category: Sciences
Description: The broad goal of this research project is to look at the dynamics of open quantum systems while making as few approximations as possible. This will not only allow us to understand the dynamics of realistic quantum systems better, but it may also lead to novel phenomena and application. By tackling fundamental and important questions on open quantum systems, the research project will increase the visibility of Pakistan in the international research community. The project can then also serve as a launching pad for research collaborations with universities in the region.

Title: The Quantum Zeno and Anti-Zeno Effects with Strong System-Environment Coupling
PI: Dr. Adam Zaman Chaudhry
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 660,000
Project Initiated in: 2018
Duration: 12 Months
Category: Sciences
Description: The idea behind the proposed project is to explore the Zeno and anti-Zeno effects in regimes where these effects have not been explored before. In particular, this project will look at arbitrary time evolution of the quantum system, and quantum systems that are strongly interacting with their environment. The main objective of this project is to study the quantum Zeno and anti-Zeno effects in the unexplored regime of strong system-environment coupling with both energy exchange and dephasing taking place. The strong coupling means that straightforward perturbation theory cannot be used to analyse the system dynamics; furthermore, the system-environment correlations need to carefully taken into account.

Dr. Ata Ulhaq
Department of Physics, SBASSE
ata.haq@lums.edu.pk
+924235608130

Profile Dr. Ata Ulhaq is an Assistant Professor of Physics at the School of Science and Engineering LUMS. His research interests lie in experimental quantum optics, nanoscale condensed matter physics, photonics and solid state spectroscopy. He is a fellow of International Max Planck Research School Stuttgart Germany. He was a postdoctoral researcher at University of Sheffield, UK. His work has been published in reputable journals including Nature Photonics, Nature Materials, Physical Review B and Optics Letter etc. Currently, he is working on exploring mesoscopic physics in biological structures and naturally formed two-dimensional systems in minerals.

Selected Publications

- Chekhovich, E. A., Ulhaq, A., Zallo, E., Ding, F., Schmidt, O. G., & Skolnick, M. S. (2017). Measurement Of The Spin Temperature Of Optically Cooled Nuclei And Gaas Hyperfine Constants In Gaas/Algaas Quantum Dots
- Ulhaq, A., Weiler, S., Roy, C., Ulrich, S. M., Jetter, M., Hughes, S., & Michler, P. (2013). Detuning-Dependent Mollow Triplet of a Coherently-Driven Single Quantum Dot. Optics Express, 21(4), 4382-4395
- Ge, R. C., Weiler, S., Ulhaq, A., Ulrich, S. M., Jetter, M., Michler, P., & Hughes, S. (2013). Mollow Quintuplets from Coherently Excited Quantum Dots. Optics Letters, 38(10), 1691-1693

Title: Micro-Raman Spectroscopy on Single Cancer Cells
PI: Dr. Ata Ulhaq
Co-PI: Dr. Amir Faisal
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 993,820
Project Initiated in: 2017
Duration: 12 Months
Category: Sciences
Description: Raman spectroscopy is a well established technique for biomedical applications which can effectively detect the chemical signatures associated with various biochemical processes occurring within the cells. However, commercially available Raman spectrometers in general do not selectively probe single cells. Nanoscale physics commonly combine spectroscopy techniques with microscopy to access structures of nanometer sizes (billionth of a meter). Borrowing this concept from nanotechnology, this project proposes a microscope based Raman spectroscopy setup which would enable detailed biochemical analysis at single cell level. The whole set-up will be home-built with minimal resources and would not only work in Raman spectroscopy mode but fluorescence spectroscope mode as well providing greater flexibility in its operation. The main focus is to investigate the effects of drug or growth factor treatments on biochemical changes in various parts of a single cancerous cell. This research project will help in understanding the intracellular biological processes initiated by application of cancer related drugs or growth factors. The project not only employs diverse expertise from Biological Sciences to Physics and Engineering but would also provide a state-of-the-art investigative tool for graduate research students in Biology, Chemistry and Physics.

Dr. Muhammad Faryad
Department of Physics, SBASSE
muhammad.faryad@lums.edu.pk
+924235608367

Profile Dr. Muhammad Faryad is an Assistant Professor and Chair of the Department of Physics at LUMS. He obtained his Ph.D. in Engineering Science and Mechanics from the Pennsylvania State University in 2012. Currently, his research focuses on increasing the efficiency of photovoltaic solar cells by increasing the light trapping in them using zero-index metamaterials made of photonic crystals. Also, he is working on understanding the radiation and propagation of light inside anisotropic metamaterials. His research interest includes plasmonics, surface electromagnetic waves, nanoengineered metamaterials, nanophotonics, thin-film solar cells and optical sensing.

Selected Publications

- Faryad, M. (2018). Differentiating Surface Plasmon-Polariton Waves and Waveguide Modes Guided By Interfaces with One-Dimensional Photonic Crystals. Applied Physics A, 124(2), 102
- Abbas, F., & Faryad, M. (2017). A Highly Sensitive Multiplasmonic Sensor Using Hyperbolic Chiral Sculptured Thin Films. [Article]. Journal Of Applied Physics, 122(17)
- Rasheed, M., & Faryad, M. (2017). Excitation of the Uller-Zenneck Electromagnetic Surface Waves in the Prism-Coupled Configuration. Physical Review A, 96(2)
- Erten, S., Faryad, M., & Lakhtakia, A. (2017). Multiple Surface-Plasmon-Polariton Waves Guided By a Chiral Sculptured Thin Film Grown On a Metallic Grating. JOSA B, 34(9), 1937-1945
- Manzoor, H. U., Maab, H., & Faryad, M. (2017). Multiple Surface Electromagnetic Waves Guided By the Planar Interface of a Rugate Filter and a Hyperbolic Columnar Thin Film. Optik-International Journal for Light and Electron Optics
- Faryad, M., & Lakhtakia, A. (2017). On The Huygens Principle for Bianisotropic Mediums with Symmetric Permittivity and Permeability Dyadics. Physics Letters A, 381(7), 742-746
- Iqbal, Y., & Faryad, M. (2017). Photonic Band Structures of One Dimensional Multilayered Dielectric-Magnetic Photonic Crystals. Photonics and Nanostructures-Fundamentals And Applications, 24, 63-68

Title: Design and Implementation of Light-Trapping Coatings for Thin-Film Solar Cells Using Effective Zero-Index Photonic Crystals
PI: Dr. Muhammad Faryad
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 7,921,207
Project Initiated in: 2018
Duration: 36 Months
Category: Computer Vision
Description: Under this project, the design and experimental implementation of a light-trapping layer of zero-index-metamaterial (ZIM) is proposed to enhance the efficiency of the thin-film solar cells. The light trapping will increase the overall efficiency of the photovoltaic solar cell by increasing the generation of charge carriers. This project proposes to design and experimentally implement this layer for thin film silicon solar cells, which are being used commercially all over the world. The design and research conducted for this project will also have applications in other areas of optics, such as light-couplers, isolators, spectrum splitters, and one-way transmission of light signals.

