LUMS
A Not-for-Profit University

Learning Without Borders

Office of Research

Research Portfolio

2022-24

LUMS | Office of Research

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MESSAGE FROM THE
VICE CHANCELLOR

Fifteen years ago, our university embarked on a transformative journey by institutionalising the tenure system, marking our commitment to becoming a research-focused institution. This pivotal shift has empowered our faculty to pursue research that addresses critical issues pertinent to Pakistan's struggle to emerge as an inclusive, socially just, and innovative society.

Research at LUMS has been instrumental in tackling key national concerns across various domains, including green transport, environmental sustainability, public health, gender equality, citizenship, countering misinformation, educational transformation, governance, supply chains, family businesses in the digital age, and sustainable energy transformations. Our faculty's dedication to exploring fundamental questions about gender and equality, enhancing healthcare outcomes, and delving into national identity and citizenship complexities is driving meaningful societal change. Moreover, they advocate for sustainable practices, such as energy-efficient building designs, and have played instrumental roles in formulating essential national policies.

This remarkable progress is a testament to the dedication of over 280 distinguished faculty members at LUMS, many of whom have joined us from top institutions worldwide. Their efforts have positioned LUMS

as a hub of high-quality research, with a substantial portion of our publications appearing in top international peer-reviewed journals and esteemed university presses. Our faculty actively disseminates impactful research at leading conferences, secures competitive fellowships and research grants, and receives prestigious awards, significantly contributing to both academia and national development.

Over the past year, our faculty members have achieved remarkable accolades that underscore the depth and impact of their scholarly work. Drs. Ihsan Ayub Qazi, Agha Ali Raza, and Ayesha Ali received the prestigious Foundational Integrity Research Award from Meta for their pioneering efforts in combating misinformation among populations with low digital literacy. Dr. Zartash Uzmi's contributions to enhancing internet efficiency in Pakistan were recognised with the Information Society Innovation Fund (ISIF Asia) award at the Internet Governance Forum in Kyoto, while Dr. Faheem Hassan Akhtar made history as the first South Asian to be honoured with the North American Membrane Society's Young Membrane Scientist Award for his groundbreaking work in separation science. It was an immensely proud moment for us all when Dr. Naveed Arshad earned the esteemed 2024 Pride of Performance award for innovations in big data, cloud computing, and sustainable energy solutions. Additionally, Dr. Maryam Mustafa's groundbreaking work in maternal healthcare, recognised by both the Bill and Melinda Gates Foundation and the Google Academic Research Award, exemplifies our commitment to leveraging technology for societal benefit. In a landmark achievement, Dr. Zubair Khalid became the first Pakistani recipient of the prestigious Gordon Bell Prize in Climate Modelling, often referred to as the 'Nobel Prize of Supercomputing,' for his collaborative work on developing an ExaScale Climate Emulator to enhance climate modelling accuracy and efficiency.

In the realm of historical scholarship, faculty from MGSHSS have played a pivotal role in shaping critical conversations on urban transformation and heritage. *Lahore in Motion*, published by UCL Press, brings together chapters authored by LUMS faculty, including Drs. Amen Jaffer, Ali Raza, Umair Javed, Nida Kirmani, and Ali Usman Qasmi, to examine the impact of the Orange Line metro rail system on Lahore's urban fabric. In the realm of historical preservation, Dr. Nadhra Shahbaz Khan, Associate Professor of Art History, has been awarded the Ordre des Palmes Académiques, one of France's highest academic honours, for her work on Lahore's overlooked French heritage, particularly the lost funerary monument of Kuri Bagh, which has sparked renewed interest in the city's historical ties with France.

At SDSB, faculty members continue to produce impactful journal articles and high-quality, industry-focused case studies; in 2023-24, they published over 60 research articles in top academic journals. Notably, Dr. Jawad Syed was recognised as the Best Researcher in Social Sciences (2023) by the Higher Education Commission (HEC). The Academy of Management (2024) conferred the Best Book Award to Dr. Azfar Nisar, who, along with Dr. Ayesha Masood, has received multiple recognitions for Best Paper and Top-Cited Article in Public Administration Review. Dr. Ghazal Zulfiqar Mir's leadership in management research was acknowledged with her election as co-editor-in-chief of Organisation, while Dr. Shakeel Jajja was honoured with the prestigious Fulbright postdoctoral fellowship for a joint appointment at Stanford University's Graduate School of Business and the Stanford Doerr School of Sustainability.

SAHSOL faculty remain at the forefront of critical legal discourse in Pakistan and beyond. Dr. Sikander Ahmed Shah's latest book, *Federalist Solutions to Pakistan's Political Crises* (Rowman & Littlefield, 2024), challenges historical power imbalances in Pakistan and provides locally relevant and indigenously viable solutions for fostering positive and equitable outcomes. In a landmark contribution to public interest litigation, the SAHSOL Dean's Office submitted a legal brief in the Pakistan Mineral Development Corporation (Pvt.) Ltd. and Another v. Naveed Shahzad, a constitutional case heard by the Islamabad High Court under Honourable Justice Babar Sattar. The brief examined whether federal employees automatically acquire permanent employment status over time, in light of constitutional guarantees and relevant labour laws, reinforcing SAHSOL's commitment to legal reform and justice. Furthering this impact,

Dr. Syed Muhammad Azeem and Muhammad Umar Ali provided expert insights on labour reforms in consultations with the Punjab Assembly's Standing Committee on Labour, particularly concerning industrial relations and social security legislation.

The School of Education (SOE) has made remarkable strides in bridging research and policy implementation in Pakistan's education sector. Drs. Farah Nadeem and Jessica Albrent were awarded competitive grants under the FCDO-funded Data and Research in Education (DARE) programme to design and pilot an innovative predictive model for education policymaking and implementing targeted interventions. Similarly, Dr. Soufia Siddiqi secured a grant under the DARE programme to investigate teacher education and its role in addressing the learning crisis in Pakistan. Dr. Tayyaba Tamim, Dean of SOE, was awarded a research grant from the Gates Foundation to study the role of education in disrupting or reinforcing social gender norms. Her research on building capacity for online education also received funding from the Erasmus+ CBHE funding scheme. Also, this year, SOE faculty, including Drs. Gulab Khan, Farah Nadeem, Jessica Albrent, and Soufia Siddiqi, will be presenting their research at one of the most prestigious academic gatherings – the Comparative & International Education Society (CIES) Conference.

Our university's commitment to research excellence is significantly bolstered by the dedicated efforts of our specialised research centres. At the School of Science and Engineering, centres such as the Technology for People Initiative, the LUMS Energy Institute, the Water Informatics & Technology Centre, the National Centre for Big Data and Cloud Computing, the High-Performance Computing Lab, and the Centre for Intelligent Systems and Networks have been instrumental in driving innovation and addressing critical technological challenges. In the School of Humanities and Social Sciences, the Mushtaq Ahmad Gurmani Humanities Research Centre and the Saida Waheed Gender Initiative have enriched our understanding of cultural, social, and gender dynamics, fostering inclusive dialogues and scholarly discourse. The Suleman Dawood School of Business's Centre for Business and Society has adeptly bridged the gap between academic research and societal needs, promoting ethical business practices and sustainable development. Collectively, these centres embody our interdisciplinary approach, enabling impactful research that resonates within Pakistan and on the global stage.

Looking ahead, LUMS is poised to further its research priorities by focusing on interdisciplinary themes critical to Pakistan and the world: addressing environmental challenges to promote a sustainable future; enhancing healthcare and overall well-being by tackling essential issues of maternal health, the rising burden of infectious diseases, and the crisis of the public health infrastructure; promoting equality and inclusivity in education and gender; fostering active participation and fairness in society; developing technologies that prioritise human welfare; and preserving cultural heritage to encourage diversity and acceptance.

A key priority is to strengthen community engagement, ensuring that insights from our research translate into tangible societal benefits. By fostering collaborations with local communities, policymakers, and industry partners, we aim to bridge the gap between academic research and real-world applications, driving meaningful change that resonates beyond our campus.

These achievements reflect the intellectual vitality of our faculty and reaffirm the university's commitment to research excellence. As we look ahead, LUMS remains dedicated to fostering a thriving research ecosystem, empowering scholars to address the pressing challenges of our time and shaping a more inclusive and innovative future for Pakistan and beyond.

Dr. Ali Cheema

Vice Chancellor

MESSAGE FROM THE PROVOST

It is with great pleasure that we present this report, showcasing the groundbreaking work of our exceptional faculty, whose dedication and expertise continue to position LUMS as Pakistan's leading research institution. This report highlights innovative research across diverse fields, including health, technology, energy, sustainability, gender studies, climate change, and more, addressing some of the most pressing challenges of our time.

LUMS faculty consistently demonstrate their commitment to advancing knowledge and finding solutions to critical societal issues. Their efforts are supported by a robust research ecosystem at the university, facilitated by the Office of Research (OR). From managing research funding to fostering collaborations with esteemed global institutions, the OR provides vital resources that empower our researchers to pursue ambitious projects and share their findings with the international community.

Over the past two years, our faculty has completed numerous externally funded projects, underscoring the depth and breadth of research at LUMS. Initiatives such as building potential partnerships with Scandinavian universities further extend the scope of our research impact, paving the way for joint projects in biomedical engineering and emerging fields like AI and data analytics. Notable achievements include securing significant research funding through national and international projects.

We remain deeply grateful to our faculty for their unwavering pursuit of excellence and to the Office of Research for their steadfast support. Together, they exemplify the spirit of innovation and collaboration that defines LUMS. This report reflects the collective talent, passion, and vision of our community. For more information on these initiatives, we encourage you to visit the Office of Research website.

Dr. Tariq Jadoon

Provost

MESSAGE FROM THE
DIRECTOR, OFFICE OF RESEARCH

It brings me immense pleasure to present to you the 'LUMS Office of Research (OR) Report 2022-24,' which highlights the research efforts and achievements of the LUMS community over the past two years. During this period, we won 198 external grants worth around PKR 6 billion and 42 consultancy projects worth around PKR 105.3 million. In the same period, LUMS awarded its faculty 101 internal grants of PKR 105.4 million in a variety of disciplines, including Business, Social Sciences, Humanities, Law, Education, Sciences, Technology, and Engineering. Over the years, LUMS has built a strong reputation as a leading academic and research institution. A significant part of this success arises from our faculty's impactful research. The supportive environment at LUMS helps schools and faculty establish meaningful partnerships with top universities and researchers worldwide. Notably, research output and innovation have directly contributed to LUMS' strong performance in international rankings. In 2025, LUMS was recognised as one of the top-ranked universities in Pakistan.

In the past two years, we have collaborated with both local and international partners, working on projects that address important issues in our country and society. Our research spans key themes such as Agriculture, where faculty have driven innovations in AgriTech, sustainable crop management, and smart irrigation. Our researchers have also excelled in Business and Economy, emphasising behavioural sciences, capacity building, data analysis, and economic growth. In Culture and Heritage, they explored digital preservation and history. Contributions to Education include curriculum development, EdTech, and

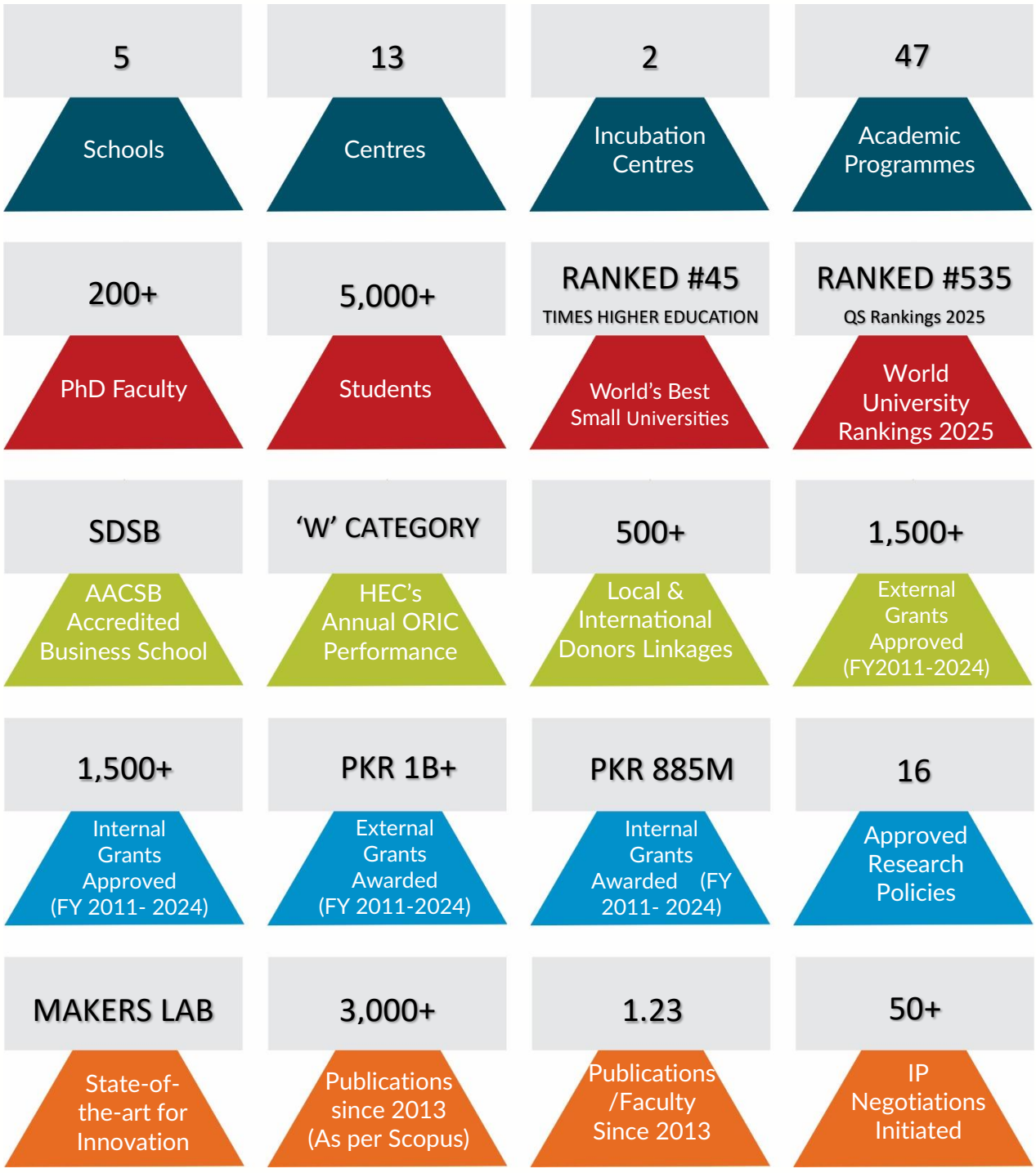
innovative teaching methods. In Energy, LUMS researchers have advanced renewable solutions, solar integration, and energy efficiency. Environmental research focuses on climate resilience, ecological conservation, and waste management. Our work in Health addresses critical concerns like diagnostics, immunisation, and disease prevention. In Human Rights, our researchers work on inclusivity and child protection. Research in Mathematics explores mathematical education. In Media, we focus on digital marketplaces and interactive platforms. Advancements in Natural Sciences continue to expand knowledge in areas such as experimental physics, material science, medicinal chemistry, molecular biology, and photonics. Research in Policymaking highlights law, politics, and strategy. Technology remains a major focus, with advancements in AI, IoT, and wireless communications. These impactful efforts address key societal challenges.

This report highlights how our faculty's passion for research drives meaningful progress, fosters excellence across diverse fields, and positions LUMS as a globally recognised centre for research and innovation. We hope that the readers will be inspired by the innovative, rigorous, and relevant ideas that shape the research culture at LUMS.

Dr. Saad Azmat

Director, Office of Research (OR)

LUMS AT A GLANCE



ABOUT LUMS

Established in 1985 as a private, not-for-profit university, LUMS is one of South Asia's top academic institutions known for its commitment to outstanding learning, research intensity, and teaching excellence. It is renowned for its exceptional academics and research, emphasising access, relevance, and collaboration, with an increasing focus on tackling the major challenges confronting the Global South. LUMS now offers undergraduate, graduate, and doctoral programmes through its five schools: Suleman Dawood School of Business, Mushtaq Ahmad Gurmani School of Humanities and Social Sciences, Syed Babar Ali School of Science and Engineering, Shaikh Ahmad Hassan School of Law, and Syed Ahsan Ali and Syed Maratib Ali School of Education.

LUMS offers a distinctive academic experience through its 'Learning Without Borders' philosophy, providing an integrated core curriculum across disciplines. It is home to several transdisciplinary centres that engage faculty and students and collaborate with external institutions to address society's grand challenges.

With faculty dedicated to teaching and the creation of knowledge, the University offers an enriching, seamless experience through multidisciplinary research and education, emphasising integrative learning, critical thinking, and creative problem-solving.

SCHOOLS AT LUMS

Syed Babar Ali School of Science and Engineering (SBASSE)

Practising a 'no-boundaries' philosophy, SBASSE is making significant strides in the experimentation of teaching and learning, while celebrating the novelty of research. Through innovative and impactful contributions to science and technology, SBASSE is nurturing future leaders with the potential to impact society. SBASSE faculty and students conduct ground-breaking research and develop solutions to the most complex local and global problems. The curriculum is designed to encourage cross-disciplinary collaborations between the various disciplines at SBASSE, as well as those offered by other schools at LUMS. SBASSE offers four-year undergraduate Bachelor of Science degrees in basic sciences as well as Computer Science, Electrical Engineering, Mathematics, and Chemical Engineering. It also offers a joint major in Economics and Mathematics. The school has robust MS and PhD programmes in various disciplines designed to train an ambitious group of scientists and researchers.

Suleman Dawood School of Business (SDSB)

SDSB has gained international acclaim over three decades. As Pakistan's first and only business school to have earned the Association to Advance Collegiate Schools of Business (AACSB) international accreditation, SDSB offers its students leading-edge business and management education. AACSB has featured SDSB in its Innovations That Inspire member spotlight programme. The school has received this honourable recognition for its Women's Scholarship Initiative, which offers a 50% tuition fee waiver to all women admitted to its graduate programmes. The initiative has also been awarded the Best of Asia Pacific in the Leadership - Diversity, Equity, and Inclusion Initiative by the Council for Advancement and Support of Education, based in Washington. SDSB, through this initiative, aims to promote gender diversity and produce highly skilled graduates who can lead, transform, and create a long-lasting impact in business and society.

Pioneer of the case method of learning in Pakistan, SDSB adds blended and experiential learning to its pedagogy. The school is also a Harvard Publishing Content Partner and has one of the largest collections of indigenous business case studies in South Asia.