Dr. Muhammad Sabieh Anwar
Department of Physics, SBASSE
sabieh@lums.edu.pk
+924235608124

Profile Dr. Muhammad Sabieh Anwar completed his DPhil from the Department of Physics, Oxford University (UK) in 2004, where he studied as a Rhodes Scholar from Pakistan. His dissertation was titled, "Quantum Information Processing using Para-Hydrogen NMR" and revolved around the preparation of pure quantum states for quantum computing. His postdoctoral experience at the University of California, Berkeley (USA) involved the demonstration of hyperpolarized NMR using heterogeneous catalytic systems, microfluidic and "lab-on-a-chip" NMR, synthesis of precise magnetic fields for ex-situ NMR, algorithmic cooling, polarisation lifetime studies and hypersensitive nanoparticle MRI. Prior to his doctoral studies, Sabieh received his B.Sc. (Honours) degree in Electrical Engineering (Electronics and Communications) from University of Engineering and Technology, Lahore.

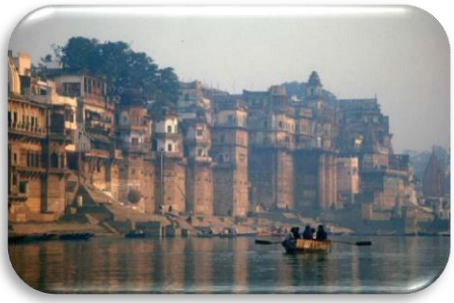
Selected Publications

- Akbar, A., Saleem, M., Atiq, S., & Anwar, M. S. (2018). Magnetic Dynamics and All-Optical Switching In 5 Nm Dy-Fe Nanostructures. IEEE Transactions On Magnetics
- Waqar, M., Rafiq, M. A., Mirza, T. A., Khalid, F. A., Khaliq, A., Anwar, M. S., & Saleem, M. (2018). Synthesis and Properties of Nickel-Doped Nanocrystalline Barium Hexaferrite Ceramic Materials. Applied Physics A, 124(4), 286
- Rafiq, M. A., Waqar, M., Muhammad, Q. K., Waleed, M., Saleem, M., & Anwar, M. S. (2017). Conduction Mechanism And Magnetic Behavior Of Cu Doped Barium Hexaferrite Ceramics. Journal Of Materials Science: Materials In Electronics, 1-9
- Anwar, M. S. (2017). Effective Oscillator Strengths of Tb3+ Ions in A Garnet Crystal Determined From Low Temperature Magneto-Optic Rotations. In Nano-Optics: Principles Enabling Basic Research And Applications (Pp. 429-429). Springer, Dordrecht
- Li, Z., Kim, I., Zhang, L., Mehmood, M. Q., Anwar, M. S., Saleem, M. & Wang, Y. (2017). Dielectric Meta-Holograms Enabled With Dual Magnetic Resonances In Visible Light. ACS Nano, 11(9), 9382-9389

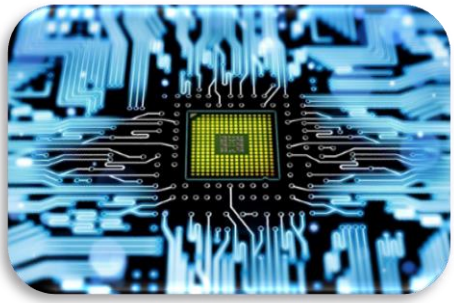
Title: Development of Low-Field, Low Cost, Re-configurable NMR and MRI
PI: Dr. Muhammad Sabieh Anwar
Sponsor: Pakistan Science Foundation (PSF)
Funding Amount: PKR 2,540,820
Project Initiated in: 2016
Duration: 24 Months
Category: Sciences
Description: The present project aims at developing a magnetic resonance system. The proposed system will be highly reconfigurable. It will be within easy access of students who must realise that "NMR machines are not frightening at all" and a large number of Pakistani researchers can enjoy access to a basic unit demonstrating the basic principles and probe highly innovative applications outside the realm of high field magnetic resonance. From a fundamental physics research perspective, the project will open up new directions in using hyperpolarized NMR with para-hydrogen for increasing the sensitivity of NMR and MRI, and that too, at low magnetic fields, possibly using only the earth's ambient magnetic field.

Title: Planck's Radiation from Incandescent Light Sources
PI: Dr. Muhammad Sabieh Anwar
Sponsor: National University of Sciences and Technology
Funding Amount: PKR 340,000
Project Initiated in: 2016
Duration: 12 Months
Category: Sciences
Description: The main objective of this consultancy project is to provide an introduction to blackbody radiation and Planck's radiation law. The experimental objective involves the determination of the numerical value of Planck's constant using incandescent light bulb as a source of blackbody. In the first step, students estimate the filament's temperature using its electrical properties. Students will also practice uncertainty propagation and learn how to measure important parameters using weighted fits of a straight line.

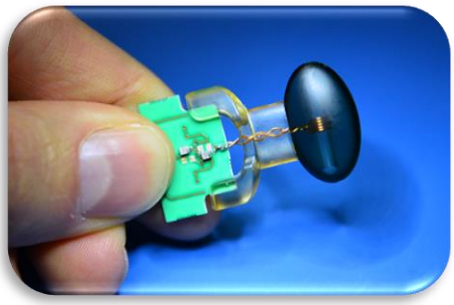
Title: Establishment of Quantum Computing and Quantum Communication (QCQC) Laboratory at LUMS
PI: Dr. Muhammad Sabieh Anwar
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2016
Duration: 12 Months
Category: Education
Description: The proposed project aims at designing and establishing a modern laboratory of quantum computing and quantum communications at LUMS which will be used by computer science, physics, and engineering students as testbeds for quantum mechanics, cryptography, atomic physics and quantum communications. Furthermore, it will directly enrich the principle investigator's current research themes. The QCQC Laboratory will be poised to become a valuable resource for LUMS, both in teaching and research.