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

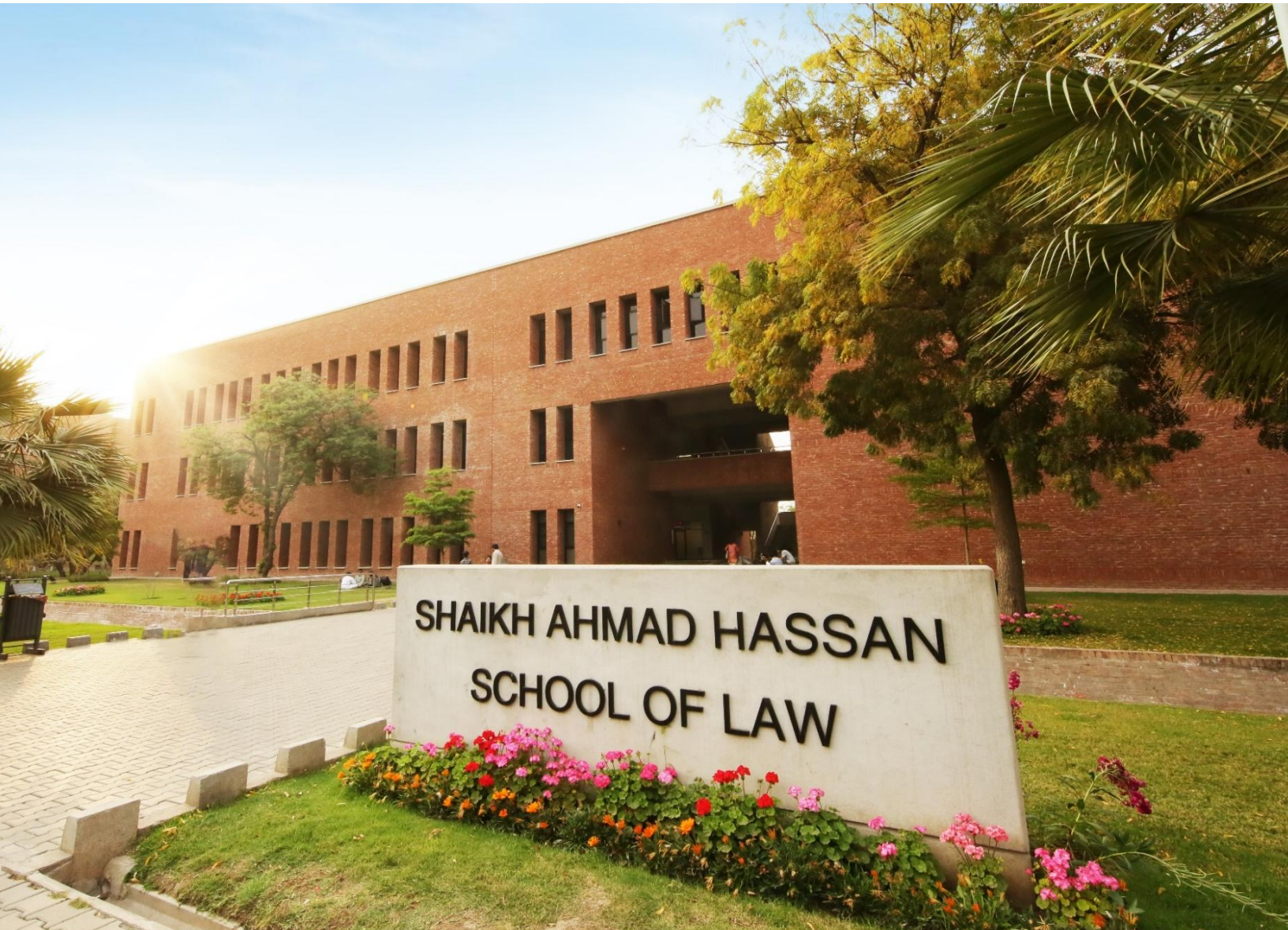
MGSHSS is reshaping the way social sciences and humanities are taught in Pakistan. The school offers a comprehensive liberal arts curriculum. It consists of two departments: Economics and Humanities and Social Sciences. The Department of Economics at MGSHSS is one of the most established in Pakistan, with 21 faculty members who hold PhDs. The school also has a partnership with the University of East Anglia for a joint PhD programme in Economics. The innovative curriculum at MGSHSS provides a broad foundation of knowledge to its students as they delve into works on politics, scientific reasoning, sociology, economics, culture, religion, art, literature, and aesthetics. Equipped with a diverse set of transferable skills, students are able to overcome challenges in a rapidly changing world, whether they have to work in the public sector, the private sector, for non-governmental organisations, or in academia.

The international reputation of the school continues to grow and gain recognition through its research. Its faculty members have authored over 40 academic publications and five books in the past year.

Shaikh Ahmad Hassan School of Law (SAHSOL)

The 5-year BA-LL.B degree at SAHSOL is recognised by the Pakistan Bar Council and the Higher Education Commission, Pakistan. The two-year BA phase of the degree is interdisciplinary and exposes students to a wide range of disciplines across LUMS. The three-year LL. B phase requires students to undertake fundamental and specialised courses in law. The curriculum at SAHSOL has been carefully designed to ensure key learning objectives about core areas of the law. Students can choose from a diverse set of elective courses organised in five course streams: Government, Law and Citizenship, Criminal Law, Business Law, Legal Theory, and International and Comparative Law. The Socratic Method employed at the school engages students in dynamic discussions that enhance their critical thinking and analytical reasoning skills. In addition to learning in the classroom, real-world training is an important component of this degree. Law majors have multiple opportunities to undertake legal internships, contribute to the LUMS Law Journal, and engage in pro bono work through the Street Law Programme. Students are provided with career guidance through the Advisement Cell at the School and the Alumni Mentorship Programme. The Legal Writing Lab also provides advice on students' analytical, critical, and persuasive writing skills.

The school also hosts the Centre for Chinese Legal Studies, a collaboration with Wuhan University in China. SAHSOL graduates have gained recognition as leaders in the corporate sector, partners in top law firms, as well as advocates for a range of public interest causes.



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

Through its comprehensive programmes, SOE produces strategic leaders, policy researchers, and reflective practitioners who are geared towards directing a vibrant education reform agenda for Pakistan. The school offers three interdisciplinary minors in education, an MPhil in Education Leadership and Management and a weekend-based Executive MPhil in Education Leadership and Management. The programmes feature extensive field engagement and operate at the nexus of research, policy, and practice.

MPhil candidates participate in the Practicum Programme, a mandatory, intensive semester-long 'residency' rooted in field-based research during which students are placed in one of the 46 educational organisations that have partnered with SOE. The school also helps students reach their full potential through the numerous individual interviews, advising sessions and networking events conducted by the SOE Career Placement Programme. The school provides Professional Education solutions to educators at various stages of their careers. The solutions are offered at the individual level through courses, trainings, workshops, and certifications, as well as at the organisational level through custom programmes. Faculty at SOE actively engages at the national level. They are part of the government's education task forces, boards of public-private partnerships, and autonomous bodies in the government. They also lead policy roundtables with multiple stakeholders on issues of national importance.

CENTRES AT LUMS

Rausing Executive Development Centre (REDC)

The Rausing Executive Development Centre imparts executive education with the aim of enabling managers to progress into leaders, following both case-based teaching and hybrid pedagogies. The Centre is recognised for its transformative learning experiences, impacting individual and organisational performances.

Centre for Business and Society (CBS)

The Centre for Business and Society is a platform for debates, policy discussions, student engagement and events to engender positive societal impact. This impact is created by providing a critical forum for discussion on focus areas vital to Pakistan's social and economic sustainability.

National Centre in Big Data and Cloud Computing (NCBC)

The National Centre in Big Data and Cloud Computing partners with 11 universities working on big data across areas of agriculture, industry, energy, health, multimedia, and local languages. The Centre also hosts Pakistan's open data portal and focuses on human resource development in the specialised field of big data and cloud computing, and its practical applications.

Centre for Water Informatics and Technology (WIT)

The Centre for Water Informatics and Technology conducts research and works closely with industry and the government on developing technologies to improve irrigation efficiency and introduce sustainable agricultural practices.

LUMS Energy Institute (LEI)

The LUMS Energy Institute works with the energy and power sector of Pakistan. It provides interdisciplinary research and shares capacity-building practices, which support power and energy planning, renewable energy technologies, and grid modernisation.

Technology for People Initiative (TPI)

The Technology for People Initiative was established to explore and enhance sustainable, innovative, and low-cost technology. It aims to make government institutions in Pakistan as informed, inclusive, and responsive as possible to achieve good governance.

Mahbub Ul Haq Research Centre (MHRC)

The Mahbub ul Haq Research Centre supports interdisciplinary research, scholarship, and teaching on issues of human development, social exclusion, and inequality across South Asia.

Saida Waheed Gender Initiative (SWGI)

The Saida Waheed Gender Initiative leverages research, teaching, and praxis related to gender at LUMS. It encourages research and resource development supporting pedagogy in gender studies. The initiative hosts events that bring together scholars, students, and members of the broader community.

National Incubation Centre Lahore (NICL)

The National Incubation Centre Lahore has a focus on contributing to Pakistan's economic development by promoting innovation and entrepreneurship in high-impact areas. It inspires and facilitates problem-solvers in agriculture, education, environment, financial inclusion, healthcare, and applications utilising artificial intelligence and machine learning.

LUMS Learning Institute (LLI)

The LUMS Learning Institute transforms learning and teaching practices by utilising modern technologies and innovative teaching tools. It also connects students with faculty to establish valuable pedagogical partnerships. The Centre has been instrumental in developing LUMSx - the new digital platform for open courses, encouraging inter-institutional collaboration, and national and regional partnerships.

Gurmani Centre for Languages and Literature (GCLL)

The Gurmani Centre for Languages and Literature was established in 2010 for the advancement of South Asian languages and literature. The Centre achieves this aim through language teaching, research, and publications as well as cultural programming.

Centre for Continuing Education Studies (CES)

The Centre for Continuing Education Studies offers courses that develop the professional expertise of students, professionals, and non-traditional learners. Its courses are designed and delivered by highly acclaimed industry experts and academics.

Centre for Chinese Legal Studies (CCLS)

The Centre for Chinese Legal Studies promotes the teaching of Chinese law in Pakistan. It aims to become a regional hub for shared legal resources between Pakistan and China. Academics, students, and legal and business professionals in both countries are facilitated to exchange knowledge and build capacity and legal expertise through the Centre.

OFFICE OF RESEARCH

The Office of Research (OR) was established on August 16, 2010, to promote a research culture at LUMS, and since then, it has actively pursued its mandate by making sure that the LUMS research community is facilitated as much as possible. OR acts as a bridge between the faculty and external funding agencies. However, OR does not just limit itself in facilitating the faculty members with their external grants. It also manages the internal grants sponsored by LUMS for its faculty members and students. The Office is responsible for ensuring that all submitted proposals conform to donor guidelines and LUMS policies, and once funded, the project complies with donor requirements and applicable University policies and procedures.

Moreover, OR works tirelessly to make sure that all the funding opportunities are identified and availed by faculty members/researchers, whenever and wherever needed. This pathway is broadly classified into four steps:

01

Pre-Award Administration

OR helps the research community in the review of research proposals to protect the university's interests and ensure compliance of donor guidelines. OR also assists in the due diligence of the organisation as part of proposal submission to international donors. All efforts from identifying funding opportunities to proposal submission, fall under the Pre-Award phase.

02

Contract Review & Signing

After the submission, proposals are reviewed by the donor and contracts are drafted. The in-house legal counsel at OR assists PIs in drafting of contracts that are then shared with the respective donors. Once the terms have been negotiated between the PI and donor, the contract goes through a final budget review by the OR and signing off through the Vice Chancellor or his/her designated authority.

03

Post-Award Project Management

OR provides Post-Award Project Management services once the grant is approved from the donor and formal contract is signed. Support in the Project Management is provided through GAMES including change request management, resource hiring, bridge finance and ethics approvals etc. The financial controls are facilitated through SAP GM-GTE module for reporting to stakeholders.

04

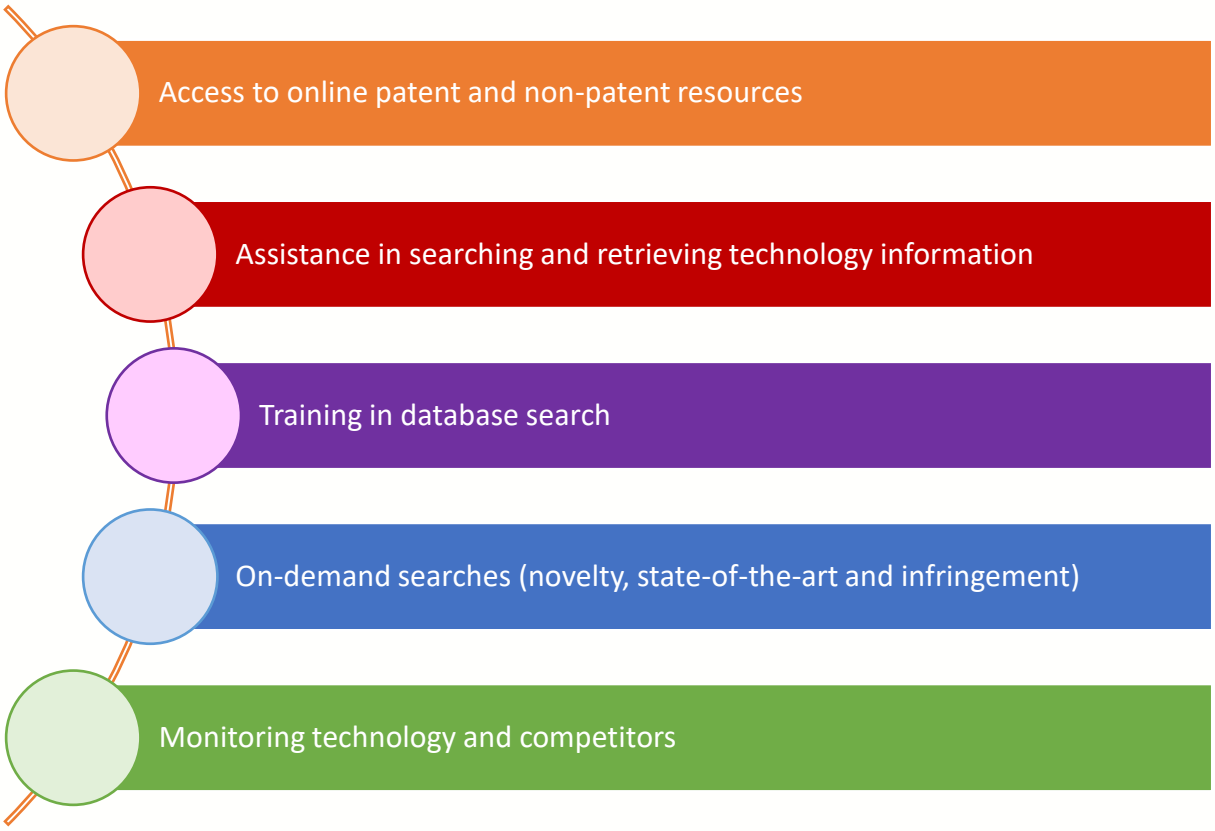
Closure & Commercialisation

In the closure phase, assistance is provided with audits for official closure. Project completion certificate is acquired from the donor. In case a commercialisable product is produced, OR provides legal advice for Patent Filing, Drafting, IP Licensing, Trademark and Copyright Registrations along with the commercialisation support including industrial partner identification and negotiations.

Technology and Innovation Support Centre

In April 2009, the World Intellectual Property Organisation (WIPO) initiated a pilot project designed specially to help innovators in developing areas access locally based, high-quality technology information services. This project was titled Technology & Innovation Service Centres (TISCS). The commencement of these centres was a success, and therefore, currently, 500 TISCS are operating globally.

Out of these, 23 TISCS are operating in Pakistan. LUMS, being a proponent of such science and technology-related initiatives, is one of these 23 institutional bodies. LUMS signed an MoU with WIPO, HEC, and IPO on December 12, 2017, thereby laying a foundation of TISC at LUMS.



Eminent Research Awards

LUMS has always been a step ahead when it comes to research and innovation. To accomplish the mission of the institute, it actively pursues every single opportunity to create an impact on various research domains.

The following are the top-funded projects by **national and international donors** during the last two years.

National Donors

Establishment of National Center in Big Data & Cloud Computing (NCBC)	Recruitment, training, deployment and continuous support to 1,000 education fellows in Gilgit-Baltistan	Ferozsons Initiative in Research Excellence for promoting Clinical and Translational Research	LUMS Energy Institute (LEI)
• Donor: Higher Education Commission (HEC) • Award Amount: PKR 1.5 Billion	• Donor: Government of Gilgit Baltistan • Award Amount: PKR 72 Million	• Donor: Ferozsons Laboratories • Award Amount: PKR 50 Million	• Donor: Multiple Donors • Award Amount: PKR 43 Million

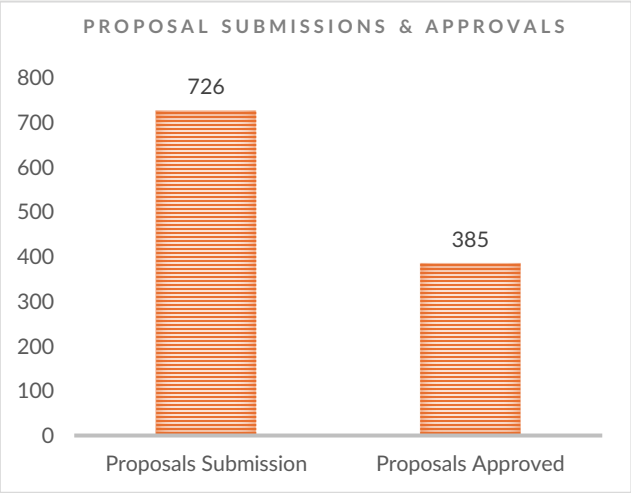
International Donors

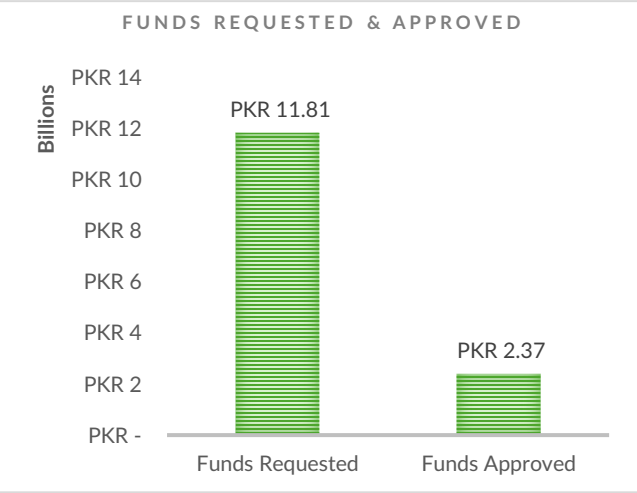
Low-Cost, Circular, plug & play, off grid Energy for Remote Locations including Hydrogen (LOCEL-H2)	Establishing E-Mobility R&D at LUMS, and Pilot Project in Secondary City	Recasting best prActices of euroPean universities during pandemic for Improving online eDucation in Pakistan HEIs (RAPID)	Tabeer (BIC Capacity Building Initiative)
• Donor: European Union • Award Amount: PKR 409 Million	• Donor: USAID • Award Amount: PKR 176 Million	• Donor: European Union • Award Amount: PKR 157 Million	• Donor: US Department of State • Award Amount: PKR 146 Million

Research Statistics

Submissions and Approvals

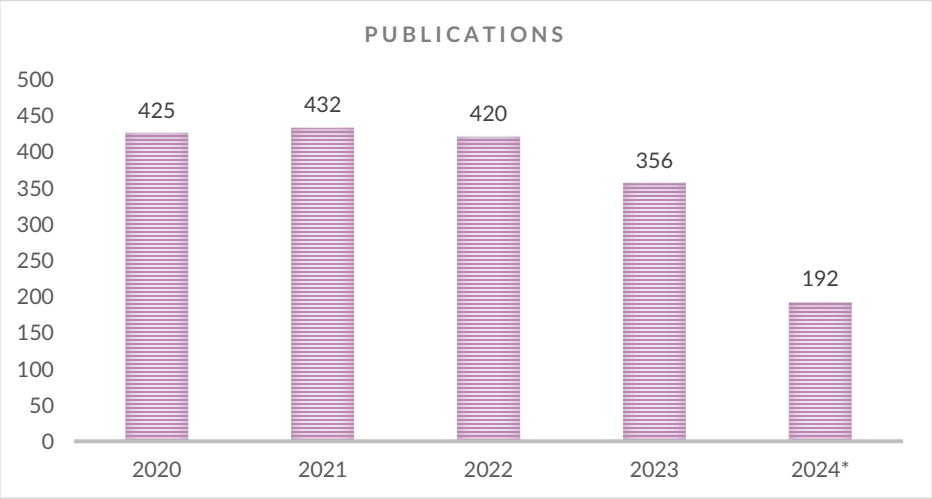
This section encompasses the latest submissions and approvals of the grants that OR has managed for the last two years, i.e., July 2022 - June 2024. Starting with the facts and figures, the following illustration depicts all grants submitted by OR and approved by the Sponsors.





Scopus Publications

The range of research activities and publications by the LUMS faculty is broad and profound. The graph below reflects the total unique publications authored by LUMS faculty in the last five calendar years (2020 to 2024). The research publications experienced growth, demonstrating a healthy trend during the period, which reflects the extensive research endeavours by the faculty over the years.



* 2024 data is from January to June 2024.

LUMS Funding Sources

LUMS aims to facilitate its faculty and students financially for their research endeavours. This section encompasses the internal funding sources managed by LUMS for the benefit of the LUMS community.

Faculty Initiative Fund (FIF)

LUMS provides internal funding opportunities to support research and development. The FIF offers competitive grants up to PKR 1,500,000 to LUMS faculty. These grants aim to facilitate innovative projects, benefiting the university and potentially leading to larger initiatives, new research endeavours, external funding opportunities, or creative works.

Faculty Travel Grant (FTG)

LUMS offers the Faculty Travel Grant (FTG) to support the research activities of its full-time regular faculty. The grant aims to encourage international travel and collaborations for faculty members to enhance their research endeavours.

Start-Up Grant (STG)

Start-up grants are the first grants given to full-time regular faculty; newly recruited on tenure track or as tenured faculty. These grants are awarded by the Deans of the respective schools.

Students as Co-Researchers (SCR)

The ScR programme supports undergraduate students as co-researchers. It promotes scholarly activities among students who have completed their junior year and are beginning their senior year. The programme encourages students to pursue their own research projects in collaboration with a LUMS faculty member. The funding provided can be utilised for summer research projects or SPROJs.

Sponsors


INTEGRATION


INTERLOOP


ICGEB


ICTD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IGC
International
Growth Centre


INTERNATIONAL RESEARCH NETWORK
FOR THE STUDY OF SCIENCE & BELIEF IN SOCIETY


J-PAL
ABDUL LATIF JAMEEL POVERTY ACTION LAB


ARANDAAZ


KE


LEARNING ALLIANCE


LSE
THE LONDON SCHOOL
OF ECONOMICS AND
POLITICAL SCIENCE


McGill
UNIVERSITY


MERIDIAN
INSTITUTE


Meta


NCGSA
NATIONAL CENTER OF GIS & SPACE APPLICATIONS


NCRA
NATIONAL CENTRE OF
ROBOTICS & AUTOMATION


NATIONAL
GEOGRAPHIC
.COM


NATIONAL UNIVERSITY OF SCIENCES & TECHNOLOGY
PAKISTAN


OXFAM


PACKAGES Limited


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PRIO
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PIDE
Pakistan Institute of Development Economics


QUAID-I-AZAM UNIVERSITY
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standard
chartered


SYED MARATIB ALI
RELIGIOUS &
CHARITABLE TRUST
SOCIETY


TEIN CC
COOPERATION CENTER


Transforming Energy Access
LEARNING PARTNERSHIP


UN
WOMEN


UNESCO


UNHCR
The UN Refugee Agency


USAID
UNITED STATES AGENCY INTERNATIONAL DEVELOPMENT


UNIVERSITAS BERGENSIS


2005
جامعة حائل
UNIVERSITY OF HAIL


TECHNISCHE UNIVERSITÄT
KAISERSLAUTERN


UNIVERSITY OF
OXFORD


University of
Reading


UNIVERSITY of
ROCHESTER


UNIVERSITÄT
DES
SAARLANDES


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XCELERIUM

AGRICULTURE

Dr. Hassan Jaleel
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
hassan.jaleel@lums.edu.pk

An Intelligent Tunnel Farm Management System

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

Pakistan's food scarcity problems are rising on average basis in Pakistan, although the farm tunnel systems are working in Pakistan due to multiple problems. Now, there is an intense need to promote an intelligent tunnel farm management system. This project aims to develop a system that can intelligently monitor environmental factors like humidity and temperature. An AI software is generated in this system that aims to raise the yield through continual monitoring. And to add multiple tunnel nodes at different levels. This helps in increasing productivity and reducing poverty and the scarcity of food.

Dr. Khurram Bashir
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
khurram.bashir@lums.edu.pk

Mineral-Enriched Crops to Improve Human Nutrition and Strengthen Food Security

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

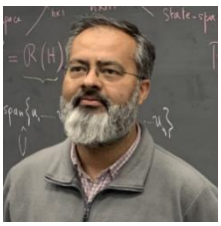
This project proposes to screen rice varieties based on higher Fe & Zn accumulation and reduced levels of arsenic to improve human health and strengthen food security. A phenotypic screening system has been developed, and the local variety lines based on parameters like leaf color, plant height, and mineral contents in the leaf tissue will be screened. Moreover, the expression of genes regulated by mineral contents will be monitored. Selecting crop plants based on mineral content could improve plant growth and human health. This project has the potential to identify rice varieties with better and healthier nutritional value and growth potential. This screening approach could be applied to other staple crops to enhance their overall production, thereby improving the health of millions of people in Pakistan, particularly children and women living below the poverty line.

Development of Climate-Smart Cotton by Editing Arginase (Gharg) Genes Using Genome Editing (CRISPR/Cas) Tools

Sponsor: HEC
Funding Amount: PKR 430,500
Project Initiated in: 2022

This project uses a special gene-editing tool called CRISPR to change certain genes (called GhArg) in cotton plants. The aim is to help cotton grow better in tough conditions like heat, drought, and salty soil. These changes can also help the plants use less water and fertilizer. As a result, cotton will grow more, be of better quality, and survive harsh weather. This helps farmers and supports a stronger, more sustainable cotton industry.

Dr. Muhammad Abubakr
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
abubakr@lums.edu.pk



NCRA Agricultural Robotics Lab

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 100,888,000
Project Initiated in: 2018

The proposed lab aims to set up a state-of-the-art national precision agriculture facility, focusing on agricultural robotics and automation, and a clear path from scientific problem-solving to technology roll-out for each theme. Moreover, the project proposes technological advancements that fall under the general philosophy of assistive technologies that respect the human labor-automation dynamics in our current society and may gain easier acceptance over fully autonomous solutions.

Planning, Installation, Testing, and Commissioning of IoT Soil Moisture Sensors as Part of NRSP Karandaaz Project at Amanpur Village, UC Tarap, Tehsil Jand, District Attock, Punjab, Pakistan, Under Innovation Challenge Fund-Green-Karandaaz

Sponsor: Karandaaz Pakistan
Funding Amount: PKR 2,570,000
Project Initiated in: 2023

This project focuses on solving irrigation problems by using smart farming technology. It aims to develop soil moisture sensors that check how wet the soil is in real time. This helps farmers water their crops only when needed. It also includes an automatic weather station that tracks local weather changes. Based on this data, water pumps can work more efficiently. The project is part of WIT, which uses technology to improve water use. It also involves the Agricultural Robotics Lab, which works on farming robots and automation.

Improving Canal Irrigation Management through Remote Sensing-Based Decision Support Tool

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2021

This project aims to develop a remote sensing-based decision support tool to improve canal irrigation management in Pakistan. The tool utilizes satellite data and geographic information systems (GIS) to monitor water distribution, detect anomalies, and provide actionable insights to canal managers. The consultant of the project is responsible for conducting a thorough review of existing canal irrigation management systems and identifying areas for improvement. The aim is to collaborate with stakeholders to design and develop the decision support tool, incorporating their requirements and feedback. It enables managers to optimize water allocation, reduce waste, and improve crop yields, ultimately enhancing the efficiency and equity of canal irrigation systems. This project also supports the sustainable development of Pakistan's agriculture sector, improves water productivity, and benefits farmers and communities reliant on canal irrigation.

Dr. Muhammad Adeel Ahmed Pasha
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
adeel.pasha@lums.edu.pk

SAIFeR: Soil Analytics and Intelligent Fertilizer Recommendation Using Custom Instrumentation and Artificial Intelligence

Sponsor: LUMS
Funding Amount: PKR 1,380,000
Project Initiated in: 2024

This research project aims to develop an embedded intelligent fertilizer recommendation system based on soil analytics to optimize the production of crops. It will be a user-friendly and cost-effective portable embedded device that will help local farmers and modern agricultural farms make more informed decisions about the application of fertilizers in their respective crops. This research initiative will promote collaboration between academia and agricultural experts, including farmers, which will eventually facilitate their adoption of modern tools and techniques in modern-day agriculture. In the long run, this research project will contribute to the sustainable development of agriculture in Pakistan and beyond, addressing the challenges of economic growth, food security, and environmental sustainability.
Additionally, it will provide real-time insights to farmers, enabling them to reduce fertilizer wastage and minimize environmental harm. By integrating advanced AI technologies with practical agricultural solutions, the project aims to revolutionize farming practices, making them more efficient and eco-friendlier.

Dr. Muhammad Zaheer
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
muhammad.zaheer@lums.edu.pk

Valorization of Crop Residues into Value-Added Chemical Products: Process Development and Techno-Economic Analysis

Sponsor: HEC
Funding Amount: PKR 14,388,000
Project Initiated in: 2023

Carbon is in demand in this era. A new method of taking carbon from crop residues is proposed in this project. The project develops innovative approaches to convert crop residues into valuable chemical products. It helps in reducing waste and generates renewable biochemicals. The project aims to develop catalytic methods for obtaining chemical products. It also seeks to introduce an industrial-scale bench-scale process to estimate the amount of waste and its environmental hazards. It creates a sustainable process in which renewable chemicals are produced for energy and other value-added products.

Dr. Nauman Zafar Butt
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
nauman.butt@lums.edu.pk

Field-Validated Food Energy Water Models for Agrivoltaic Systems

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This project focuses on developing food-energy models and validating them through field experiments at a newly established Agrivoltaic (AV) testbed in Pakistan. The goal is to assess AV technology's potential for local climate conditions and crops, addressing energy, food, water, and climate challenges in the country. The main aims of this project are to develop and calibrate agrivoltaic food-energy production models. The detailed characterization of the soil moisture/temperature and microclimate conditions under the solar panels using an IoT-based sensor network. It will also help to benchmark the performance metrics, including dual food-energy production, water saving, and stress mitigation on selected crops. This study will provide a critically needed estimation of the AV potential for Pakistan and propose optimal system configurations for larger field experiments. The project's focus on local manufacturing, indigenous design, and materials will also facilitate Pakistan's economic development.

Dr. Talha Manzoor
Assistant Professor
talha.manzoor@lums.edu.pk

Integrating Remote Sensing and In-Situ Sensor Data for Reliable Irrigation Decision Support in Smart Farming

Sponsor: LUMS
Funding Amount: PKR 996,000
Project Initiated in: 2022

The project aims to revolutionize the hydrologic monitoring systems in Pakistan by leveraging cutting-edge computational and statistical methods. This project represents a crucial step towards bridging the gap between indigenous tools and global satellite data, ensuring more accurate and reliable irrigation decision support in the face of rapidly changing climatic conditions. By integrating remote sensing and in-situ sensor data, the project seeks to enhance the precision and efficiency of smart farming practices, empowering farmers with timely and informed irrigation management strategies. Through this transformative initiative, the project team envisions a sustainable and resilient agricultural sector that can adapt to the challenges posed by a changing climate and secure food production for the future.

Dr. Zaigham Shahzad
Syed Babar Ali School of Science and Engineering (SBASSE)
Associate Professor
zaigham.shahzad@lums.edu.pk

Development of Production Technology of a High-Yielding Soybean Genotype for Fertile and Salt-Affected Areas

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

The research identifies a high-yielding soybean variety and develops suitable production technology for various soils in Pakistan. The main tasks of this research include evaluating the LUMS-5 soybean line's yield at different planting dates, optimizing inputs like seed rate and fertilizer application, and determining the best dose and timing for thiourea under abiotic stress. This project significantly enhances domestic soybean production and reduces the import bill for soybean-based poultry meal. The high yield of LUMS-5 (over 2,000 kg per acre) promises substantial economic benefits for farmers. This project addresses salinity issues affecting over 6.3 million hectares of Pakistani farmland, promoting sustainable soybean cultivation. Furthermore, it supports the diversification of cropping systems, improving soil health and farm resilience in the face of climate change. By leveraging advanced agronomic practices, this initiative paves the way for large-scale adoption of soybean cultivation, transforming it into a viable and profitable crop for farmers in both fertile and salt-affected regions.

Dr. Khurram Bashir
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
khurram.bashir@lums.edu.pk

Screening Synthetic Siderophores for Improved Plant Growth and Human Nutrition

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

Synthesizing cheap, stable, and environmentally friendly Fe chelators (Siderophores) is crucial for improving mineral uptake from soil. This emerging research area is important; however, screening large chemical libraries to identify novel chemicals for improving plant nutrition is challenging. It's laborious, costly, and less efficient. Moreover, manually recording large data sets can lead to human error, making it harder to identify desirable characteristics. This project aims to improve plants' ability to extract more Fe from soil, which can have two benefits. First, it can enhance plant health. Second, it can provide Fe-enriched cereals to humans. To achieve this, we can use organic siderophores. These natural compounds can improve Fe extraction from soil. The proposed project is timely and would significantly contribute to the strengthening of sustainable agricultural technologies.

Regulating NAD Salvage Pathway in Cotton for Drought Stress Tolerance

Sponsor: HEC
Funding Amount: PKR 10,416,000
Project Initiated in: 2023

Cotton production is very crucial for Pakistan at this time, when Pakistan is on the verge of default. A process called the NAD salvage pathway is introduced in this project, which is created within an organism or any plant, like cotton. It helps prevent plants from shrinking in drought or intense weather conditions. This project aims to develop drought-tolerant cotton crop varieties. Create water-efficient cotton crop varieties. And to use genetic and molecular approaches to improve cotton crop production. It helps in the development of many cost-free plants that can tolerate weather conditions and could contribute to the national economy and farmer income. In addition to supporting economic stability, this initiative also addresses the critical issue of water scarcity by promoting sustainable agricultural practices. By enhancing the resilience of cotton plants to climatic stresses, the project aims to secure consistent yields and reduce dependency on external resources. Furthermore, the application of advanced biotechnological techniques in this research sets the foundation for future innovations in crop improvement, ensuring long-term food and fiber security for the region.

Agronomy

Dr. Rahman Shah Zaib Saleem
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
rahman.saleem@lums.edu.pk

Improving Iron Uptake in Plants to Improve Plant Health and Human Nutrition

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

To enhance food security and combat malnutrition through the synthesis of organic siderophores at LUMS, which improve iron intake in plants. The research involves interdisciplinary collaboration and provides in-house examples for educational purposes. Developing environmentally friendly fertilizers helps local agriculture. Successful completion makes LUMS a regional leader in sustainable agriculture and creates significant industry links for further development. This initiative is aligned with SDG2 by promoting sustainable agriculture and improved nutrition.

Development of Novel Organic Siderophores to Improve Plant Growth and Human Health

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

A large portion of the population suffers from nutrient deficiency, such as Iron (Fe) and Zinc (Zn), despite consuming a calorie-rich diet. Although Fe is present in mineral soils, its uptake by plants is not possible as alkaline soil reduces its solubility, and acidic soil causes its toxicity. Some plants get iron by secreting Phyto siderophores that make Fe soluble, but these products are not environmentally friendly. This project aims to develop economical, stable, and environmentally friendly siderophores and to evaluate their ability to improve plant growth in Fe-deficient conditions. This project would allow the development of synthetic fertilizers containing siderophores that would improve crop yield. Moreover, the use of these innovative siderophores can enhance the nutritional quality of food crops, contributing to the reduction of micronutrient deficiencies in human populations. By promoting sustainable agricultural practices, the project has the potential to minimize environmental degradation while addressing global food security challenges. Additionally, it will open avenues for further research on eco-friendly agricultural inputs, paving the way for greener and more productive farming systems.

Dr. Zaigham Shahzad
Syed Babar Ali School of Science and Engineering (SBASSE)
Associate Professor
zaigham.shahzad@lums.edu.pk

Optimizing Root System Architecture to Improve Phosphorus Use Efficiency in Rice

Sponsor: International Centre for Genetic Engineering and Biotechnology
Funding Amount: PKR 18,299,281
Project Initiated in: 2023

Rice is an important source of calories for billions of people across the world. Current rice production strategies rely heavily on phosphorus (P) fertilization; however, this practice is not sustainable due to the expected exhaustion of P resources and harmful environmental impacts of P fertilization, such as eutrophication. Therefore, rice varieties with improved P-use efficiency are becoming a prerequisite to improve yields and reduce environmental impacts. In this regard, plants with topsoil foraging root systems and a high capacity to solubilize soil P are suggested to be ideal. A large variation in root growth under P-deficient environments exists between rice varieties. However, the genetic basis of such variation remains unclear. Here, using a candidate gene approach coupled with untargeted association genetics, this research aims to uncover genetic mechanisms controlling root adaptation to P deficiency in rice. This research establishes a mechanistic framework for improving phosphorus use efficiency in crops.

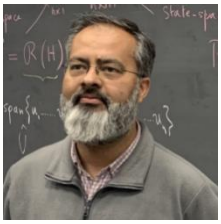
A Candidate Gene Approach to Improve Phosphate Use Efficiency in Rice

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

Rice is an important cash crop that requires Phosphorus for its cultivation. Phosphorus is important for proper root development of the plant, and it is provided via fertilizers. However, very little phosphorus in fertilizers is available for plants, thus causing nutrient deficiency and poor yield. This project aims to study and disclose the molecular and biological pathways linking the phosphorus content of the soil with root development and to study in detail the genetic signals that would improve the P efficiency of the soil. The project will also deliver comprehensive and reliable information on how P availability influences the performance of important crops that will impact policymakers committed to optimizing Pakistan's food strategies

Water Informatics

Dr. Muhammad Abubakr
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
abubakr@lums.edu.pk



AMS-HyRes (Autonomous Mobile Sensors for Hyper-Resolution Hydrology)

Sponsor: University of Kaiserslautern
Funding Amount: PKR 10,008,574
Project Initiated in: 2021

River basins around the world are facing rapid, large-scale environmental changes brought about by natural forces that have been unleashed by climate change. The impact of these changes is felt the most in the water sector, in poor management of irrigation networks, depleting groundwater, deterioration in water quality, poor sanitation, and difficulties in the preservation of ecosystems. Difficulties in the collection of water samples from remote or inaccessible locations and the challenges in the continued structural monitoring of resources have prompted the need to propose robotic sensing solutions. This study aims to develop and deploy semi-autonomous sensor floats that can produce surveys of water channels using standard techniques of simultaneous mapping and localization. A framework to incorporate the robotic surveys into hydrodynamic models for increasing the temporal and spatial resolution of existing surface hydrology models will be set up.