Title: Fog Monitoring in the Indo-Ganges Plain
PI: Dr. Muhammad Sabieh Anwar
Sponsor: National University of Sciences and Technology (NUST)
Funding Amount: PKR 200,000
Project Initiated in: 2016
Duration: 5 Months
Category: Sciences
Description: This research project will include sample collection on 12 hour basis as per provided protocols, proper maintenance and care of the deployed instruments, provision of logistic support and electricity and working space and Indigenous design and manufacture of fog monitoring station for future usage.

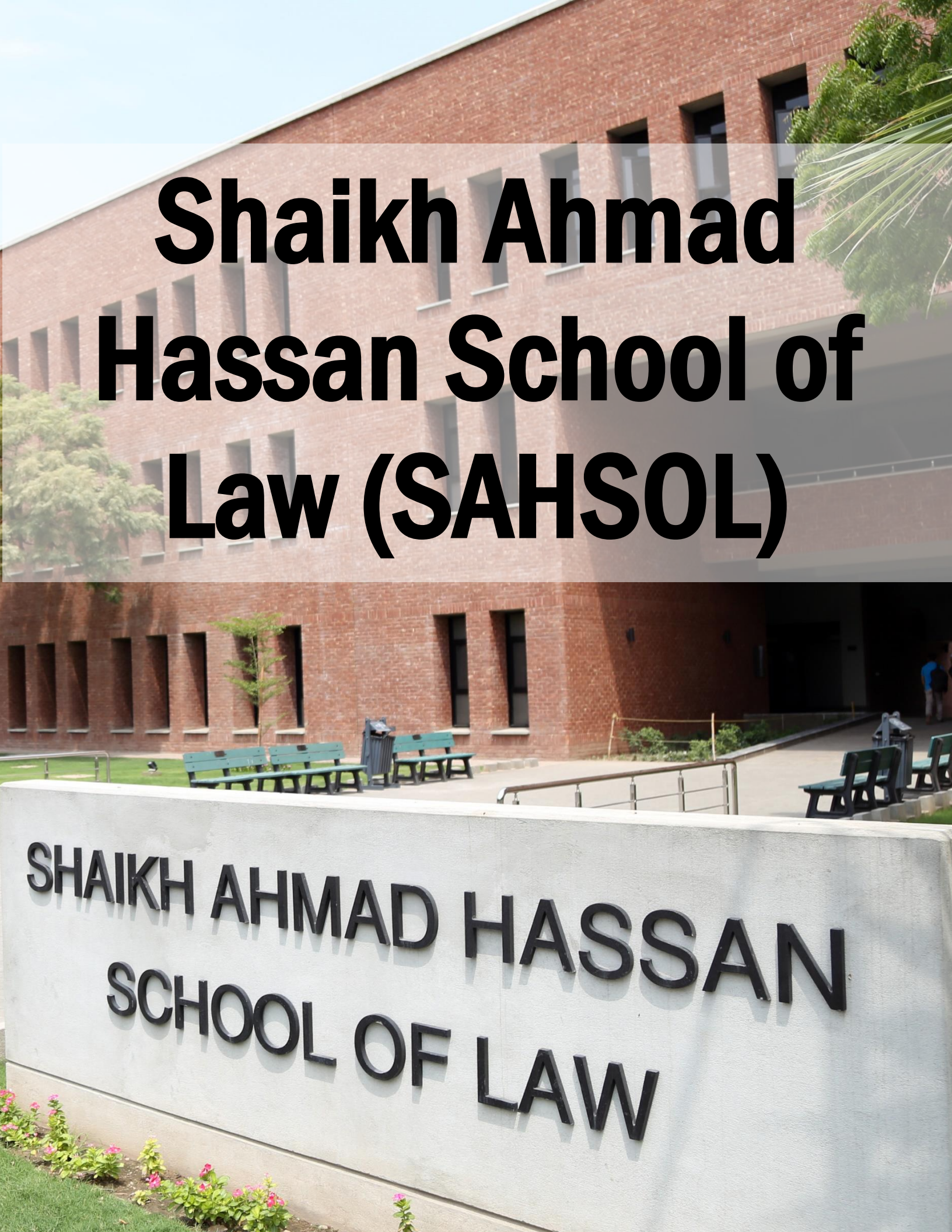


Title: Design of Experiments for Semiconductor Characterization
PI: Dr. Muhammad Sabieh Anwar
Sponsor: Nusrat Jahan College, Rabwah
Funding Amount: PKR 180,000
Project Initiated in: 2018
Duration: 1 Month
Category: Sciences
Description: Semiconductors are one of the technologically most important class of materials. According to the band theory of solids, which is an outcome of quantum mechanics, semiconductors possess a band gap, i.e., there is a range of forbidden energy values for the electrons and holes. This research project calculates the energy band gap in the intrinsic region and the temperature dependence of the majority carrier mobility in the extrinsic region.

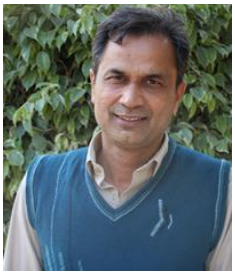


Title: Low-Field Nuclear Magnetic Resonance Sensors: Miniaturized, Mobilized and Hyperpolarized
PI: Dr. Muhammad Sabieh Anwar
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Technology
Description: The fundamental objective of this research project is the development of a low-field NMR/MRI system that is capable of exploring new physics that opens up in this unusual regime of operation, and circumventing some of the drawbacks that come with low-field systems. One of the major challenges is that the strength of the signal scales as the square of the strength of the magnetic field. Lower fields produce quadratic smaller signals which are difficult to detect. These may be buried in the noise floor. This project intends to address this hurdle by using non-equilibrium initial states of spins, for example using para-hydrogen induced polarization (PHIP).