Dr. Talha Manzoor
Syed Babar Ali School of Science and Engineering (SBASSE)
Assistant Professor
talha.manzoor@lums.edu.pk

UAV-Borne Bathymetry for Water Quantification in Small Reservoirs

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This research focuses on measuring water availability in small water bodies with unstructured catchments, particularly in the Potohar region, using bathymetry studies. The goal is to accurately estimate stored water volume in these reservoirs to optimize their operation and mitigate flood risks. By employing UAV-based LiDAR technology, the study aims to provide critical information for effective water management and enhance the capacity of the local industry in water sector solutions.

BUSINESS & ECONOMY

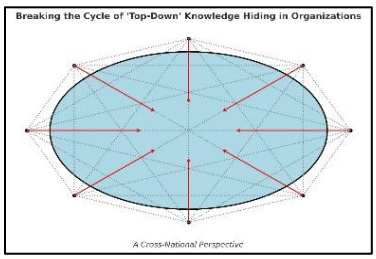
Ms. Angbeen Atif
Shaikh Ahmad Hassan School of Law (SAHSOL)
Assistant Professor
angbeen.mirza@lums.edu.pk

Alternative Dispute Resolution (ADR) in 8 districts of Sindh

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

This project includes reviewing and finalizing a customized training manual on ADR and court-annexed ADR frameworks, conflict resolution, and consensus-building skills, with pre- and post-training assessment forms for paralegals' training. It also covers delivering in-person training to a total of 192 paralegals/ attendees in six batches (30-36 participants per training) through a 2-day training, imparted at divisional ranges of Sukkur, Hyderabad, and Karachi. Moreover, it caters to reviewing and finalizing customized training manuals/material for refresher training on ADR and court-annexed ADR frameworks, conflict resolution, and consensus-building skills, with pre- and post-training assessment forms for paralegals' training.

Dr. Ghulam Ali Arain
Suleman Dawood School of Business (SDSB)
Associate Professor
ghulam.arain@lums.edu.pk



Breaking the Cycle of 'Top-Down' Knowledge Hiding in Organizations: A Cross-National Perspective

Sponsor: LUMS
Funding Amount: PKR 1,260,000
Project Initiated in: 2024

This research aims to develop a practical model for breaking the cycle of "top-down" knowledge hiding, i.e., leader knowledge hiding from subordinates (LKHS), in Pakistani organizations. It will determine the factors influencing subordinates' perceptions of this behavior and whether they choose to emulate it or engage in knowledge-sharing with coworkers. The study will use quantitative research methods, collecting data from business organizations in Pakistan and a diversified sample from the West. The research findings will be used to develop academic and practitioner-focused strategies for breaking the cycle of LKHS in business organizations operating in Pakistan as well as globally. Additionally, these results will be helpful for policymakers to shape knowledge-sharing policies aligned with Vision 2030.

Dr. Ilyas Ahmad Chattha
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
ilyas.chattha@lums.edu.pk

The Legacies of Economic Inequality: Evidence from Pakistan

Sponsor: University of Rochester
Funding Amount: PKR 9,402,943
Project Initiated in: 2023

This project examines the long-term effects of economic inequality in Pakistan, leveraging a natural experiment in colonial land distribution policies. Between 1880 and 1930, the British government opened desert areas to settlement through irrigation canals, creating a "tabula rasa" for colonial policy. The project aims to examine the relationship between land policy and post-independence economic growth, public goods provision, and voting for landlord politicians. And to investigate how historical policies have shaped contemporary economic inequality in Pakistan. Exploring this natural experiment provides empirical evidence of the enduring legacies of economic inequality, shedding light on the complex relationships between colonial policies, economic development, and political dynamics in Pakistan. The findings will contribute to a deeper understanding of the historical roots of economic inequality and inform policies to address these disparities.

Dr. Muhammad Ghufran Ahmad
Suleman Dawood School of Business (SDSB)
Associate Professor
ghufran.ahmad@lums.edu.pk

Consultancy Services for HBL Cultural Transformation

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

This project includes conducting relevant research into people's behaviors (local and International, regional) customized to the local environment. It also covers Ethical Culture Gap Analysis and Root Causes Analysis (RCA) of unethical conduct (covering all categories as per Ethics and Conduct KPIs) in terms of the key areas mentioned in the project scope. The project aims to identify underlying behavioral patterns and systemic factors contributing to gaps in ethical practices. It also includes the development of actionable recommendations tailored to strengthen ethical culture and alignment with organizational values. This comprehensive approach ensures the proposed solutions are both practical and sustainable for long-term impact.

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

What Makes the Family Tick: The Influence of Family Attitude, Family Instrumental and Emotional Support on 'Business Performance' and 'Intention to Quit' amongst Pakistani Women Entrepreneurs

Sponsor: LUMS
Funding Amount: PKR 655,000
Project Initiated in: 2022

The study examines family-related factors by dividing them into a gender-specific component (family attitudes toward the image of women) and an entrepreneur-specific component (family attitudes toward entrepreneurship). Online questionnaires were used to gather data from 300 entrepreneurs from Lahore, Karachi, Islamabad, and Peshawar to target a mix of cultures and ideas regarding the topic. This study is designed to offer tremendous assistance in developing a full-fledged course on women-led entrepreneurship at the university level, eventually leading to the launch of a minor in Entrepreneurship at SDSB. Furthermore, this study is offering a practical approach with an evidence-based assessment of how to enhance the scale and scope of women's entrepreneurship in Pakistan. The findings of this study highlight the familial challenges/support faced by women entrepreneurs in Pakistan and will assist social institutes and policymakers in developing a more practical and supportive credit policy for female-led micro-enterprises and small businesses in the years to come. The insights from this study also aim to inspire targeted training programs that address the unique needs of women entrepreneurs, fostering their leadership and managerial capabilities. By shedding light on the interplay between family dynamics and entrepreneurial success, the research encourages a cultural shift toward more inclusive and supportive family environments. This can ultimately contribute to enhancing the economic contributions of women entrepreneurs, bridging gender gaps in business, and promoting sustainable economic growth in Pakistan.

Dr. Asim Karim
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
akarim@lums.edu.pk

Integra: Capacity Building in Higher Education

Sponsor: Harokopio University of Athens
Funding Amount: PKR 17,623,809
Project Initiated in: 2020

INTEGRA aims to respond to the limited participation of young refugees from conflict-affected countries in the higher education system of India & Pakistan by introducing an innovative methodology that allows them to overcome the obstacles they currently face. This is accomplished by combining a short-term ICT course for youth with migrant backgrounds, based on the expectations of the ICT labor market in these countries, along with the establishment of 4 psychosocial support structures that can provide personalized psychosocial support. By bringing young refugees closer to the higher education system in India and Pakistan, the ambition of the project is to facilitate their full integration in these countries by attending higher education courses and/or by entering the labor market and especially the ICT sector, which is one of the main economic activities in this Region.

Dr. Faiza Ali
Suleman Dawood School of Business (SDSB)
Associate Professor
faiza.ali@lums.edu.pk

Transforming Academic Knowledge to Develop Entrepreneurial Universities in Pakistan

Sponsor: University of Saarland
Funding Amount: PKR 21,770,351
Project Initiated in: 2020

This project focuses on the capacity building of (associated) staff members of BICs, as these play a crucial role in the motivation, development, and sustainability of business ideas at the HEIs and equip universities with the necessary tools to facilitate the work of incubation centers. Activities in the project are designed in a way that a holistic approach is taken to create a broad understanding of being an entrepreneurial university, so that the capacity-building effort has a sustainable effect on the institutions themselves. By fostering collaboration between academia, industry, and government, the project aims to create a thriving entrepreneurial ecosystem that drives innovation and economic growth. It also emphasizes the importance of integrating entrepreneurial education into university curricula, encouraging students and faculty to think beyond traditional academic boundaries. Ultimately, this initiative aspires to position Pakistani universities as hubs of innovation and entrepreneurship, contributing to the nation's economic development and global competitiveness.

Capacity Building

Dr. Muhammad Fareed Zaffar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
fareed.zaffar@lums.edu.pk

Public Financial Management Support Programme II (PFM-II)

Sponsor: Oxford Policy Management
Funding Amount: PKR 5,292,000
Project Initiated in: 2023

This project aims to design and develop a database to house all available soft data of statistical supplement for the EAW, import all clean available data to the new database, develop user-friendly data entry modules for future data entry against indicators defined in statistical supplement, embed the governance structure to enable profile based access to the data to meet the internal functional requirement of the EAW, develop an interactive and professional website to support users to download customized datasets from the central database, and provide analytical and visualization tools and dashboards and organize the website pages to allow ready access to statistical supplement datasets and links to other data sources.

Dr. Qandeel Almas
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
qandeel.almas@lums.edu.pk

Feasibility Studies for the Establishment of a Research and Development (R&D) Centre

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

The project aims to explore the viability of setting up a Research and Development (R&D) center. The project seeks to conduct comprehensive feasibility studies, assessing the technical, financial, and operational aspects of establishing an R&D center, which helps to develop innovative products, improve manufacturing processes, and stay competitive in the global market. The importance of this project lies in its potential to drive innovation, enhance product quality, and increase exports, ultimately contributing to the growth of the textile industry in Pakistan. By establishing an R&D center, the initiative can create new job opportunities, foster collaboration with academia and industry partners, and contribute to the development of a knowledge-based economy in the region.

Dr. Muhammad Ghufran Ahmad
Suleman Dawood School of Business (SDSB)
Associate Professor
ghufran.ahmad@lums.edu.pk

Characteristics of Successful Young Entrepreneurs in Pakistan

Sponsor: LUMS
Funding Amount: PKR 720,000
Project Initiated in: 2022

Being successful has been associated with several personal characteristics according to the literature. All personal characteristics are studied individually, but in real life, certain characteristics do not perform individually; rather, they may be associated with each other. This project aims to study the characteristics such as leadership, and its every aspect, and to check whether every component of leadership works individually, or all elements are interlinked. This project would be interview-based and would get data from the most experienced entrepreneurs who talked about the challenges and qualities by which they tackle them. This research will provide useful information to young entrepreneurs for their business world and to students to learn. This research can be used further to extract case studies and as material for a new course. It will further lead to a wide range of research.

Dr. Kashif Zaheer Malik
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
kashif.malik@lums.edu.pk

Study on Sugar Consumption in Pakistan

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

The study includes cross-product sugar-content research which compares the sugar contents in other products/industries such as bakery and sweets, dairy products, cereals, biscuits, savory foods, and other processed foods thus making the policymakers aware of the potential of not achieving their stated objective of promoting a sugar-free diet in Pakistan by imposing a discriminatory additional tax on the beverages industry. It also takes a multi-faceted approach by combining the Socio-Economic Impact Assessment Framework with primary on-field data. Under the broad categories of input, activity, output, and outcome, the framework's objective was to capture the impact of a potential increase in taxes on economic variables such as income, tax revenues, and employment. Such an evaluation provides a bigger picture of how additional taxation impacts socio-economic outcomes in the industry. The research also caters to a cross-country comparison in terms of taxes imposed on items with high sugar content. The idea is to make a case for lower taxation by presenting evidence from other countries' experiences.

Data Analysis

Dr. Misbah Tanveer Choudhry
Suleman Dawood School of Business (SDSB)
Assistant Professor
misbah.tanveer@lums.edu.pk

Impact of COVID on Youth Labor Markets: An Empirical Estimation

Sponsor: LUMS
Funding Amount: PKR 830,000
Project Initiated in: 2023

The COVID-19 pandemic has dramatically impacted labor markets, although the full extent is not yet clear due to limited data. Youth unemployment has been particularly affected, with rates already 2.5 times higher than adult workers before the pandemic. This project aims to study the effects of the pandemic on youth labor markets. The project is to analyze how youth labor market indicators have changed and identify any significant shifts. And to examine the relationships between these indicators and key factors affecting youth and total labor markets. This project has three main aims. First, to study how COVID-19 affected youth labor market indicators. Second, to look at how the impact varied by gender and economic development (developed, developing, and emerging economies). Third, targeted policies should be suggested to help young workers and female workers who were hurt by the pandemic. In the future, it will advise policymakers and relevant departments on improving the market outcomes for the marginalized segments of society. By providing empirical evidence on the challenges faced by young workers, this research aims to highlight structural gaps in labor markets and recommend actionable solutions. Additionally, it seeks to explore how digital transformations and remote work trends triggered by the pandemic might offer opportunities for youth employment. The project's findings will contribute to the design of inclusive economic recovery plans, ensuring that young workers, particularly women, are not left behind in post-pandemic labor market reforms.

Dr. Ali Cheema
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
cheema@lums.edu.pk

LSE/Uchicago/LUMS Pre-Doctoral Research Associate in Environmental Economics

Sponsor: London School of Economics & Political Science
Funding Amount: PKR 539,375
Project Initiated in: 2021

This project aims to recognize the research potential through engagement with the government in Pakistan while seeking to capitalize on the opportunity by creating an established position for the future to attract top talent to work on our various projects for 1-2 years. LUMS, being the top university in Pakistan, is the natural base for recruiting and housing these pre-docs. Because this is a cross-cutting role, covering many projects, it makes more sense for this role to be housed inside a university setting rather than other research centers like CERP.

Dr. Faiza Ali
Suleman Dawood School of Business (SDSB)
Associate Professor
faiza.ali@lums.edu.pk

Asian Management Research & Case Conference (AMRC)

Sponsor: Consortium
Funding Amount: PKR 2,584,424
Project Initiated in: 2024

This grant has multiple sources of funding, and it is used to organize the annual Asian Management Research & Case Conference (AMRC). The PI for this grant is SDSB's Associate Dean of Research & Scholarship, and the Research Unit, SDSB, assists the Associate Dean for this purpose. The AMRC provides a unique platform for scholars, practitioners, and policymakers from across Asia to share insights, present research, and discuss emerging trends in management and business practices. The conference promotes collaboration between academia and industry, fostering innovative solutions to regional challenges. Additionally, it serves as a hub for developing high-quality case studies, enhancing the teaching and learning experience in business education throughout Asia.

Economic Development

Dr. Farah Said
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
farah_said@lums.edu.pk

State Reform, Land Rights, and Rural Livelihoods in Pakistan

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 34,689,728
Project Initiated in: 2024

This project involves evaluating the productivity and welfare impacts of a state-led reform to partition jointly held familial agricultural land holdings and improve individual land right security in Punjab, Pakistan. By giving individuals clear ownership of their land, it aims to reduce conflicts within families and make it easier for people to get loans and invest in their land. This change could especially help women, who often don't get their fair share of land due to traditional rules. The government wants to know if this initiative works well before expanding it across the province. To study its effects, researchers will look at three districts where the initiative is being tested. They'll use data from surveys, government records, and satellite images to see how it affects productivity and people's lives, especially for women. The government is interested in this research to see if the initiative is effective. This project fits with the IGC's (International Growth Centre) focus on understanding how government programs can make a big difference in people's lives, especially for women.

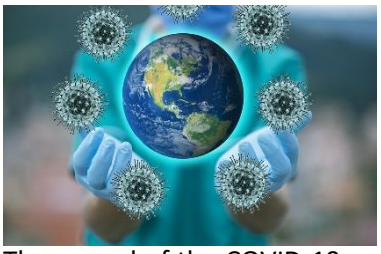
Dr. Hadia Majid
Mushtaq Ahmad Gurmani School of Humanities & Social Sciences (MGSHSS)
Associate Professor
hadia.majid@lums.edu.pk

Measuring the Impact of Mobile Wallets on Low-Income Women's Economic Empowerment in Pakistan.

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This project proposes to measure the impact of access to mobile wallets on the economic and non-financial indicators of the well-being of low-income female borrowers. This project aims to measure whether the use of mobile wallets and technology has facilitated other aspects of the lives of women, like decision-making, privacy, and increased opportunities. The project measures the affordances of digital technologies as being used to link women to markets, raise incomes, reduce poverty, and facilitate women's greater control over their earnings and savings. This research will help in expanding understanding around processes of empowerment, as well as whether and how these are impacted using technology. This will explore in depth, using qualitative data, the specific pathways to empowerment in our context, and the specific ways in which technology alleviates specific contexts.

Dr. Jawad Syed
Suleman Dawood School of Business (SDSB)
Professor
jawad.syed@lums.edu.pk



Impact of COVID-19 on Women's Employment and Work-Life Balance

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

The spread of the COVID-19 pandemic continues to affect the lives and livelihoods of people around the world. Women who were already doing most unpaid care work at home before COVID are the most affected ones after this pandemic in terms of economy, social protection, and employment. Also, government policies lack women's representation in decision-making bodies. This research aims to identify problems faced by women after the pandemic, to document stories of women who dealt with them successfully, and to improve policies to reduce these difficulties. Through this project, the lack of government policies will be addressed, and gender-based employment issues and others will be resolved.

Dr. Kashif Zaheer Malik
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
kashif.malik@lums.edu.pk

Providing Affordable Housing for Low-income Households Using Shared Ownership Contracts

Sponsor: LUMS | International Growth Centre (IGC) | Higher Education Commission (HEC)
Funding Amount: PKR 1,000,000 | PKR 4,034,940 | PKR 5,193,500
Project Initiated in: 2019 | 2021| 2022

Providing innovative solutions to the shortage of affordable housing for the poorest members of society is a critical policy challenge in many countries, especially in Pakistan. This project ultimately aims to develop an innovative housing finance product, based on the principles of ownership and risk sharing in Islamic finance, and in collaboration with one of the largest and fastest-growing microfinance institutions in Pakistan, Akhuwat. The project intends to provide low-income households with financing amounts in the region of PKR 500,000–800,000, which they will be permitted to use for one of the two purposes: construction of a new house and renovation or extension of an existing house. This study served as an initial exploratory pilot.

Economic Development

Equity-Based Microfinance Contracts for Microenterprises

Sponsor: University of Oxford | LUMS
Funding Amount: PKR 6,883,962 |PKR 960,000
Project Initiated in: 2016 | 2021

The proposed project intends to focus specifically on micro-entrepreneurs in services and help them set up a business. The goal is to offer equity-based financing to ten different types of services where people have certain skill sets, but they need capital to set up or expand their businesses. An exploratory field experiment is implemented using a randomized controlled trial (RCT) to conduct detailed baseline and follow-up surveys and investigate the success of this intervention and the impact on a range of different business and household outcomes for the entrepreneurs.

Research on Ascertaining Tax Evasion in the Tobacco Industry

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

The tobacco industry of Pakistan is nearly 80-83 billion sticks, and it includes legitimate and illicit sectors. The legitimate tobacco industry of Pakistan contributes 97% of the total tax revenue collected from the tobacco sector in Pakistan, whereas the illicit tobacco sector comprises three types: (a) local tax-evaded brands, (b) smuggled brands, and (c) counterfeit brands. This project aims to research to ascertain the shift of consumption from legitimate cigarette brands to illicit cigarette brands due to an increase in Federal Excise Duty, further impacting Government Revenue and Public Health Agenda. This allows for checking the extent of illicit drugs and implementing regulatory reforms to decrease the financial impact of illicit trade.

Micro-Equity for Microenterprises in the Services Sector

Sponsor: LUMS
Funding Amount: PKR 960,000
Project Initiated in: 2021

This project aims to evaluate lease-based microfinancing, specifically equity-based contracts, as an alternative to traditional debt and savings-based approaches for supporting microenterprises in the services sector. It focuses on providing capital to individuals with specific skills who need financing to start or expand their businesses. The project will be implemented through a randomized controlled trial involving a pilot study of 60 enterprises, divided into equity-based financing, debt-based financing, and a control group. The intervention includes baseline, quarterly follow-up, and endline surveys to assess business and household outcomes. The goal is to test whether equity-based financing can offer a more flexible and effective model for promoting entrepreneurship and economic growth in the services sector.

Dr. Mariam Chughtai
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Assistant Professor
mariam.chugtai@lums.edu.pk

LUMS - Harvard Collaboration for Projects in Pakistan

Sponsor: Ferozsons Laboratories
Funding Amount: PKR 14,000,000
Project Initiated in: 2017

The LUMS-Harvard Collaboration for Projects in Pakistan is a strategic partnership between Lahore University of Management Sciences (LUMS) and Harvard University. It is aimed at driving economic growth, social progress, and sustainable development in Pakistan. This collaboration brings together the academic excellence and research expertise of both institutions to tackle complex challenges and create a meaningful impact in the region. Through joint research initiatives and knowledge exchange, the partnership seeks to foster innovative solutions to Pakistan's economic challenges. It strengthens the capacity of Pakistani institutions and individuals and enhances knowledge sharing and exchange between the two institutions. This collaboration has the potential to drive meaningful change in Pakistan. It is expected to yield innovative solutions, sustainable impact, and a strengthened capacity for growth and development in the region.

Dr. Misbah Tanveer Choudhry
Suleman Dawood School of Business (SDSB)
Assistant Professor
misbah.tanveer@lums.edu.pk

Impact Assessment of TDAP Women Development Program on Technology Adoption in Female Entrepreneurs

Sponsor: Pakistan Institute of Development Economics (PIDE)
Funding Amount: PKR 3,000,000
Project Initiated in: 2024

This project aims to conduct an impact assessment of the TDAP Women Development Program on Technology Adoption in Female Entrepreneurs. The adoption of information communication and digital technology is increasingly being considered an enabler for women entrepreneurs in building personal and firm capabilities and improving access to the markets. Women's participation in entrepreneurship in Pakistan is low due to the challenging socio-cultural and institutional context of the region. Technology and its adoption offer promising potential for women entrepreneurs to grow and scale their businesses. The project seeks to assess the impact of the TDAP women entrepreneurs training program, addressing gaps in digital literacy training and capacity building. It aims to propose specific public policies that promote professional development opportunities to support women's economic empowerment. Through an exploratory qualitative study employing semi-structured interviews, the project intends to gather rich contextual insights into women entrepreneurs' experiences with technology adoption.

Prof. Nauman Ahmad Zaffar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
nauman.zaffar@lums.edu.pk

Tabeer (BIC Capacity Building Initiative)

Sponsor: US Department of State
Funding Amount: PKR 146,114,900
Project Initiated in: 2023

The Tabeer Program focuses on boosting the capabilities of business incubation centers (BICs) in Punjab through various capacity-building measures. Given Pakistan's economic challenges and high unemployment, BICs are vital for fostering entrepreneurial growth and innovation. The program offers training, community-based project design, a customized training framework, and long-term capacity building to empower BICs and support a sustainable entrepreneurial ecosystem. By partnering with strategic allies and international collaborators, Tabeer addresses the specific challenges faced by BICs and promotes entrepreneurship as a driver of economic development. These efforts aim to establish self-sustaining business centers that empower entrepreneurs and meet local needs, thereby contributing to the region's economic growth and prosperity.

Dr. Naveed Arshad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveedarshad@lums.edu.pk

Establishment of the National Centre in Big Data & Cloud Computing (NCBC)

Sponsor: HEC
Funding Amount: PKR 1,534,079,000
Project Initiated in: 2018

NCBC has diligently crafted a robust sustainability plan, as most of its labs have secured funding not only from non-PSDP sources but also from industrial partnerships. To overcome the factors hindering critical start-up support, the NSC has approved the establishment of a Business Development Unit (BDU) within NCBC to assist start-ups in overcoming these challenges. However, the centre currently lacks a designated budget for providing entrepreneurial services to its labs and projects. The project aspires to allocate funds from the recently approved endowment to establish a BDU. The project aims to identify hard problems in big data and cloud computing and to provide solutions to the market. It aims to develop an advanced workforce in cloud computing through training that will contribute to economic growth.

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

Belt and Road Initiative and Supply Chain Development: A Case Study of the Havelian-Thakot Motorway in Pakistan and Tourism Supply Chain Development

Sponsor: RAND Corporation
Funding Amount: PKR 400,213
Project Initiated in: 2021

In explaining the factors that drive tourism supply chain changes after the completion of the Havelian-Thakot Motorway, the paper assesses the quality of financial performance and operational performance of the actors involved in the upstream, midstream, and downstream. Firstly, to assess the quality of financial performance, the paper evaluates the quality of financial attributes of those actors, which include return on investment, manufacturing costs, total revenue, and distribution costs. Secondly, the quality of performance attributes encompasses the quality of operational performance of service delivery, which comprises product availability and quality, among others. As a result, the effect is expected to translate into achieving objective attributes of the level of customer satisfaction and robustness and flexibility of the tourism supply chain in the area.

Dr. Suleman Shahid
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
suleman.shahid@lums.edu.pk

A data-driven socio-digital system for incorporating citizen feedback in governmental service delivery

Sponsor: Oxford Policy Management
Funding Amount: PKR 15,750,561
Project Initiated in: 2022

This project aims to create a system that helps the government understand and improve public services based on citizen feedback. This is particularly important for essential services like water, sanitation, health, and education, especially in developing countries like Pakistan. By leveraging modern data analytics and digital platforms, the system will enable real-time collection and analysis of feedback, providing actionable insights for policymakers. It seeks to bridge the gap between citizens and service providers, ensuring that public resources are allocated efficiently and equitably. Additionally, the project emphasizes transparency and accountability in governance, fostering trust between the government and its citizens.

Economic Development

Dr. Ummad Mazhar
Suleman Dawood School of Business (SDSB)
Assistant Professor
ummad.mazhar@lums.edu.pk

Internationalization of Pakistani Exporting Firms

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This project aims to guide international business thinking towards understanding SME intermittent exporting from an emerging market economy (EME) perspective. Intermittent exporting is when companies enter and exit export markets repeatedly, a behavior not yet well studied. EMEs like Pakistan face unique socio-economic and political conditions that require a different research approach. This research will explore challenges faced by Pakistani SMEs, such as limited financing, political instability, currency fluctuations, and poor infrastructure. By analyzing this export behavior, the project aims to offer strategies to help firms build consistent export performance. The findings will support policymakers, business leaders, and researchers in promoting sustainable international growth of SMEs in emerging markets.

Mr. Uzair Jamil Kayani
Shaikh Ahmad Hassan School of Law (SAHSOL)
Associate Professor
uzair.kayani@lums.edu.pk

Women's Economic Empowerment (WEE)

Sponsor: UN Women
Funding Amount: PKR 17,642,160
Project Initiated in: 2023

The project aims to mobilize WWs and WOBs in Lahore and form them into functional groups to expand their networks, such as forming linkages with micro-finance institutions and mentors, upskilling them, and enhancing their capacities to operate their enterprises. It focuses on fostering a supportive ecosystem where women entrepreneurs can access resources, build resilience, and achieve financial independence. The initiative also emphasizes creating opportunities for peer-to-peer learning and collaboration among women-led businesses. By addressing key barriers to economic participation, the project seeks to contribute to sustainable economic growth and gender equality in the region. Additionally, the project will advocate for policy changes that support women entrepreneurs and ensure the sustainability of women-led enterprises. Through these efforts, it aims to create a lasting impact on the socio-economic fabric of the community, empowering women to play a central role in driving economic development.

Dr. Ali Cheema
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
cheema@lums.edu.pk

The Political Economy of Progressive Property Tax Reform: Evidence from Pakistan

Sponsor: International Centre for Tax and Development (ICTD)
Funding Amount: PKR 46,772,863
Project Initiated in: 2022

The project's objective is to delve into the political and public perspectives on property taxes, specifically in regions like Punjab, Pakistan, where they currently exhibit regressive traits and yield limited revenue. Through an experimental approach, it endeavours to assess the level of endorsement for increased and more equitable property taxation among citizens, local politicians, and party members. By examining whether citizens grasp the implications of property taxes and whether politicians accurately perceive public sentiments, it aims to pinpoint the factors shaping support for progressive tax measures. Moreover, the project delves into the influence of gender on tax preferences and assesses the feasibility of interventions within broader reform agendas, emphasizing transparency through the publication of data and the protection of human subjects.

Dr. Faiza Ismail
Shaikh Ahmad Hassan School of Law (SAHSOL)
Assistant Professor
faiza@lums.edu.pk

Challenges of Money Laundering for Pakistan

Sponsor: LUMS
Funding Amount: PKR 730,000
Project Initiated in: 2022

Carrying a huge amount of cash from one country to another is a crime called money laundering. The Financial Action Task Force (FATF), the international regulator, has marked Pakistan as a country that has ineffective money-laundering laws for years and placed it on the gray list. So, it's the right time to identify an ideal legal framework to help it overcome money laundering and get off the FATF's gray list. This research will make suggestions for the anti-money laundering law reforms in Pakistan. The goal of this project is to study the money laundering laws of Pakistan as well as those of the countries that have overcome this crime to make suggestions in the Pakistani law. It also includes training, education, and awareness regarding this crime. The paper and the case study will be used to offer workshops to Federal and Provincial judicial academies in Pakistan and to present all laws regarding it to reduce this crime.

Finance

Dr. Kashif Zaheer Malik
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
kashif.malik@lums.edu.pk

Micro Equity for Microenterprises: Encouraging Entrepreneurship through Modaraba Financing

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

Access to finance is frequently listed as one of the most important constraints on the expansion of small firms in low-income countries. This proposal considers risk-sharing or equity-based contracts, in which the MFI and microenterprise share profits and losses. This provides a more flexible source of capital that could stimulate transformational entrepreneurship and lead to wider economic and employment growth. The project aims to make an equity-based microfinance product based on modaraba financing and then test its effectiveness. This microfinance contract leads to greater investment in a productive asset for more risk-averse entrepreneurs. The project can stimulate micro-entrepreneurship through modaraba financing. In addition, after rigorous testing of the micro-equity product, it can be replicated by not only national microfinance institutions but also international microfinance institutions.

Dr. Muhammad Junaid Ashraf
Suleman Dawood School of Business (SDSB)
Associate Professor
jashraf@lums.edu.pk

Limited Due Diligence & Estimation of Book Value of Shares

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

The board, after receiving a takeover bid, has requested the management to perform a quick review of the financial statement and estimate the share value based on the audited financial statement. The management decided to engage an external consultant to assist them in this task. The project aims to perform a limited scope due diligence, identify any adjustments in the financial statements, and prepare financial adjustments for the company. The scope of the work has been substantially reduced to a very basic level of due diligence, where we will be relying mostly on management representation and information. This assignment will at best act as a trigger to start serious conversations about the value of the organization and its future strategy.

Dr. Sher Afghan Asad
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
sherafghan@lums.edu.pk

Organizational Effectiveness and Tax Compliance in Punjab, Pakistan

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 5,167,083 | PKR 5,308,131
Project Initiated in: 2021 | 2022

This project explores how well organizations in Punjab, Pakistan, are working and how this affects their tax compliance. It aims to identify strengths and weaknesses and provide recommendations to improve organizational effectiveness and tax compliance. It also aims to investigate the relationship between organizational effectiveness and tax compliance. It helps to find ways to improve both organizational effectiveness and tax compliance. It also helps to identify areas for improvement, allowing for targeted interventions. This project is important because it can help to increase tax revenue for the government and help to improve organizational performance and productivity.

Incidence of Tax Expenditures: Evidence from the Agricultural Sector of Pakistan

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This research examines tax expenditure in Pakistan, particularly in the agriculture sector, aiming to analyze its impact on revenue, food security, and equitable distribution of benefits. By systematically examining the incidence of agricultural tax concessions, it seeks to guide tax policy reform in Pakistan. The study's impact extends to informing tax policy practice, enhancing teaching in Public Finance courses at LUMS, and potentially paving the way for further research and collaboration with entities like the Federal Board of Revenue.

Finance

Leveling the Tax Playing Field: Evidence from Punjab, Pakistan

Sponsor: International Growth Centre (IGC) | JPAL The Abdul Latif Jameel Poverty Action Lab
Funding Amount: PKR 26,527,794 | PKR 16,977,481
Project Initiated in: 2023

Mobilizing domestic revenue is a significant challenge for many emerging economies, hindering their economic growth and sustainability. This proposal focuses on tax compliance in Punjab, Pakistan's largest province, specifically examining the sales tax on services, which accounts for a substantial PKR 136 billion out of the total provincial revenue of PKR 228 billion. By investigating the compliance behavior of competing firms, this study aims to inform key policy interventions by the Punjab Revenue Authority. The findings will provide valuable insights into the factors influencing tax compliance, enabling the authority to develop targeted strategies to improve revenue collection, reduce tax evasion, and promote a more equitable and sustainable tax system. In the future, the findings will serve as a model for other emerging economies, informing tax reform initiatives and promoting sustainable economic development. This research will also assess the impact of digitalization and data analytics on tax compliance, identifying opportunities for technological interventions that could streamline tax administration processes. By leveraging big data and analytics, the study can help detect discrepancies in tax payments and target non-compliant entities more effectively. Moreover, it will explore ways to improve taxpayer education and communication to enhance compliance and foster a culture of voluntary compliance. Through these efforts, the study aims to create a more resilient and efficient tax system that can adapt to changing economic conditions and global best practices.

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

Case Study on Organizational Transformation

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

The project chronicles the cultural transformation of the USF organization from a traditional bureaucracy to a more efficient corporate culture. The study highlights the interpersonal challenges and initial resistance faced by the organization, and how they were constructively managed. The project applies the Organizational Culture Assessment Instrument and Schneider's Culture Model to identify the specific cultural dimensions that shifted. It results in accrued efficiencies in interpersonal relationships, goal achievement, and overall impact. This project aims to document the transformation journey, identify the challenges and successes, and provide insights into the cultural dimensions. The purpose of this project is to serve as a model for other organizations to transform. By sharing this story, the project aims to inspire and guide organizations toward a more efficient and effective culture, leading to improved productivity and success.

Dr. Faheem Hassan Akhtar
Syed Babar Ali School of Science and Engineering (SBASSE)
Assistant Professor
faheem.akhtar@lums.edu.pk

Process Safety Management

Sponsor: Consortium
Funding Amount: PKR 500,000
Project Initiated in: 2022

The Process Safety Management (PSM) project aims to develop a comprehensive program that enables industries to create and implement effective awareness and management of process safety. PSM is the cornerstone of occupational health and safety programs, and its absence is a significant gap in many small and large businesses. This project seeks to address this gap by providing the necessary knowledge base to develop and implement effective PSM systems. The program focuses on identifying and mitigating potential hazards. It also ensures compliance with regulations and fosters a culture of safety within organizations. By achieving these goals, the project aims to reduce the risk of incidents, protect employees and the environment, and promote a safer and more sustainable work environment. The goal is to empower industries with the expertise and tools necessary to prioritize process safety.

Dr. Muhammad Abdur Rahman Malik
Suleman Dawood School of Business (SDSB)
Associate Professor
abdur.malik@lums.edu.pk

Consultancy Services for the Development of a Performance Appraisal System

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

To help in the development of a good performance appraisal system, this project holds discussions with senior members and conducts workshops for the proper application of that system. The project aims to conduct meetings with the senior members to assess the nature of their business and its needs, then organize and conduct workshops that would cover all the requirements and devise a performance appraisal system for clients, then lastly implement that system. The workshops, discussions, and meetings will allow a good performance appraisal system to be developed. Additionally, the project will ensure that the performance appraisal system is aligned with organizational goals, fostering a culture of continuous improvement. By incorporating feedback from key stakeholders throughout the process, the system will be tailored to the specific needs and challenges of the organization, improving employee engagement, productivity, and development. The successful implementation of the system will enable organizations to evaluate and enhance employee performance effectively, leading to better organizational outcomes and employee satisfaction. To further ensure its effectiveness, the project will provide post-implementation support, offering guidance on how to adapt the system as organizational needs evolve. This ongoing support will also involve training managers and HR personnel on how to use the system to its fullest potential. Ultimately, the goal is to create a dynamic performance appraisal system that not only measures performance but also drives personal and organizational growth, creating a competitive advantage in the marketplace.

Dr. Farah Said
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
farah_said@lums.edu.pk

Fresh Produce Supply Chains in Punjab Mapping Transactions from the Mandi to the Store

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project focuses on economic agents who rely on the Badami Bagh Fruit and Vegetable market. The Badami Bagh market is the largest wholesale agricultural produce market in Pakistan. It supplies retailers and other small markets in Lahore and nearby districts. This project aims to achieve three main goals. First, it will create a new dataset on the agents involved in the wholesale-to-consumer supply chain. Second, it will estimate how profits are shared among these agents and retailers. Third, it will inform public policy by addressing the government's informational barriers and skewed perspective, which have led to ineffective and coercive regulatory measures. In the future, it will directly aid the efforts of the Agriculture Department of Punjab in setting the price floor and regulating the agricultural markets in Punjab.

Dr. Raja Usman Khalid
Suleman Dawood School of Business (SDSB)
Assistant Professor
raja.khalid@lums.edu.pk

Updating Cold Supply Chain Infrastructure in Central Punjab: A Step Towards Food Security

Sponsor: HEC
Funding Amount: PKR 8,106,000
Project Initiated in: 2023

The proposed project intends to evaluate the possibility of developing a sustainable FCC infrastructure in Central Punjab as a first step towards building a pan-Pakistan state-of-the-art FCC infrastructure. It is worthwhile highlighting that the term FCC in extant research refers to a controlled environmental supply chain dealing with perishable products such as fresh fruits and vegetables, meat, and seafood. The project aims to identify the major obstacles that hinder the efficiency of the food cold chain. The project also aims to explore two main works first is to work with stakeholders to find solutions and examine how regulations can help address these issues by understanding the challenges and finding ways to overcome them. A better food chain can be built with good infrastructure that reduces waste and gets fresh food to people more efficiently.

Supply Chain

Dr. Sher Afghan Asad
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
sherafghan@lums.edu.pk

COVID and Agricultural Supply Chains

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 4,400,352
Project Initiated in: 2021

This study focuses on the complete supply chain of fresh produce, from the farmer to the wholesale markets, to identify the role played by middlemen and how it impacted farmers and consumers during the pandemic. Specifically, the aim is to identify if they acted as facilitators or created encumbrances during the COVID lockdown. To understand the impact of the study, the importance of the farmers and agricultural produce for the largest province of Pakistan is highlighted. Very little research has been done to investigate this influential position occupied by the different tiers of middlemen in the agriculture supply chain in Pakistan, and no steps have been taken to find alternatives. This study is aimed at generating evidence on the facilitative or exploitative role played by middlemen during natural calamities and seeking to uncover avenues through which the agents' role can be improved or minimised with alternatives to the current archaic market mechanism through a partnership with the Government and the private sector.