Shaikh Ahmad Hassan School of Law (SAHSOL)



Dr. Muhammad Azeem
Shaikh Ahmad Hassan School of Law (SAHSOL)
muhammad.azeem@lums.edu.pk
+924235608061



Profile Dr. Azeem completed his B.Sc. Electrical Engineering, from the University of Engineering and Technology, Lahore. Being involved in activism against child labour at the time, he became impressed by the media writings of Asma Jahangir and others. He started writing in the media and completed an LL.B, at the University of the Punjab, Lahore. He practiced law and public interest litigation around issues concerning workers and peasants in the lower and High Court for 6 years. He wrote three books which were quite popular in Pakistan. At Osgoode Hall Law School, Toronto, He completed an LL.M writing on the topic, "The Collapse of the WTO and Rethinking of Development Theory." In 2014, he successfully defended his PhD in Law, from Osgoode Hall Law School on the topic, "The weaknesses of the 'good governance' paradigm: a study of the judiciary in Pakistan."

Selected Publications

- Azeem, M. (2016, June). Law and Social Change. Law and Society Annual meeting, New Orleans, USA
- Azeem, M. (2016, March). Historians Conference. Metropolitan Club, Lahore
- Azeem, M. (2013). Structural Analysis of 'Institutionalism'. National University Singapore Law School
- Azeem, M. (2013). Structural Analysis of "New Governance". Institute for Global Law and Policy, Harvard Law School
- Azeem, M. (2013). On and Daily Life in the British Colony and Postcolony: From Colonial Modernity to Modernization. Law and Society annual Conference, Boston

Title: Labour Law Jurisprudence in Pakistan: A Critical Perspective
PI: Dr. Muhammad Azeem
Co-PI: Dr. Sadaf Aziz
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 920,000
Project Initiated in: 2016
Duration: 12 Months
Category: Law & Policy
Description: The main objective of this project is to analyse the corpus of labour laws and their accompanying jurisprudence in the context of state-building and consolidation for the Pakistani state. The primary purpose is to develop some theoretical insights on how particular juridical forms and categories are carriers of accumulative and authoritarian logics and thus aid strategies for the legal and non-legal redressal of the heightened immiseration of labour in this country. The study will turn on an analysis of cases and procedure, primarily from the Federal area, Punjab and Sindh. The cases will be taken from the relevant National Industrial Relations Commission, Labour Appellate Tribunals, High Courts, and the Supreme Court of Pakistan.

Dr. Sikander Ahmed Shah
Shaikh Ahmad Hassan School of Law (SAHSOL)
sikander@lums.edu.pk
+924235605603

Profile Professor Dr. Sikander Shah is a pioneering member of the Shaikh Ahmad Hassan School of Law (SAHSOL), LUMS. He obtained a B.A. in Economics and a Juris Doctorate (Cum Laude) from the University of Michigan, Ann Arbor. He has held visiting faculty positions at the Temple Law School, the Wayne State Law School and the University of Michigan Law School and holds the position of adjunct faculty at the Maurer School of Law, Indiana University Bloomington. Professor Shah served as the Legal Advisor to the Ministry of Foreign Affairs, while he was on sabbatical in 2012-2013. Professor Shah's teaching and research interests are focused on Public International Law, International Human Rights Law, International Humanitarian Law, Corporate Governance and Constitutional Design.

Selected Publications

- Shah, S. A. (2014). International Law and Drone Strikes in Pakistan: The Legal and Socio-political Aspects. Routledge

Title: International Human Rights Law Clinic for Law Students
PI: Prof. Dr. Sikander Ahmed Shah
Co-PI: Mr. Uzair Kayani
Sponsor: American Bar Association (ABA)
Funding Amount: PKR 1,526,325
Project Initiated in: 2016
Duration: 9 Months
Category: Law & Policy
Description: In recent years, the Punjab Bar Council, which is required to make provisions for free legal aid for underprivileged litigants under its constitution, has been woefully inadequate in taking adequate measures to realise this goal, especially in matters of human rights abuse. Over the past few years, students at LUMS have taken an active interest in doing pro-bono work, both as a way of giving back to the community and in order to hone their newly developed skills as lawyers. There is a two-part class taught at LUMS titled, 'Legal Aid' which aims to train law students in litigation by encouraging them to aid underprivileged litigants in their legal matters.

Mr. Uzair Kayani
Shaikh Ahmad Hassan School of Law (SAHSOL)
uzair.kayani@lums.edu.pk
+9242356085604

Profile Mr. Uzair teaches Torts, Commercial Law, and Law & Economics. Tort liability distributes the costs of social and economic harms to those parties that can best prevent, bear, or insure against them. Commercial law sets default rules for market exchange (sales, negotiable instruments, and securities), and market participants (partnerships, corporations, and hybrid forms). Economic analysis of law applies Microeconomic insights (primarily Price Theory, Game Theory, and Social Choice) to study the incentives created by law and other forms of regulation. Mr. Uzair studied Social Choice and Game Theory with Professors Elizabeth M. Penn and John W. Patty at Washington University in St. Louis. He studied Law and Economics with Professor Richard Epstein, Judge Richard Posner, Professor William Landes, and Professor Douglas Baird at the University of Chicago. Earlier, he studied Political Philosophy, Literature, and the Classics at Middlebury College (Vermont) and Deep Springs College (California).

Selected Publications

- Kayani, U. (2016). International Trade Law: Strategies, Pitfalls, and Controversies. Government Officers' Fellowship Programme, Research Society for International Law, Pakistan, Lahore, Pakistan
- Kayani, U. (2015). Human Rights and Constitutional Protection. American Bar Assoc. Rule of Law Initiative, Islamabad, Pakistan
- Kayani, U. (2015). The Convention against Torture. Human Rights Commission of Pakistan, Quetta, Karachi and Islamabad, Pakistan

Title: Regulatory Incentives for Foreign Direct Investments: BIT's, Targeted Partnerships, SEZ's, and Islamic Finance
PI: Mr. Uzair Kayani
Co-PI: Dr. Khyzar Hussain
Sponsor: American Business Forum (ABF)
Funding Amount: PKR 800,000
Project Initiated in: 2016
Duration: 12 Months
Category: Law & Policy
Description: The main objective of this project is to propose ways to increase foreign direct investment. To increase or maintain FDI inflows in Pakistan, the signing of bilateral investment treaties between Pakistan and its largest FDI partners could be a step in the right direction. Special policies may also be formulated by the government that provide tax and investment benefit to individual prospective investors. The government may provide Islamic finance benefits to prospective investors. Malaysia has been particularly successful in using Islamic finance as a means to attract FDI. This model may be successful in Pakistan too.