Understanding Agri Supply Chain Dynamics and Price Wedges

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 4,692,515
Project Initiated in: 2022

The agriculture sector in Pakistan plays a central role in the economy of the country as it employs 43% of the country's labour force and makes a 19% contribution to the overall GDP. The agricultural landscape in Pakistan is characterized by inefficient markets leading to high price volatility, a lack of innovation, and food insecurity for the masses. Research was previously conducted that focused on understanding the gap between the farmgate prices and retail prices for potatoes and Onions. This gap was split into two of its components: the gap between farmgate and wholesale prices and the gap between wholesale and retail prices. After studying the first gap for Potatoes, the Department of Agriculture expressed a keen desire to understand the second gap as well for three commodities (Potato, Tomato, and Onion). This second gap was also of policy relevance, as most of it was determined within the regulated markets set up by the government, and the government also directly intervenes through retail price control mechanisms. Following up on the demands of the policymaker, the current research investigates the wedge between wholesale and retail prices for the three commodities using the existing administrative data. The wide gap and the large fluctuations between these two prices warrant a detailed investigation forming the basis for this research.

Asymmetric Information, Relational Contracts, and Prices: Evidence from Fresh Produce Supply Chain in Pakistan

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 13,823,172
Project Initiated in: 2023

The project investigates how small farmers in Punjab, Pakistan, can improve their economic returns through better access to market information and linkages. Despite existing research highlighting significant price disparities in the potato market, many farmers remain unaware of these opportunities or lack connections with wholesale agents who can offer competitive prices. This project aims to address these knowledge and market gaps, enhancing the livelihoods of small farmers by providing real-time market information and facilitating connections with wholesale agents. By exploring the role of dynamic price information and market linkages, this project seeks to increase the efficiency and equity of agricultural markets in Pakistan, ultimately contributing to more sustainable and prosperous farming communities. This project has the potential to enhance the livelihoods of small farmers in Punjab by providing them with real-time market information and facilitating connections with wholesale agents, ultimately increasing their economic returns. By addressing the issue of asymmetric information, this project will contribute to a more equitable and efficient fresh produce supply chain in Pakistan.

Vulnerable Markets: Assessing the Impact of Climate-Induced Shocks on Fresh Produce Supply Chains in Punjab

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 7,042,335
Project Initiated in: 2023

The study aims to explore the resilience and adaptation strategies of food markets facing climate-induced disruptions. Events like floods significantly impact global economic stability, with South Asia's agriculture and food security being particularly vulnerable (Hsiang & Kopp, 2018; Douglas, 2009). The 2022 floods in Pakistan highlighted this issue, causing extensive damage and disrupting supply chains in regions like Sindh and Balochistan (UNDP, 2022; OCHA, 2022). This research will focus on the effects of these floods on fresh produce supply chains in Punjab, examining supply responsiveness and price fluctuations (Congressional Research Service, 2022; Balboni, Boehm, and Waseem, 2023). The study will integrate flood data with supply chain analysis and include surveys and interviews. In addition to analysing the immediate impacts, the research will explore long-term strategies for enhancing the resilience of supply chains through improved infrastructure, better risk management practices, and more efficient market linkages. By providing actionable insights, this study aims to inform policymakers, local businesses, and farmers on how to mitigate the effects of future climate-induced disruptions and ensure food security in the region.

Dr. Kashif Zaheer Malik
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
kashif.malik@lums.edu.pk

Pilot Study to Evaluate Strategies to Increase the Uptake of QR Payments by Micro and Small Merchants in Pakistan

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

The State Bank of Pakistan's Raast payment system aims to boost digital payments for low-income households and informal businesses. Current payment fees have limited adoption, but Raast's QR code-based P2P payments (launched in 2022) and planned P2M payments address these barriers. This research explores adoption challenges and tests ways to increase digital payment use among small merchants, offering insights to policymakers and industry to advance financial inclusion.

A Pilot Study to Evaluate Strategies to Increase the Uptake of QR Payments by Micro and Small Merchants in Pakistan

Sponsor: Innovations for Poverty Action (IPA)
Funding Amount: PKR 17,745,245
Project Initiated in: 2022

In Pakistan, digital payments can boost financial and economic growth, prompting this project to normalize their use. The project encourages merchants to adopt QR code payment systems to enhance productivity and effectiveness in trade. It serves as a case study to assess QR code adoption and aims to promote its use among small and medium-sized businesses. Data from small merchants could inspire new trade policies and further stimulate economic growth.

Dr. Osama Khan
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
o.khan@lums.edu.pk

Pakistan - Gulf Cooperation Council Free Trade Agreement

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

The Pakistan-GCC Free Trade Agreement aims to boost trade and economic cooperation between Pakistan and GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE) by eliminating tariffs and non-tariff barriers. This agreement enhances market access, attracts GCC investment in Pakistan, increases exports, and strengthens economic ties, opening new opportunities for Pakistani businesses in the GCC market.

CULTURE & HERITAGE

Dr. Ali Cheema
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
cheema@lums.edu.pk

The Economic History of the Punjab Canal Colonies

Sponsor: University of Maryland
Funding Amount: PKR 1,841,533 | PKR 9,096,664
Project Initiated in: 2021 | 2023

This project includes developing a natural experiment in colonial Pakistan that varied the number of hereditary village headmen (lambardari) in newly formed "canal colony" villages. Under British rule in the late 1800s, a series of canals were built in the Punjab region, allowing for the formation of thousands of new villages: the canal colonies. The colonial government controlled the rules surrounding village formation and implemented a cut-off rule in the village area for the number of headmen. This context allowed the research to study the long-run effects of local political competition using a regression discontinuity (RD) framework. Additionally, the project is intended to increase our understanding of an important period of Pakistan's economic history during which the British created Lenovo village institutions in the areas that came to constitute the country's most populous province. The project's scope includes but is not limited to the collection of archival documents, the digitization of the materials of Punjab Canal Colonies, and the analysis of the resulting datasets.

Dr. Murtaza Taj
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
murtaza.taj@lums.edu.pk

Digital Documentation of Heritage Site in Karachi

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

The project involves scanning the House located at 234 Staff Lines, Karachi, tentatively in June 2022. The project proposes to conduct a survey of a portion of heritage sites in Karachi and provide results in the shape of raw scans in a non-proprietary format. This initiative aims to preserve architectural and cultural heritage by creating a digital archive that can be accessed for research, restoration, and conservation purposes. The scans will serve as a critical resource for documenting the historical significance and structural details of the sites. Additionally, the project highlights the importance of using advanced digital tools to safeguard heritage against risks such as urbanization and environmental degradation.

Digital Preservation

Scanning of a Portion of the Lahore Museum

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

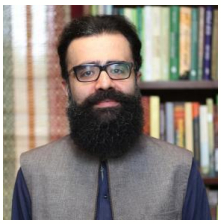
The project involves performing up to 40 scans of a portion of the Lahore Museum located at Mall Road, Lahore. In this research, a survey is conducted of a portion of the Lahore Museum and gives results in the shape of raw scans in a non-proprietary format. The initiative aims to digitally document the museum's artifacts and architectural details, ensuring their preservation for future generations. These scans will provide invaluable data for researchers, historians, and conservationists to study and restore heritage items. Furthermore, the project underscores the role of technology in safeguarding cultural history and making it more accessible to a broader audience through potential digital archiving or virtual exhibits. In addition to preserving the museum's physical heritage, the project also aims to create a digital archive that can serve as an educational resource, allowing global access to the artifacts and enhancing public engagement with cultural heritage. By using advanced scanning technology, the project will capture intricate details that may otherwise be missed in traditional documentation, ensuring a more accurate and comprehensive preservation of Lahore's cultural legacy.

Survey of Old Settlement on One Huge Rock Boulder Formation at Mehdiabad, Kharmang

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2024

The project involves texture-less scanning of the exterior of the old settlement on one huge rock boulder formation at Mehdiabad, Kharmang. In this project, a survey is conducted of a portion of the said settlement and gives results in the shape of raw scans in a non-proprietary format. This initiative aims to document and preserve the unique architectural and cultural significance of the settlement, which is an integral part of the region's heritage. The scans will provide detailed spatial data to support further research, restoration, and conservation efforts. Additionally, the project highlights the importance of modern documentation techniques in capturing the essence of historical sites that are at risk of degradation due to environmental and human factors. Through this project, valuable data will be gathered to assess the settlement's vulnerability to natural wear and human interference, enabling more targeted conservation strategies. The use of advanced scanning methods ensures that even the most intricate details of the site are preserved, which could aid future archaeological studies and provide educational opportunities for generations to come.

Dr. Ali Usman Qasmi
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
ali.qasmi@lums.edu.pk



Children of Partition: Documenting the History of Violence, Trauma and Displacement

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project explores an otherwise understudied aspect of the 1947 Partition violence, the experiences of the many thousands of children who were abducted on both sides of the partitioned border between India and Pakistan. It involves extensive archival and oral research, including unconventional sources like mental asylums and orphanages, and interviews with survivors. The findings are used to produce a short documentary, making these neglected histories accessible to a wider audience. This research not only enhances the understanding of the Partition's human impact but also aims to position LUMS as a leading institution in innovative historical research.

Dr. Furrukh Khan
Associate Professor
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
furrukh@lums.edu.pk

MigrationRhythms

Sponsor: Peace Research Institute Oslo (PRIO)
Funding Amount: PKR 2,349,476
Project Initiated in: 2022

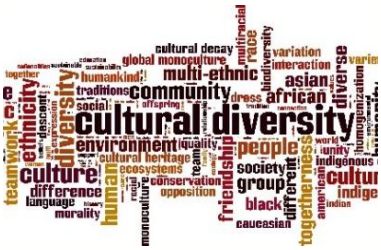
The MigrationRhythms project aims to study the family histories of middle-class families in Karachi. Dr. Furrukh Khan and Dr. Marta Bivand Erdal will conduct interviews and fieldwork to learn about their migration patterns. This includes at least 10 days of fieldwork in Karachi, divided between late 2022 and spring 2023, along with time for preparation and planning.

Dr. Nadhra Shahbaz Naeem Khan
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
nadhra.shahbaz@lums.edu.pk

Historical Evolution

Curatorial Consultancy Services at Lahore Fort-2023, Phase-1
Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

A museum or a visitor center is to be established in the Lahore Fort that reflects the culture of the past and exhibits works, objects, crafts, and documents as well as the provision of knowledge of past culture to the public. The project aims to use a computerized system to provide historical information about the fort and the culture of that time. The focus of this project is to make the public aware of the history of visiting places in the fort and those who made it. By collaboration with stakeholders, a proper museum with good management can be made, and, in this way, this project will familiarize the present public with their esteemed past culture.



Preservation and Promotion of Cross-Cultural Edifices of Lahore Fort (Archival, Historical & Analytical Studies)

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

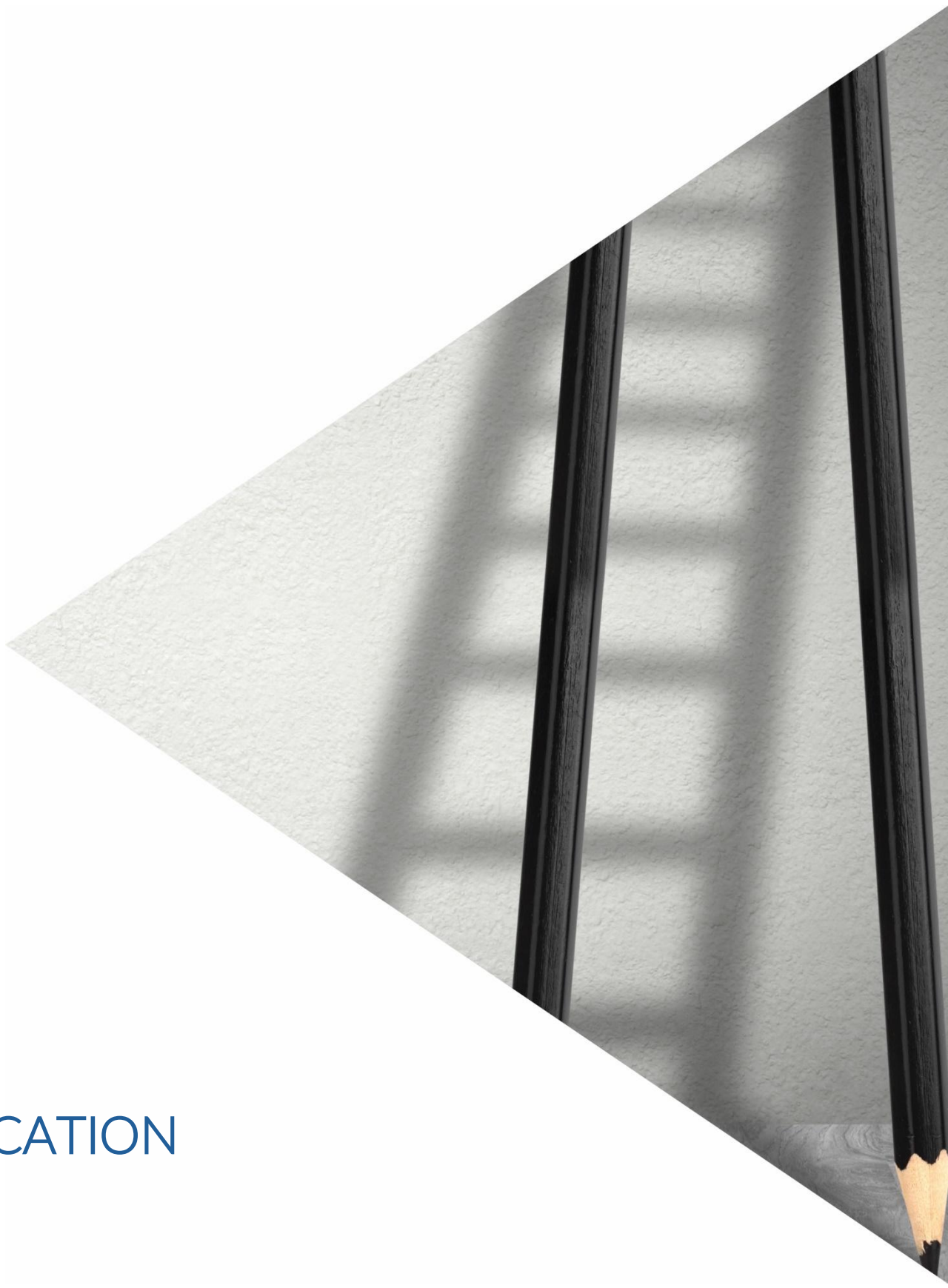
For the conservation and restoration of Lahore Fort an initiative is taken, which includes Sheesh Mehal Quadrangle, Loh's Temple, and Sikh's Temple. The project aims at using the best international practices along with the history of construction, past usage, and interventions, followed by an analytical and descriptive analysis of the features and decorations of the Fort. Also, devising a proper restoration policy. The project will preserve the monument and present the culture and ethnicity of the Fort and its occupants to the present population as it was at that time.

Dr. Waqar Zaidi
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
waqar.zaidi@lums.edu.pk

Explaining the Globalization of Aviation through the Greater Middle East

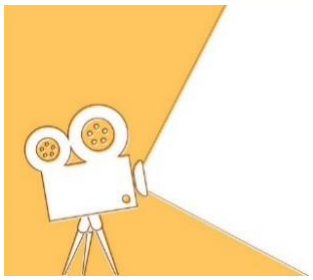
Sponsor: LUMS
Funding Amount: PKR 800,000
Project Initiated in: 2022

This project examines the history of civil aviation in the greater Middle East – the region from Egypt to Pakistan/Afghanistan. This project explores the development of Middle Eastern airlines from their formation in the late 1940s through to their massive expansion in the 1960s. By placing this development within the political, social, and economic currents of its time, the project provides much-needed historical context for current political debates about the impact of COVID on international aviation.



EDUCATION

Dr. Nida Yasmeen Kirmani
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
nida.kirmani@lums.edu.pk

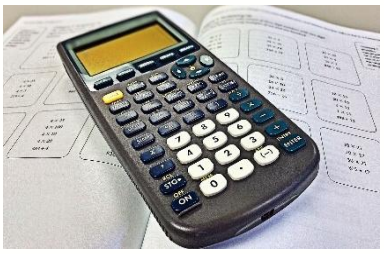


Memories of Conflict: Healing from Lyari's Violent Past

Sponsor: Education Justice and Memory Network (EdJAM)
Funding Amount: PKR 7,016,113
Project Initiated in: 2022

This project utilizes documentary film as a means of learning, healing, and teaching about Lyari's violent past. Through the process of making the film, participants can connect with it to reflect and heal from over a decade of violence. Furthermore, through the screening process, audience members can discuss and mend some of the fissures that were created during this time. The film will also be shared outside of Lyari in other neighborhoods and cities to reflect on how communities are affected and can heal from violent conflict. The project aims to create a platform for dialogue, encouraging emotional healing by giving voice to the experiences of those who lived through the conflict. It seeks to break the silence surrounding trauma and promote social cohesion through shared storytelling. By extending the film to broader audiences, it also serves as a tool for building empathy and raising awareness of the long-term impacts of violence, fostering a collective journey toward peace and reconciliation. In addition, the documentary will act as a historical archive, preserving personal narratives that might otherwise be forgotten. This resource will be invaluable for future generations to understand the complexities of conflict and the resilience of the affected communities. The film's outreach will also engage policymakers and social organizations, offering insights into the critical role of community-based healing initiatives in post-conflict recovery and peacebuilding.

Dr. Imran Anwar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
imran.anwar@lums.edu.pk



LUMS MATH Circle Outreach Program

Sponsor: Consortium
Funding Amount: PKR 8,714,000
Project Initiated in: 2023

This project proposes the development of the LUMS Math Circle Program in collaboration with the Pak Alliance for Math and Science (PAMS), which helped to organize different sessions all over Pakistan. In addition, different workshops are conducted, and funding from different elite schools is approved to make this self-sustained non-profit outreach program. This project aims to make a LUMS math circle outreach program where budgets will be allotted and managed for math circles, and this project will bear fruit for students from less privileged backgrounds, and they will be facilitated.

Experiential Workshop on Evolving Math Circles Outreach in Pakistan

Sponsor: Pak Alliance for Math and Science
Funding Amount: PKR 1,399,300
Project Initiated in: 2022

The aim of this workshop is twofold: firstly, to provide the motivation for the math outreach programs and value, and secondly, to provide hands-on experience to participants about conducting math circles. This workshop is intended to equip the participants with the skills and resources to launch math circles independently at their respective institutes. This workshop is an excellent platform to build a network of math enthusiasts for evolving the math circle outreach culture in Pakistan.

Dr. Malik Jahan Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Visiting Associate Professor
jahan@lums.edu.pk

Consultancy: Feedback on Technical Course Development

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

This consultancy project aims to guide and support Technical Content Engineers (TCEs) throughout the course development process, from planning to launch. It proposes to guide them through planning, development, and launching courses, allowing them to make decisions and try new ideas. The project reviews courses for accuracy, interactivity, and clear writing. It also aims to improve processes, ensure high standards, and create guidelines that balance quality and creativity.

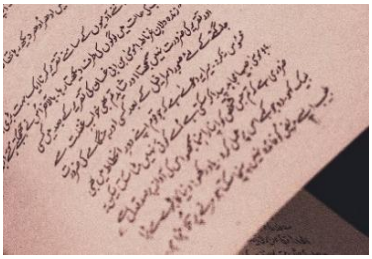
Dr. Saad Azmat
Suleman Dawood School of Business (SDSB)
Associate Professor
saad.azmat@lums.edu.pk

Review of Islamic Banking and Finance Program

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

This project aims to strengthen the Islamic Banking and Finance program by addressing critical gaps in academic rigor, faculty capacity, and graduate readiness for industry demands. It seeks to realign the program structure to reduce delays in degree completion, enhance the quality and consistency of teaching, particularly in the Shariah component, and promote research-led instruction. The project also focuses on improving the professional grooming and communication skills of students, attracting high-caliber applicants from across the country, and leveraging the program's strategic location in a major Islamic finance hub. Additionally, it proposes the establishment of a dedicated advisory board to guide the program's development, with expert recommendations on board composition and terms of reference.

Dr. Asim Karim
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
akarim@lums.edu.pk



Leveraging Prompt Engineering for Text Classification in Urdu

Sponsor: LUMS
Funding Amount: PKR 996,000
Project Initiated in: 2023

Prompt engineering deals with the problems of old text classification modes that are barriers in natural language processing NPL. This project helps in making techniques for promoting Urdu and evaluating Urdu text. This project aims to develop user interference for Urdu text classification. And to train human resources on the new AL technique of prompting and in-context learning. This project is benefiting the field of promotion of the Urdu language and helping to improve Urdu for the Urdu-speaking population through online modes.

Dr. Faisal Bari
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Associate Professor
bari@lums.edu.pk

Exam Ready Project

Sponsor: TikTok
Funding Amount: PKR 5,395,000
Project Initiated in: 2022

This project includes a partnership with TikTok and EdKasa to enhance access to education through innovative means. The objective of this collaboration is to develop learning materials in the form of videos that will be hosted on the TikTok platform. Through an Agreement, the School of Education will work closely with EdKasa to curate educational content specifically tailored for the TikTok audience. LUMS will provide technical advisory support to EdKasa in the development of these materials. This project seeks to leverage the popularity and reach of TikTok to make education more accessible and engaging for a wider audience, contributing to the advancement of educational opportunities in Pakistan. Additionally, by embracing contemporary platforms, the project aims to foster a dynamic and interactive learning experience, effectively bridging educational gaps for students across diverse demographics in Pakistan.

Dr. Ihsan Ayub Qazi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ihsan.qazi@lums.edu.pk

Navigating the Research Landscape: Skills and Strategies for Aspiring Students

Sponsor: Google
Funding Amount: PKR 9,157,219
Project Initiated in: 2023

This Google award, structured as an unrestricted gift, will be used for training and supporting undergraduate students in research, as well as executing a research project on lowering the barrier to accessing generative AI technologies in education.

Dr. Ijaz Haider Naqvi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ijaznaqvi@lums.edu.pk

Huawei Lab Establishment in LUMS University Engineering Department for Huawei Training and Certification Exams

Sponsor: Consortium
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project aims to establish a Huawei Lab in the Engineering Department of LUMS University, providing a state-of-the-art training facility for Huawei technologies. The lab will offer hands-on training and certification programs for students, faculty, and industry professionals, enhancing their skills in cutting-edge technologies like 5G, AI, and cloud computing. This research aims to fill the gap between LUMS students and other private institutions and firms. It also provides a field for professors to engage in professional engagement with telecommunication. It also aims to work with a company like Huawei, which leads to multiple opportunities in the future. It helps to support the growth of Pakistan's tech industry.

Dr. Razia Iram Sadik
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Associate Professor
razia.sadik@lums.edu.pk

Education with Arts and Media Integration: Practices, Challenges and Futures in South Asia

Sponsor: LUMS
Funding Amount: PKR 1,499,163
Project Initiated in: 2024

This research seeks to broadly understand how educators and practitioners of media and arts in South Asia integrate arts, media, and digital technologies into their teaching and curricula at various levels of education. This research aims to identify policies, curriculum, content, pedagogical approaches, learning outcomes, and societal influences. The study will be conducted through Literature Scan, Fieldwork, and Case Studies. The proposed research delves into the integration of arts and media education in South Asia, unlocking substantial value for LUMS across curriculum enrichment, new course development, and robust student participation. This research promises to be more than an academic endeavor. It stands to reinforce LUMS's stature as a regional beacon of transformative, future-ready education.

Dr. Shahid Masud
Syed Babar Ali School of Science and Engineering (SBASSE)
Professor
smasud@lums.edu.pk

2022 Summer Internship in Embedded System Design

Sponsor: Xcelerium
Funding Amount: PKR 400,000
Project Initiated in: 2022

As part of the recently signed MOU with M/S Xcelerium, USA, this project has launched a sponsored summer internship program to promote the area of Digital Embedded Systems. The students will receive a stipend of Rs 25,000 each for the duration of the internship, during which they will focus on learning AWS Cloud-Based Design Tools for Integrated Circuits, as assigned by an external collaborator. A comprehensive report on the activities and outcomes will be submitted to the sponsors at the end of the internship period. This will be beneficial in the expansion of collaboration with M/S Xcelerium to explore further opportunities in the realm of Digital Embedded Systems. Secondly, it will be an establishment of a centre of excellence in Digital Embedded Systems, which will serve as a hub for innovation, research, and skill development in this area.

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

Development of Case Studies in Fintech for Use in Fintech Education and Study of Fintech Ecosystem in Pakistan

Sponsor: Karandaaz Pakistan
Funding Amount: PKR 12,500,000
Project Initiated in: 2024

The primary goal of this project is to enhance fintech education in academic institutions throughout Pakistan. This will be accomplished by developing educational content centred on local fintech activities. The project aims to create industry notes and case studies that offer a thorough understanding of the opportunities and challenges in Pakistan's fintech sector. This initiative will benefit students, the business community, and professionals while also attracting global investor interest. Collaboration with organizations like Karandaaz is essential to ensure the project's success and sustainability.

Dr. Zubair Khalid
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
zubair.khalid@lums.edu.pk

Recasting Best Practices of European Universities During the Pandemic for Improving Online Education in Pakistan HEIs (RAPID)

Sponsor: European Union
Funding Amount: PKR 157,780,071
Project Initiated in: 2023

The RAPID project aims to improve online education in Pakistani universities, especially in remote areas that struggled during the COVID-19 pandemic. It supports the development of a national online education policy, trains faculty in e-learning, and builds infrastructure in remote universities. Pakistani universities will partner with European institutions to learn best practices. The project includes faculty training, a national summit for policy drafting, and infrastructure upgrades. It will enable uninterrupted education during crises, promote digital literacy, and enhance teaching quality. Ultimately, RAPID will help Pakistani universities become more resilient and bridge the educational gap in underserved areas. It also encourages innovation in teaching methods and greater use of digital tools in classrooms. Over time, this will improve access, equity, and the overall learning experience for students across the country.

Dr. Faisal Bari
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Associate Professor
bari@lums.edu.pk

Towards Inclusive Education: Exploring the Lived Realities of Children with Disabilities

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

Many children with different disabilities are getting an education in the public and private sectors of Pakistan. These students are facing many challenges. This study aims to encapsulate the voices of those students enrolled in private and public special education schools/institutions, and of their parents and teachers. The study aims to capture reasons for educational inclusion. And the barriers that prevent their participation in school activities. And to study the challenges faced by their families, the role and voices of teachers in special education institutions, and the complex, multifaceted lived realities of children with disabilities. Through this project, the methodologies are changing for those students. This is also helping the policymakers to rebuild for these children. The project seeks to provide a comprehensive understanding of the systemic and individual challenges faced by children with disabilities, highlighting the importance of creating a more inclusive educational environment. By focusing on the perspectives of students, families, and educators, the research aims to propose actionable solutions for enhancing accessibility, improving support systems, and promoting a more inclusive approach to education in Pakistan. In the long term, the findings will inform national policies and initiatives to ensure equitable educational opportunities for all children, regardless of their abilities.

Dr. Bilal Ahsan Malik
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Assistant Professor
bilal.malik@lums.edu.pk

Islamic Madrasa Education & Modern Science: Comparative Case Study of the Impact of Curricular Innovations at a Contemporary Pakistani Seminary (Madrasa)

Sponsor: International Research Network for the Study of Science and Belief in Society (INSBS)
Funding Amount: PKR 6,540,767
Project Initiated in: 2023

This survey project aims to investigate the impact of curricular innovations on the integration of modern science into Islamic madrasa education in Pakistan. The study conducts a comparative case study of a contemporary Pakistani seminary (madrasa) that has introduced modern science into its curriculum, it also investigates the effects on students' critical thinking, problem-solving, and analytical skills. It explores the implications for madrasa reform and the role of Islamic education in promoting scientific literacy and aims to inform evidence-based policy recommendations for improving science education in madrasas. This project sheds light on the potential for integrating modern science into Islamic education, enhancing the quality and relevance of madrasa education, and promoting a more nuanced understanding of the relationship between science and religion.

Dr. Faisal Bari
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Associate Professor
bari@lums.edu.pk

Translanguaging Practices in English Language Classrooms in Pakistan

Sponsor: University of Reading
Funding Amount: PKR 8,758,096
Project Initiated in: 2022

This project focuses on researching classroom interactions in primary and lower secondary to identify the language mixing, also called translanguaging, that occurs in peer-to-peer and teacher-to-learner interactions, as well as the teaching strategies that are currently used in linguistically diverse settings across Pakistan. The project aims to establish successful translanguaging practices that are used in schools along with development of course outline and content that is required by primary teachers of English to prepare subject learners for transition to lower secondary and the medium of English, and the materials that are essential to harness the enormous potential of translanguaging for the learning of English in formal schools.

Pedagogical Intervention

Dr. Farah Hasan Ali
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
farah.ali@lums.edu.pk

The Salam Award for Imaginative Fiction

Sponsor: Learning Alliance
Funding Amount: PKR 500,000
Project Initiated in: 2023

The Salam Award for Imaginative Fiction is a project that invites fiction writers to collaborate with local schools through a workshop platform. The aim is to promote creative writing, imagination, and critical thinking among students while also providing a unique opportunity for writers to engage with the community. The project aims to encourage creative writing and imagination among students. It provides a platform for writers to share their expertise and inspire young minds. It also fosters critical thinking and literary skills among students. It builds a community of writers, students, and educators. It celebrates imaginative fiction and its power to inspire and educate.

Dr. Farah Nadeem
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Assistant Professor
farah_nadeem@lums.edu.pk

Building Improved Teaching Practices Through Continuous Professional Development in Punjab: A Systems View of Affordances and Constraints

Sponsor: LUMS
Funding Amount: PKR 1,150,000
Project Initiated in: 2024

To improve classroom practices and teaching pedagogy in public schools in Punjab, the Quaid-e-Azam Academy for Educational Development (QAED) organizes training and continuous professional development (CPD) programs for teachers. However, there's limited evidence on how these trainings impact teaching. To answer this, the government started observing teachers and giving them feedback. They have a lot of data from these observations, but they haven't analyzed it yet. The study will analyze classroom observation data to understand trends in teaching practices at both the aggregate and school levels. It aims to identify changes over time and factors affecting practices, like location and resources. Examining extreme cases will uncover systemic factors influencing effective teaching, providing actionable insights for policymaking and teacher development.

Pedagogical Intervention

Dr. Gulab Khan
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Assistant Professor
gulab.khan@lums.edu.pk

Recruitment, Training, Deployment, and Continuous Support to 1000 Education Fellows in 10 Districts of Gilgit-Baltistan

Sponsor: Government of Gilgit Baltistan
Funding Amount: PKR 72,250,200
Project Initiated in: 2023

In the year 2023, the Gilgit-Baltistan government requested proposals for recruiting, training, and deploying 1,000 education fellows. On August 1, 2023, Lahore University of Management Sciences (LUMS), Aga Khan University (AKU), Karakoram International University (KIU), and Knowledge Platform (KP) signed the contract to undertake this initiative. AKU is leading interactions with the government, while LUMS, KIU, and KP manage recruitment, training, and supervision. Recruitment is expected to be completed by the end of 2023, with training for the education fellows starting in early 2024. These fellows will teach in public schools across ten districts in Gilgit-Baltistan, with additional refresher training planned for the second year.

Dr. Jessica Albrent
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Assistant Professor
jessica.albrent@lums.edu.pk

Data Use Practices in Educational Systems in Lahore

Sponsor: LUMS
Funding Amount: PKR 999,960
Project Initiated in: 2023

The study aims to understand data-driven decision-making practices in Lahore's school systems by investigating available data types, stakeholder access and usage, and purposes for data use. It identifies barriers to effective data use for school improvement through mixed-methods case studies, including interviews and a modified Teacher Data Use Survey. The goal is to make policy and enhance educational outcomes. This research addresses a global gap by focusing on developing context practices, offering insights for both local and broader applications. The study also aims to identify gaps in data literacy among teachers and administrators, which may hinder the effective use of data for decision-making. By providing evidence-based recommendations, the project will help build a more data-centric culture within the educational system, enabling stakeholders to make informed choices that improve student performance and overall school management. This approach is expected to contribute to the development of a more sustainable and effective educational framework in Lahore and beyond.

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

FEEROSA - Female Entrepreneurship Education and Research: Overcoming Standard Approaches in Pakistan

Sponsor: German Pakistani Research Cooperation Program - DAAD
Funding Amount: PKR 19,407,920
Project Initiated in: 2023

The FEEROSA project aims to promote female entrepreneurship education and research in Pakistan, focusing on the challenges faced by women entrepreneurs, especially in the informal economy. It builds capacity in social science skills needed for quality entrepreneurship training and research. The project provides training in entrepreneurship, psychology, and research methods, and hosts conferences on female entrepreneurship. It targets senior researchers, early-career researchers, students, and non-university stakeholders. FEEROSA will support the creation of a sustainable entrepreneurial ecosystem where women can access quality teaching, research networks, and benefit from knowledge exchange. It will also promote joint German-Pakistani projects, enhancing international collaboration and knowledge sharing.

Dr. Razia Iram Sadik
Syed Ahsan Ali and Syed Maratib Ali School of Education (SOE)
Associate Professor
razia.sadik@lums.edu.pk

Sedimenting Environmental Knowledge: Exploring the Potential of Visible Thinking Routines in Teacher Training for Green Schools Certification in Pakistan

Sponsor: LUMS
Funding Amount: PKR 995,440
Project Initiated in: 2022

Small-scale eco-conscious initiatives have played a crucial role in environmental reconstruction and conservation, but a comprehensive environmental education policy is lacking in the state, so it is very crucial to come out with a way to address this challenge. So, this project intends to develop and implement a baseline Green Schools Certification (GSC) program in ten public schools in Lahore, and to create a robust and interactive instructional design for the GSC Punjab. In the future, it will help to improve government schools in Lahore and their communities regarding environmental awareness and climate change advocacy. It will also help to test the transformative potential of Visible Thinking Routines as a low-cost, easily replicated tool for effective teacher training in a resource-constrained sector.

ENERGY

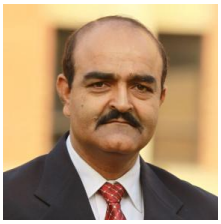
Dr. Basit Yameen
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
basit.yameen@lums.edu.pk

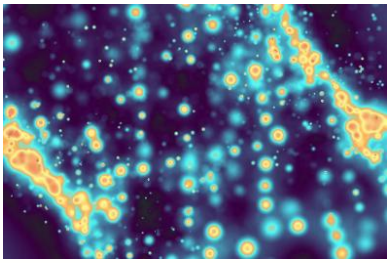
Covalent Conjugates of Organic Semiconducting Polymers and Non-Fullerene Acceptors: Towards Improved Photovoltaic Devices and Accelerated Artificial Photosynthesis

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This project aims at developing unprecedented all-organic covalent hybrids of organic semiconducting polymers (OSPs) and non-fullerene small molecules as electron acceptors (NFAs). The project is expected to contribute a library of novel P3HT-NFAs donor-acceptor covalent hybrids exhibiting higher efficiency of solar energy harvesting. These materials can be applied as photoactive materials in photovoltaic devices for improved photocurrent generation and to enhance the photoinduced CO_2 fixation via artificial photosynthesis in microbes.

Dr. Falak Sher
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
fsher@lums.edu.pk





Chemical-assisted Hydrogen Evolution Reaction (CAHER) using Nanoporous Electrocatalysts

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

The proposed study focuses to prepare nanoporous metallic, metal oxides, and metal sulfides-based electrocatalysts of various transition metals and identify biomass-based chemicals like alcohols, carbohydrates, amines, etc., which can be electrooxidized easily and converted into useful products. It also deals with optimizing the conditions for the hydrogen evolution reaction in the chemical-assisted process and training students, including females and research manpower. The project aims to advance sustainable hydrogen production by developing efficient electrocatalysts while fostering a skilled workforce to support renewable energy research and promote gender inclusion in the field.

Dr. Ijaz Haider Naqvi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ijaznaqvi@lums.edu.pk

Real-World and Intelligent Framework for Health Degradation Characterization of Lithium-Ion Batteries

Sponsor: HEC
Funding Amount: PKR 12,780,000
Project Initiated in: 2023

This project aims to develop a real-world and intelligent framework for characterizing the health degradation of lithium-ion batteries. The goal is to create a comprehensive and accurate system that can monitor and predict the degradation of lithium-ion batteries. It enables proactive maintenance and extends their lifespan. The framework integrates advanced data analytics, machine learning algorithms, and physical modeling to analyze data from various sources. This project helps to improve the reliability, efficiency, and sustainability of lithium-ion batteries, which are critical components in electric vehicles and renewable energy systems. The outcome of this project has significant impacts on the development of more durable and efficient batteries and supports the transition to a more sustainable energy future. By providing real-time health diagnostics and predictive maintenance capabilities, the framework will optimize the use of lithium-ion batteries, reduce operational costs, and prevent unexpected failures. This will contribute to the broader adoption of electric vehicles and renewable energy solutions, driving progress towards a cleaner, more energy-efficient world. Furthermore, the research will help establish industry standards for battery monitoring, ensuring better performance tracking and fostering innovation in battery technology.

Dr. Hafsa Qamar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
hafsa.qamar@lums.edu.pk

Low-Cost & Highly Efficient Multi-Port Electric Vehicle Charger Powered by Photovoltaic Energy

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

Electric vehicles (EVs) are becoming increasingly popular due to their low greenhouse gas emissions. However, they are only truly environmentally friendly when powered by renewable energy sources like solar photovoltaics. Pakistan's climate, with high solar irradiance year-round, makes it ideal for deploying solar-powered EV chargers. This project proposes developing an EV charger powered by photovoltaic (PV) panels to charge EVs using solar energy. The solar-powered EV charger promotes sustainable transportation, reduces the carbon footprint, and enhances energy efficiency. It also supports energy independence, fosters local economic development, and showcases technological innovation. Indigenous production of such chargers in Pakistan is expected to significantly impact the industrial sector by driving local innovation, knowledge, and expertise.