Title: Alternative Legal Means for Protecting IP: Sale of Goods Act, Consumer Protection Courts, Provincial Food Authorities, and Quality Control Agency.
PI: Mr. Uzair Kayani
Co-PI: Dr. Khyzar Hussain
Sponsor: American Business Forum (ABF)
Funding Amount: PKR 800,000
Project Initiated in: 2016
Duration: 12 Months
Category: Law & Policy
Description: MNCs in Pakistan often complain about the lack of intellectual property protection that takes a huge toll on their annual revenues. The main objective of this project is to propose that instead of the government indulging in the process of enacting new legislation, the existing enforcement mechanism should be improved. This can be achieved indirectly, through instruments that in their normal operation also achieve ends associated with IP protection. MNCs can obtain indirect IP protection through support of their legal institutions, such as Provincial Food Authorities, the Pakistan Standards and Quality Control Authority, Consumer Protection Courts and the Sale of Goods Act.

Dr. Zubair Abbasi
Shaikh Ahmad Hassan School of Law (SAHSOL)
zubair.abbasi@lums.edu.pk
+924235608067

Profile Dr. Zubair Abbasi completed his doctorate from the Faculty of Law, Oxford University. The focus of his doctoral thesis was on the transplantation of English legal system in colonial India and the interaction between Islamic law (Fiqh) and English law in this process. He conducted a case study of the developments in Islamic waqf law under the British legal system by analysing the jurisprudence developed in the judgments of the Judicial Committee of the Privy Council and various Indian High Courts. His research revealed the crucial role played by Muslim lawyers, judges, 'ulama', and politicians in the formation of Anglo-Muhammadan Law (later called Muslim Personal Law). It showed how they simultaneously negotiated and collaborated with, and resisted the colonial administrators in the making and operation of the new Indian legal system.

Selected Publications

- Abbasi, M. Z., Cheema, S. A. (2018). Family Laws in Pakistan. Oxford University Press
- Cheema, S. A., Abbasi, M. Z., Khan, A. U. (2018). Contribution of the Lahore High Court in the Development of Islamic Family Law in Pakistan. 14 (1) Journal of International Law and Islamic Law 1-24
- Abbasi, M. Z. (2017). Judicial Ijtihad as a Tool for Legal Reform: Extending Women's Right to Divorce under Islamic Law in Pakistan, Islamic Law and Society, 24. 384-411
- Abbasi, M. Z. (2015). Shari'a and State Law: Relevance of Islamic Legal History for the Application of Muslim Family Law in the West, Journal of Law, Religion and State, 2:3. 124-38

Title: The Contribution of the Judiciary in the Application and Development of Islamic Jurisprudence in Pakistan
PI: Dr. Zubair Abbasi
Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 819,539
Project Initiated in: 2015
Duration: 24 Months
Category: Law & Policy
Description: In Pakistan, judicial organ of the state is employed to islamise the existing laws. This is a unique approach adopted in a Muslim country in order to indigenise transplanted colonial laws and/or to replace them with Islamic law. In this respect, the jurisprudence produced in the judgments of the Federal Shariat Court and the Shariat Appellate Bench of the Supreme Court provides valuable material for assessing the mechanism of applying Islamic law in a modern nation state. This project proposes to assess the way Islamic Jurisprudence (Usul al-Fiqh) is applied in Pakistan by the Federal Shariat Court and the Shariat Appellate Bench of the Supreme Court of Pakistan since 1980. It will critically analyse the contribution of case law produced by these courts in the application and development of Islamic Jurisprudence while dealing with various issues relating to commercial law, contract law, penal law, labour law and family law.

Title: The Role of Judiciary in Protection of Women's Rights: A Case Study of Divorce Law (Khul')
PI: Dr. Zubair Abbasi
Sponsor: LUMS Faculty Initiative Fund (FIF) | Higher Education Commission
Funding Amount: PKR 3,623,320
Project Initiated in: 2016
Duration: 12 Months
Category: Law & Policy
Description: This project proposes the first comprehensive and systematic study on the role of judiciary in Pakistan in the protection and promotion of women's right to divorce. This study will propose policy recommendations for effective disposal of divorce related legal issues. This research project has two main objectives: first, it analyses the process of the development in women's right to dissolve their marriages without the consent of their husbands; and second, it assesses the impact of this legal change on the institution of marriage by collecting empirical data from family courts and local councils.

Title: Sharia and the Modern State: Judiciary and the Application of Islamic Jurisprudence in Pakistan
PI: Dr. Zubair Abbasi
Sponsor: LUMS Faculty Initiative Fund (FIF)
Funding Amount: PKR 1,000,000
Project Initiated in: 2015
Duration: 12 Months
Category: Law & Policy
Description: This project proposes to evaluate the contribution of the Shariat Courts in Pakistan in the application and development of Islamic law (Fiqh/Shari'a) by analysing the judgments of the Federal Shariat Court and the Shariat Appellate Bench of the Supreme Court of Pakistan. This project will assess the way Islamic Jurisprudence (Usul al-Fiqh) is applied in Pakistan by the Federal Shariat Court and the Shariat Appellate Bench of the Supreme Court of Pakistan. It will critically analyse the contribution of case law produced by these courts in the application and development of Islamic Jurisprudence while dealing with various issues relating to property law, commercial law, contract law, penal law, labour law and family law.

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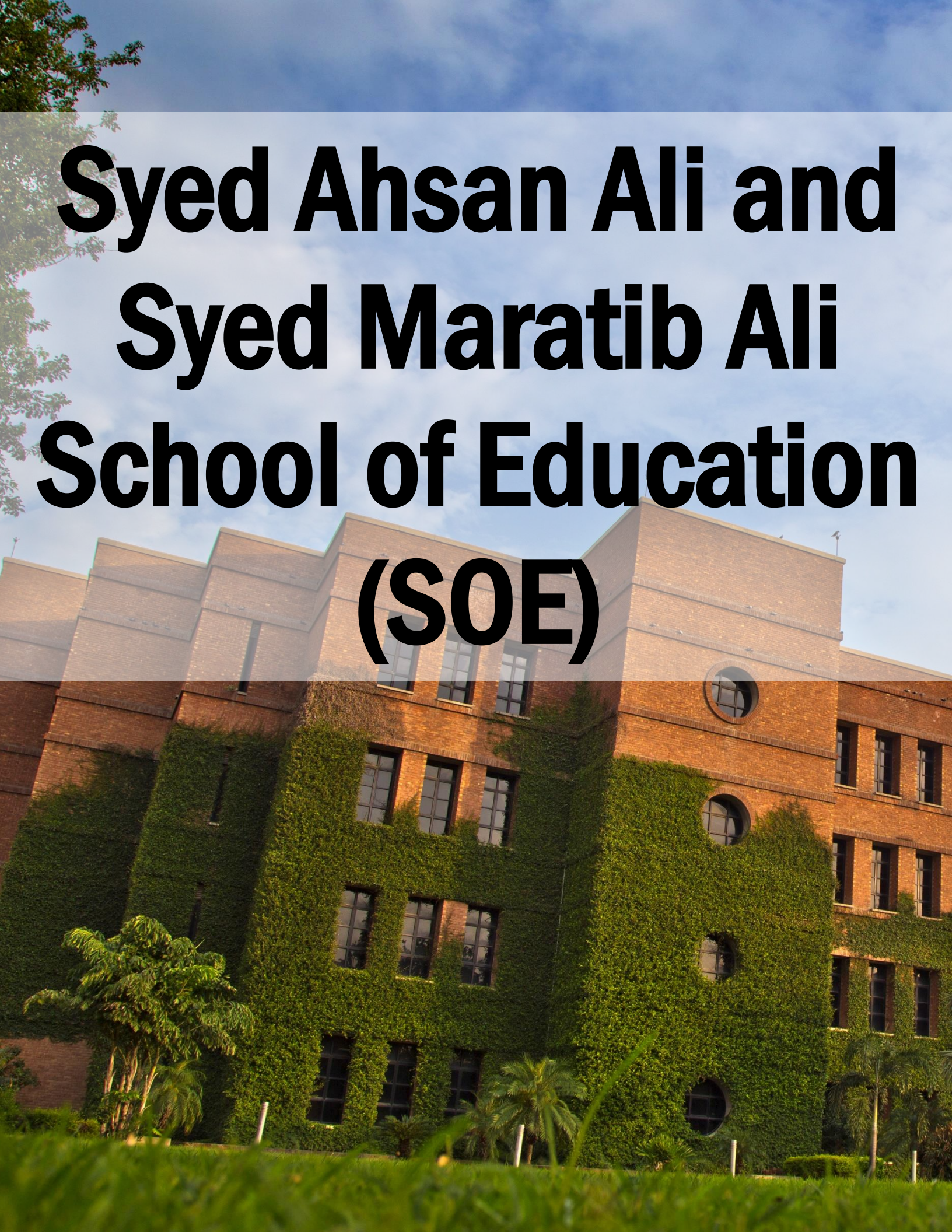

Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)

Dr. Mariam Chughtai
School of Education (SOE)
mariam.chughtai@lums.edu.pk
+924235608472

Profile Dr. Mariam Chughtai is an Associate Dean and Assistant Professor at the School of Education (SOE). She is also the Director of Pakistan Programmes for the Harvard University Lakshmi Mittal South Asia Institute. Previously, Dr. Chughtai taught several courses at the Harvard Graduate School of Education, along with Negotiations at Harvard Law School and Leadership at Harvard Kennedy School. She has a Doctorate in Education (Ed.D.) from Harvard University specialising in Education Policy, Leadership and Instructional Practice. She has two Master's degree from Harvard University, in International Education Policy and Education Policy and Management, and Bachelors in Political Science from Rice University. Dr. Chughtai is based in Pakistan and working on her forthcoming book on the politics of making and breaking identity through education in Pakistan.

Title: LUMS – SAI Collaboration for School of Education Project
PI: Dr. Mariam Chughtai
Sponsor: Ferozsons Laboratories
Funding Amount: PKR 4,000,000
Project Initiated in: 2017
Duration: 72 Months
Category: Education
Description: The aim of this project is to support the collaboration between LUMS and SAI or other Harvard centres, departments or academic units. The collaboration may include but is not limited to, collaborative research between scholars from LUMS and Harvard; research study or internship programmes for students from LUMS or Harvard; visiting scholars' programmes for faculty from Harvard or LUMS to teach or conduct research at other institutes. The collaboration may also involve other universities or institutes in the United States of America, Pakistan and elsewhere by mutual agreement of the parties involved.

Title: KP Impact challenge (KPIC)
PI: Dr. Mariam Chughtai
Sponsor: Department of Tourism, Sports, Culture, Archaeology & Youth Affairs, Government of KPK
Funding Amount: PKR 500,000,000
Project Initiated in: 2017
Duration: 12 Months
Category: Education
Description: This project is a collaboration between LUMS Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE) and Khyber Pakhtunkhwa Sports, Tourism, Culture, Archaeology, Museums and Youth Affairs Department. The main objective of this strategic partnership is to execute the KPIC Project, which is a first of its kind, government led initiative for a province-wide economic and social impact competition to promote youth entrepreneurship, innovation, and economic opportunities in KPK. The project is driven by a mandate to devise a strategy for the prosperous future and career progression of KP youth (between 14-29 years of ages). This project will not only train rural and women entrepreneurs across the KP province but will also produce innovative research on post-conflict youth in Pakistan. Thus, contributing towards the School's vision to conduct activities focused on research, policy and practice in the education landscape of a globally marginalised region of the world. In March 2018, the first training cohort of the KPIC project came to a close with a total of 18 million rupees disbursed as seed capital to 43 qualified entrepreneurs in an Investor Summit in Peshawar. Prior to the commencement of the second cohort, the KPIC research team prepared an analysis report of the first cohort and conducted an impact assessment of the trainings in order to highlight process improvement strategies for the upcoming cohorts.

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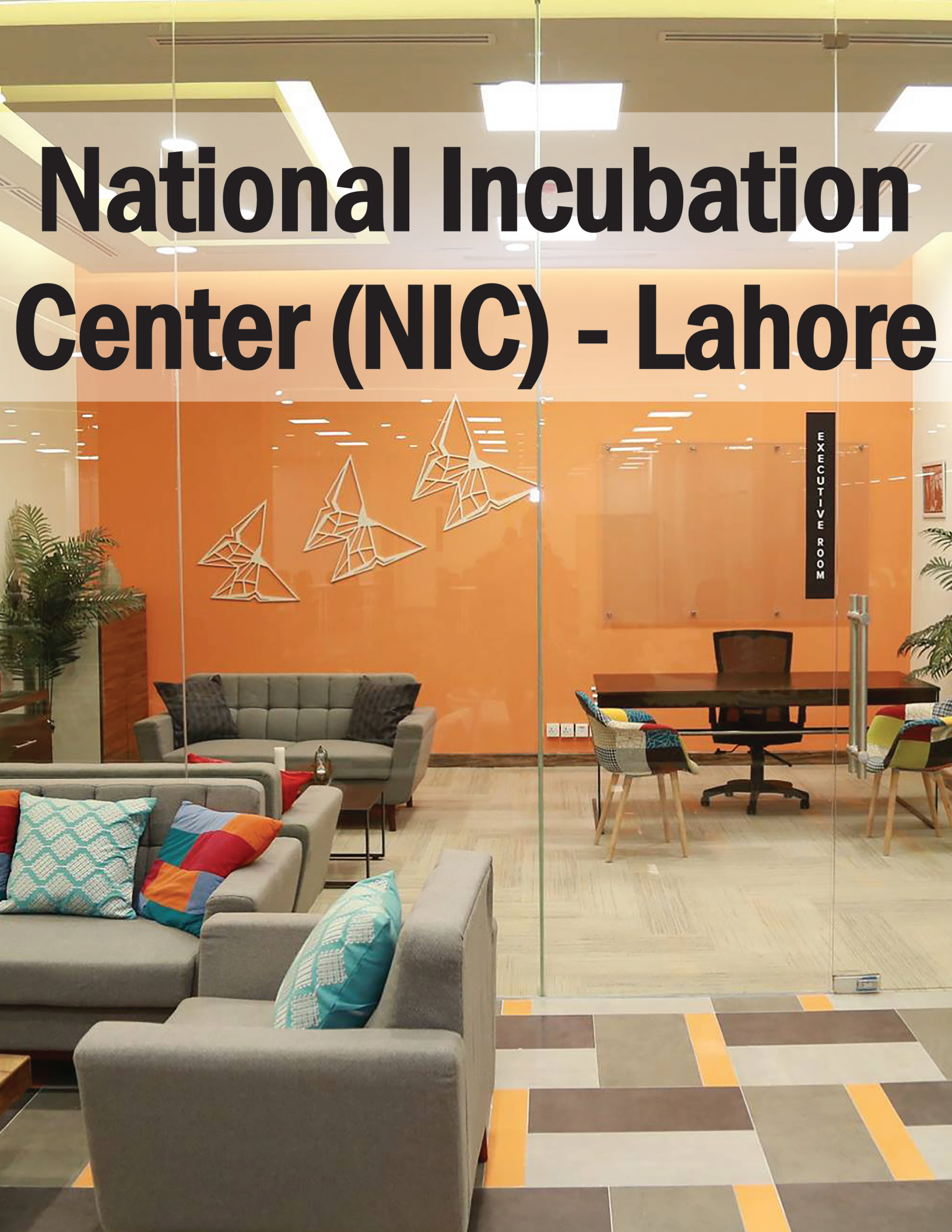
National Incubation Center (NIC) - Lahore



National Incubation Center

National Incubation Center Lahore (NIC) is setup as an independent center under the LUMS umbrella which aims to formalise the institution's support for entrepreneurship. It is the nation's most comprehensive experiential development platform for budding entrepreneurs that formalises the process of scouting, grooming and facilitating passionate start-up founders. NIC aims to build a comprehensive entrepreneurial ecosystem, with LUMS at its epicentre, that will bring together everything and everyone required to maximise the growth potential of Pakistani entrepreneurs. The vision of NIC is to become the largest breeding ground for sustainable, high-growth and high-impact ventures in Pakistan. The mission is to develop the most comprehensive experiential development platform for Pakistani entrepreneurs by 2016. Aside from building a network of investors who can fund The Foundation affiliates, NIC is also working with LUMS Alumni, corporations and other organisations to help create a Special Purpose Vehicle (SPV) with a sizable seed stage investment fund. NIC also aims to develop integrations with the academic programmes offered at all LUMS schools and provide students opportunities for experiential learning through Cooperative Education Programmes at The Foundation.

Title: LUMS Global Start-up Exchange Powered by Google
Sponsor: Google
Funding Amount: PKR 2,100,000
Project Initiated in: 2016
Duration: 12 Months
Category: Technology
Description: LUMS through its LUMS Centre for Entrepreneurship (LCE) is jointly running a start-up exchange programme for young entrepreneurs from Pakistan with support from Google. As part of the program, LCE and Google will select 8-9 entrepreneurs from across the leading incubators in Pakistan and sponsor them for a 5 days/4 nights trip to Singapore where they will get an opportunity to meet and exchange views and ideas with Singapore start-ups, get training on various Google products and services, visit incubators, get apprised of Singapore government programmes for start-ups and meet with potential investors all with an objective to build bridges outside of Pakistan, build and grow their respective businesses and showcase the strength of the Pakistani start-up ecosystem as well as learn from other ecosystems.

Title: Ilm Ideas 2 Grants Programme for Incubators
Sponsor: Mott MacDonald | Department for International Development (DFID)
Funding Amount: PKR 13,506,500
Project Initiated in: 2016
Duration: 12 Months
Category: Business & Innovation
Description: Ilm Ideas 2 is committed to identifying, supporting and promoting education innovation in Pakistan. It provides a platform for the generation, piloting and scaling-up of innovative solutions to address critical education challenges in the country. The programme aims to increase access to education and improve learning outcomes for 250,000 Pakistani children. It will do so by bringing proven education innovations to scale and establishing a permanent nationwide community that will continue to identify and support education innovation beyond the life of the programme. ILM IDEAS 2 signed a Memorandum of Understanding with the Lahore University of Management Sciences (LUMS) to scout and promote start-up ventures building innovative products and services that can positively impact education in the country.

Title: Incubator for Urban Youth Enterprises in Pakistan
Sponsor: British Asian Trust
Funding Amount: PKR 28,843,450
Project Initiated in: 2016
Duration: 24 Months
Category: Business & Innovation
Description: This project aims to enable youth from low income communities in Pakistan to have a sustainable livelihood by starting and managing their own enterprises. This will include supporting LUMS to establish an incubator programme to deliver support to young people, implementing an outreach plan to identify young people who would benefit from the support and delivering a programme of support to help them develop their business ideas from conception to success. In particular, this project will enable improved capacity to deliver tailored entrepreneurial training and incubation support to youth from low income communities that will lead to increased employment opportunities for youth.

Title: Promoting Innovation in Education – Phase II
Sponsor: Mott MacDonald
Funding Amount: PKR 27,000,000
Project Initiated in: 2017
Duration: 18 Months
Category: Education
Description: The core focus of this project is to stimulate the development of sustainable and scalable models that support the successful incubation of early stage education sector enterprises and catalyse private investment into early education sector enterprises. It aims to foster the development of entrepreneurial ecosystem in Pakistan and conduct further research and collect empirical evidence on how to further improve the education sector based entrepreneurial ecosystem in the country. This project aims to increase access to education and improve learning outcomes for 250,000 Pakistani children. It will do so by bringing proven education innovations to scale and establishing a permanent nationwide community that will continue to identify and support education innovation beyond the life of the programme.

LUMS CENTER FOR ENTREPRENEURSHIP
NIC LAHORE

Title: National Incubation Center, Lahore
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 600,951,014
Project Initiated in: 2017
Duration: 60 Months
Category: Business & Innovation
Description: Under this project, LUMS will maintain and manage the National Incubation Center at LUMS. LUMS will implement the project and provide space and allied infrastructure for establishment of Incubator as per requirements specified in the request for proposal and provide conducive environment to host 40 numbers of incubates per year. The established set-up would cover both incubator and accelerator. It will also provide entry pathway for people with special needs such as an elevator or a ramp.

Title: Customized Business Incubation Programmes for providing Support and Mentoring to Women-Led Enterprises
Sponsor: Karandaaz | Department for International Development (DFID)
Funding Amount: PKR 18,186,325
Project Initiated in: 2017
Duration: 9 Months
Category: Business & Innovation
Description: The primary purpose of this project is to promote the Karandaaz women entrepreneurship programme implemented by LUMS centre for entrepreneurship. To accomplish this purpose, a visit will be planned to BUITEMS University located in Quetta to interview the project staff. Interviews of high-growth women entrepreneurs and micro-entrepreneurs inducted under Karandaaz programme will be shooted.

Title: National Incubation Center, Quetta
Sponsor: Ignite (formerly National ICT R&D Fund Company)
Funding Amount: PKR 559,730,871
Project Initiated in: 2018
Duration: 60 Months
Category: Business & Innovation
Description: Business incubators have been gaining popularity, as important economic development tools around the world and start-up companies constitute an important dimension in the evolution of new businesses. It is at this stage where fresh unique ideas or business concepts are born and with the required assistance, these ideas can turn into commercially viable and high-growth businesses. In this context, LUMS and BUITEMS have partnered to build an incubation center in Quetta that creates lasting economic impact by successfully supporting start-ups and emerging technology companies to create and/or commercialise knowledge intensive products and services through the establishment of a purpose-built incubator.

Title: Empowering Entrepreneurs to Build Sustainable Livelihoods
Sponsor: British Asian Trust
Funding Amount: PKR 6,857,500
Project Initiated in: 2018
Duration: 10 Months
Category: Business & Innovation
Description: The main objective of this project is to support the micro-entrepreneurs in Quetta, Baluchistan. Economic perspectives of youth are extremely poor and unemployment rates staggering high. Even when jobs are available there is often a mismatch between the skills youngsters can offer and those required by the employers. Poverty, social instability and political violence are on the brink and this is why addressing the youth employment challenge ranks high on the international and local development priorities for sustainable and inclusive development. LUMS NIC, Lahore under the funding of Citi Foundation and management of British Asian Trust set out to change address this narrative for the greater good under Citibank's global programme.

Title: Fintech Disruption Challenge
Sponsor: Karandaaz
Funding Amount: PKR 3,649,491
Project Initiated in: 2018
Duration: 12 Months
Category: Business & Innovation
Description: This project consist of three phases. The first phase entails the outreach and selection of Fintechs. After selection of potential Fintechs, a programme will be designed for the acceleration of the selected cohorts. This programme will involve business training curriculum, mechanics for idea pivoting, networking and outreach activities, boot camps, dedicated mentorship and training sessions. Each Accelerated Programme will run for 4-6 month long acceleration sessions for which curriculum will be customised to the core needs of the Fintechs, which will be provided with experiential training (as opposed to theoretical learning) in areas, including but not limited to design thinking, Payment, APIs (shared by the partner Banks), innovation ecosystem, equity, elevator pitches, business model canvas, idea pivoting, business plan development, sales and research, financial plan, marketing, etc. Once the Acceleration Programme is completed, the applicants will pitch their idea on the designated pitch day in front of a panel of judges to compete for a grant of up to $100,000.

Title: Establishment of Makers Lab at NIC Lahore, LUMS
Sponsor: Fatima Group
Funding Amount: PKR 50,000,000
Project Initiated in: 2018
Duration: 24 Months
Category: Business & Innovation
Description: A Makers/Fab lab is a facility equipped with an array of tools that cover various materials, with the aim to make "almost anything". A network of around 1200 fab/Maker labs exists in the world. In Pakistan, there is a barrier to develop hardware based products because of which most of entrepreneurial ideas revolve around apps or service providing initiatives. To break the barrier for hardware based products, with the generous sponsorship from Fatima Group (Fatima Ventures), a Makers Lab is being established at NIC Lahore, LUMS, which would comprise of five distinct labs i.e. PCB fabrication and assembling lab, Metal Lab, Wood Lab, 3D printing and Scanning Lab, and Mechanical CNC Machining Lab. This would provide a conducive environment not only for incubated companies but also for other individuals belonging to schools, universities and other walks of life.

Team OSPR

| Dr. Shafay Shamail | Hamza Habib | Saad Suhail | Muhammad Faisal | Sohaib Iftikhar |

Muhammad Najam Ul Ain | Aonia Masood | Naeem Siddique | Abeera Arshad | Muhammad Yahya |

UAN: 111 115 867 | Tel: +92 42 3560 8336 | Fax: +92 42 3572 2591-2 | Email: ospteam@lums.edu.pk

Website: https://ospr.lums.edu.pk/

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Designed By:

Hamza Habib, Manager OSPR
Abeera Arshad, Research Assistant, OSPR

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