Prof. Nauman Ahmed Zaffar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
nauman.zaffar@lums.edu.pk

Big Data-based Platform to Promote EV Penetration in Pakistan

Sponsor: National Centre in Big Data and Cloud Computing (NCBC)
Funding Amount: PKR 19,214,545
Project Initiated in: 2021

This project rests upon the fundamentals of Big Data and Cloud Computing. The project involves a large-scale and extensive data collection exercise where a large amount of real-time raw data at a high granularity is being collected from batteries, motors, and Motor Control Units (MCUs), amongst various other components and systems in a vehicle. The collected data can be stored in the cloud storage. From cloud storage, the data can be cleaned and processed to make it ready for further processing at the central server. Exhaustive data processing exercises can be carried out during this project to derive various useful results and insights. Various analytic techniques in the domain of big data, such as machine learning, deep learning, and other predictive analytics, shall be used to obtain useful results and outcomes from the collected data. The processed data can be used by Android/iOS applications to directly benefit the end users.

EV Consultancy

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

This proposal is based on discussions held at an electric scooter manufacturing site in Sunder Small Industrial Estate II, focusing on electric vehicles (EVs) and mobility batteries. In addition to its existing activities in the electric domain, the partner organization is interested in initiating research, design, and collaborative discussions with LUMS on the development of EV chargers. The collaboration will address areas of strategic importance in the EV sector, including electric motors and battery controls. This engagement aims to help resolve technical challenges in electronics manufacturing for EVs and support the creation of locally relevant designs and solutions.

Dr. Naveed Arshad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveedarshad@lums.edu.pk

Indigenization of EV Value Chain in Pakistan for Two- and Three-Wheelers

Sponsor: Renewable Energy and Energy Efficiency Partnership (REEEP)
Funding Amount: PKR 2,950,000
Project Initiated in: 2023

As required by USAID and as a requirement to analyse the manufacturing framework of the EV in Pakistan, this study is planned. Moreover, it has been observed that, despite the approval of the EV policy and implementation of its incentives in Pakistan, limited adoption of electrified transportation has been witnessed. Other than a few thousand all-electric two- and four-wheelers, there is negligible on-road presence of EVs in the country. To this end, the proposed study titled “Indigenization of EV Value Chain in Pakistan for Two- and Three-wheelers” aims to provide a roadmap for the maturation of the Indigenous e-mobility industry in Pakistan to catalyse the transition towards electrified transportation. The study commences by highlighting key distinct features of an EV drivetrain that distinguish it from conventional ICE-based vehicles, followed by an overview of the state of the current EV market in Pakistan. Furthermore, a salient aspect of the proposed study is identifying and detailing EV market opportunities for automotive parts and components manufacturers, automotive manufacturers, and other private sector entities in the short, medium, and long term. The study discusses the role of government in facilitating the maturation of the local EV industry, including benefits obtained through the transition towards electrified transportation, such as a reduction in import bills and potential streams of revenue. Lastly, a roadmap and recommendations are provided to mature the indigenous electric two- and three-wheeler sector in Pakistan.

Frugal Zero-Emission Vehicles for the Urban Passenger Challenge

Sponsor: European Commission
Funding Amount: PKR 21,926,528
Project Initiated in: 2024

This project aims to address this urgent need by developing modular, cost-effective, and user-centric EVs for both passenger and goods transportation. Leveraging innovative design and engineering techniques, ZEV-UP vehicles will be tailored to meet the specific needs of users in both developed and emerging markets, ensuring high levels of user acceptance and market uptake. Key innovations include a base L7e BEV model that is designed concerning affordability and can be upgraded and adapted for various purposes and needs, including commercial applications and higher-value passenger vehicles. By optimizing vehicle components for reduced material usage and enhanced structural properties, the project will achieve lighter vehicles with increased autonomy and minimized environmental impact. ZEV-UP will also develop digital-twin models to improve vehicle development efficiency and reduce validation costs, as well as design charging capabilities compatible with a variety of regional power systems. Novel business and usage models, such as Battery as a Service, will be explored to maximize the benefits and impact of the L7e BEV platform. User-centric design, informed by market research and field interviews in both established and developing countries, will be a central focus of the project. Additionally, ZEV-UP will develop a proliferation model to assess policy intervention scenarios and strategize for short- and long-term BEV uptake in various markets. By delivering these key results, ZEV-UP will accelerate the transition to sustainable urban mobility and contribute to the reduction of greenhouse gas emissions in the transport sector.

Real-time Spatiotemporal Emissions Mapping (Phase-II)

Sponsor: Trans-Eurasia Information Network (TEIN)
Funding Amount: PKR 28,136,810
Project Initiated in: 2021

This project is planned to develop a localized passenger transport service on selected routes using the proposed electric 3-wheelers. The procured vehicles are designed to traverse a predefined route and briefly stop at each predefined location to collect the data. The vehicles' routes, fares, and timings are to be communicated to the potential commuters using the mobile application and web broadcast. The revenue generated from the service can be used to maintain the vehicles, sensors, website, database, and a stipend for personnel handling the project. This project is expected to serve as a long-term solution to ensure the project's financial sustainability and develop a low-cost alternative means of measuring air quality in countries having limited resources to deploy expensive stationary environmental monitoring solutions.

Dr. Naveed Ul Hassan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveed.hassan@lums.edu.pk

Technical and Economic Framework Development for EV Battery Swapping Stations in Pakistan

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

Electric vehicles (EVs) are becoming popular worldwide due to climate change and rising fuel costs, thanks to supportive regulations and decreasing battery prices. E-bikes and e-rickshaws have large battery capacities (1-2 kWh and 5-7 kWh, respectively) that have solved range anxiety. However, battery charging remains a significant challenge due to a lack of infrastructure and charger downtime risks, even with super-fast DC chargers. Battery swapping is a promising solution for commercial EVs, allowing depleted batteries to be replaced with pre-charged ones in minutes. This project aims to create a technical and economic framework for EV battery swapping, from entering a battery swapping station (BSWS) to leaving.

Dr. Tariq Mahmood Jadoon
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
jadoon@lums.edu.pk

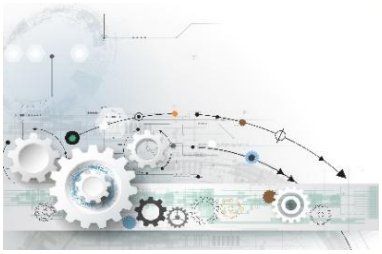
Establishing E-Mobility R&D at LUMS, and Pilot Project in Secondary City

Sponsor: United States Agency for International Development (USAID)
Funding Amount: PKR 176,350,778
Project Initiated in: 2023

LUMS is embarking on a project to set up an E-Mobility R&D centre and carry out a pilot project in a secondary city. This initiative will promote EV awareness and provide training for 360 participants. Key activities include showcasing EV Rickshaws, offering testing services for EV batteries and motors, and sharing knowledge to help develop local EV standards. After the grant period, the project aims to expand to other cities, boosting the 3-wheeler EV industry and SMEs involved in the EV supply chain. Additionally, it seeks to cultivate a skilled workforce for the EV sector, aiding its development in Pakistan. The ultimate goals are to achieve positive environmental impacts and improve grid infrastructure utilization through the shift to electric transportation.

Electrical Vehicles

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



Indigenous Design, Manufacturing & Testing of Electric Vehicle Components for Sustainable Market Development

Sponsor: National University of Science and Technology
Funding Amount: PKR 600,000
Project Initiated in: 2022

The energy shortage in Pakistan, particularly in the transportation sector of transportation emphasizes the need for sustainable solutions. In 2019, the national Electric Vehicle (EV) policy aims to shift 30% of road vehicles to EVs by 2030, opening the opportunity for global car manufacturers. Led by USPCAS-E NUST and supported by LUMS, the project focuses on developing EV components and sustainable supply chains. The goal is to make Pakistan autonomous in critical EV sub-systems and potentially export them while establishing EV testing facilities for industry and research. By developing indigenous EV components and testing capabilities, the project will reduce Pakistan's dependency on imports, lower costs, and encourage local industry growth. Additionally, it will support the transition to a greener transportation sector, aligning with global sustainability goals and creating new business opportunities in the emerging EV market.

Dr. Fiaz Ahmad Chaudhry
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
fiaz.chaudhry@lums.edu.pk

Sustainable Energy Informatics Lab

Sponsor: HEC
Funding Amount: PKR 80,692,712
Project Initiated in: 2018

This research aims to establish a research, development, and innovation lab, to be a consultancy center for the government, to investigate innovative solutions, to develop new demand-side management techniques, to help the power sector in identifying non-technical losses, and to develop a repository of energy, power, and sustainability data. The goal of the research SEIL would be to provide energy data analytics-related research, development, innovation, and consultancy needed in the smart grid planning, deployment, and operation in Pakistan.

100% Renewable Electricity Grid Study

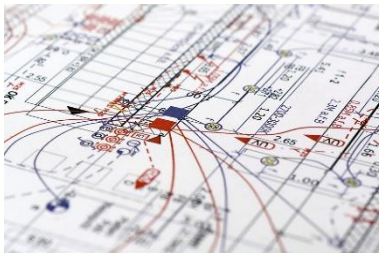
Sponsor: European Climate Foundation
Funding Amount: PKR 114,526,987
Project Initiated in: 2023

Tara, a philanthropic foundation dedicated to accelerating Asia's energy transformation, is supporting a research project to guide Pakistan towards a 100% renewable electricity grid. The LUMS Energy Institute (LEI) is conducting simulations, scenarios, and sensitivity analyses to propose a sustainable energy transition. Their goal is to persuade the government to set a net-zero target for the electricity grid by 2040, aligning with global objectives. The study's results and recommendations will empower LEI to advocate for this 2040 net-zero policy target, to secure its adoption by 2026.

Innovative Buildings

Sponsor: European Climate Foundation
Funding Amount: PKR 24,151,951
Project Initiated in: 2022

This project proposes to study the impact of various attributes that affect energy consumption in buildings. The research focuses on existing building architecture, building materials, heating and cooling mechanisms, and design, exploring measures to improve energy consumption efficiency and assist development authorities in creating better long-term policies for future building designs.



Electrical & Power Equipment Manufacturing Sector Indigenization Plan

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2024

The Power Sector Indigenization Program aims to revolutionize Pakistan's approach to its energy infrastructure development and manufacturing capabilities. Through meticulous analysis, this program seeks to identify imported finished goods and raw materials currently utilized in the power sector, assess their potential for localization, and initiate the domestic production of these essential components. Central to this initiative is the electrical equipment sector, including transformers, circuit breakers, current and potential transformers, generators for thermal power plants, solar panels, wind turbines, and insulators, among many others. The program will evaluate the feasibility and benefits of domestically manufacturing this critical electrical equipment. By shifting towards local production, this project aims not only to reduce dependency on imports but also to strengthen Pakistan's manufacturing base in the power equipment sector. Following the establishment of local manufacturing capabilities, the program will outline an export plan to position Pakistan as a key player in the global market for power equipment.

Dr. Hassan Abbas Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
hassan.khan@lums.edu.pk

Reliability Modelling and Assessment of Smartphone Batteries for Lifetime Enhancement

Sponsor: LUMS
Funding Amount: PKR 995,000
Project Initiated in: 2022

This project aims to develop an interface system using an external sensor network to find out the real-time (in-service) performance of smartphones under the active operation of major apps such as WhatsApp, Facebook, Facebook Messenger, Skype, Zoom, PUBG, Instagram, Snapchat, TikTok, and others. These apps will be tested on multiple smartphones to evaluate consumption profiles and modeling parameters.

Energy Transformation

Dr. Ijaz Haider Naqvi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ijaznaqvi@lums.edu.pk

A Comprehensive Framework for Maximizing Lifetime Value of Battery Energy Storage Systems with Health-Aware Energy Arbitrage

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

In this project, the primary aim is to establish a framework for sustainable and health-aware energy arbitrage. The research goals focus on creating a smarter way to use BESS by considering battery degradation. The aim is to develop strategies that maximize the lifespan of these batteries while reaping the economic and environmental benefits of energy storage. Ultimately, the research contributes to a more sustainable and efficient energy future. This research project encompasses financial, technical, environmental, regulatory, and scholarly impacts, each contributing to a more sustainable, efficient, resilient energy industry and clean energy storage sector.

Prof. Nauman Ahmad Zaffar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
nauman.zaffar@lums.edu.pk

Energy Conservation and Efficiency Consultation

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

The project offers expert guidance to organizations seeking to reduce energy consumption and improve efficiency. It identifies areas of inefficiency, develops reduction strategies, and implements cost-effective solutions to minimize waste. This project is crucial as it reduces energy costs, improves financial performance, and minimizes environmental impact. It enhances energy security and sustainability. It also improves productivity and supports organizations in meeting energy-related regulations. By achieving these aims, the project contributes to a sustainable future, supporting organizations in achieving their environmental and financial goals, reducing costs, and promoting a greener tomorrow.

Dr. Naveed Arshad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveedarshad@lums.edu.pk

Enabling Municipalities to Harness Digital Energy Data

Sponsor: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
Funding Amount: PKR 12,095,011
Project Initiated in: 2021

This project proposes to demonstrate the impact of digital energy data for utilization in the Energy Management System (EnMS) for large buildings. The activity involves extensive real-time data collection from various high-power-consuming appliances and the main distribution box in the selected buildings. The data is processed to yield various short and long-term measures that can be implemented to enhance the energy efficiency of the building. Furthermore, based upon the collected data, input parameters, and other conditions such as temperature and humidity, etc, the EnMS suggests high, low, and zero-investment measures along with their payback periods that can be used to conserve energy. The system can model the potential efficiency that can be achieved under a range of Energy Conservation Measures (ECMs). The proposed system is a web application to enable its utilization by the wider community. A key vertical of the proposed activity is to disseminate the results and obtained insights, as well as conduct training of personnel to allow wider applicability of ECMs in other buildings.

Improving Electricity Distribution System through Dynamic GIS Based Asset Management

Sponsor: National Centre of GIS and Space Applications (NCGSA)
Funding Amount: PKR 10,592,000
Project Initiated in: 2022

The power sector of Pakistan has been facing problems for the past many years. While the country has adequate power generation to fulfil our needs, the transmission and distribution are not resilient enough to provide a reliable electricity supply to consumers. In particular, the distribution companies (DISCOs) face tremendous challenges in the upkeep of their assets. Frequent outages and power failures are a common occurrence that impacts the financial lifeline of the country. In this project, the goal is to develop a GIS-enabled system for preventive maintenance of the distribution system assets. This system provides a dynamic view of the distribution grid with which DISCOs can perform system updates and reconfigurations before any asset is overloaded and may compromise the whole grid.

Energy Transformation

Keeping Our Cooking Stoves Burning Beyond 2030: How Can Pakistan Mitigate the Impact of Depleting Natural Gas Reserves?

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This project aims to develop a roadmap for building electrification for the country. It shall drive its policy recommendations with a data-driven approach, evaluating the impact of residential electrification on the grid, consumer behavior, market trends in developed and developing world, and the broader implications of such an undertaking for the socio-economic uplift of the country.

Dr. Raheel Zafar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
raheel.zafar@lums.edu.pk

Robust Self-Healing Control Actions with Microgrid-Based Fault Isolation and Service Restoration in Smart Distribution Grids

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project is making a smart system to help control electricity. It's like a special helper that can fix problems quickly when something goes wrong with the power grid. The project aims to make a special tool to help us understand how solar power works, so we can use it better. This project is finding the best way to fix problems in the power grid, so everyone's lights stay on. It is creating a special team of helpers (BESS and PV inverters) to work together and keep the power on, even when something goes wrong. It is planning to use all the available tools to fix the power grid quickly and efficiently, so everything goes back to normal. This project can help to make sure we have electricity when we need it. It's like having a special backup plan to keep the lights on and our homes warm or cool.

Dr. Ali Rauf
Syed Babar Ali School of Science and Engineering (SBASSE)
Assistant Professor
ali.rauf@lums.edu.pk

Photo Reforming of Biomass to Produce Methanol, a Sustainable Biofuel

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

The depletion of fossil fuels and their contribution to global warming and pollution have been known for a long time and are a famous research topic. There are many other methods of getting energy, like getting it from renewable resources like the sun and water, but these are difficult to store as they make electric energy, and storage energy should be chemical. This project aims to make syngas, such as methanol, from sunlight, which would make it possible to store the energy. This methanol is made from biomass that is less dangerous and emits very little CO2 as compared to methanol made from natural gas. This will allow us to make biomass a good intermediate for energy that would provide sustainable energy with reduced global warming and greenhouse gases.

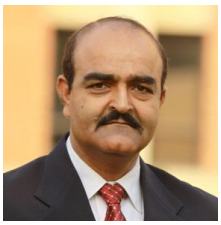
Dr. Basit Yameen
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
basit.yameen@lums.edu.pk

Identification of Cenospheres in Biomass Fly Ash

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

The objective of this project includes utilizing at least three samples of fly ash (not more than 500 grams each) to identify Cenospheres. The identification process is expected to be completed in a short period due to the consultant's extensive experience working with similar ash residues. This study aims to explore the potential of these microscopic, hollow spheres in various industrial applications, such as lightweight construction materials or fillers in composites. By leveraging expertise in analyzing ash residues, the project seeks to establish a cost-effective and sustainable process for extracting and utilizing Cenospheres, contributing to waste minimization and value addition to biomass by-products.

Dr. Falak Sher
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
fsher@lums.edu.pk



Biomass-Derived Chemical-Assisted Hydrogen Evolution Reaction (CAHER) Using Nanoporous Metallic Foams Electrocatalysts

Sponsor: HEC
Funding Amount: PKR 5,430,000
Project Initiated in: 2023

This project seeks to mediate the needs of hydrogen through other reactions than biomass. A special material called nanoporous foams is used in this method of production of hydrogen gas. This project has multiple aims mainly to create special materials called nanoporous metallic foams and nanoporous metal oxides. Then to find biomass-based chemicals that can be easily converted into useful products using electricity. After that find the best conditions for producing hydrogen gas from water using a chemical-assisted process. And lastly to train students, including women and researchers, to work on this project and gain valuable skills. This project is helping to gain almost cost-free hydrogen gas for further use in electricity-making purposes.

Dr. Fiaz Ahmad Chaudhry
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
fiaz.chaudhry@lums.edu.pk

Tara Grant

Sponsor: European Climate Foundation
Funding Amount: PKR 9,470,424
Project Initiated in: 2021

This project critically reviews and analyses the Indicative Generation Capacity Expansion Plan (IGCEP) of the National Transmission & Despatch Company (NTDC), conducts sensitivities, and proposes measures that support maximum penetration of renewable energy-based electricity which reduces the usage costs for consumers, and a policy framework for project development in the power system planning process. The project aims to enhance energy security and sustainability by integrating renewable energy resources into the national grid. It emphasizes the need for adopting advanced forecasting techniques and robust infrastructure planning to accommodate variable renewable energy sources. Additionally, the outcomes of this project will contribute to developing strategies for minimizing carbon emissions while ensuring affordable and reliable electricity for end-users.

Dr. Ghayoor Abbas Chotana
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Associate Professor
ghayoor.abbas@lums.edu.pk

Organic and Inorganic Hybrid Materials for Energy Conversion and Storage

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 5,010,600
Project Initiated in: 2021

Developing countries like Pakistan are struggling to realize and plan the energy-environment-economic nexus. Pakistan's heavy reliance on fossil fuels results in hefty import bills and a significant financial burden at the local, regional, and national levels. In comparison, the production and use of renewable energy is a reliable way of import substitution, self-sufficiency, and a sustainable energy system. Further, renewable energy promises socio-economic prosperity, human well-being, and environmental safety. The proposed project includes the design and production of electrocatalysts, photocatalysts, and hybrid porous materials for hydrogen production and storage. The project rationalizes the adoption of innovative renewable technologies in Pakistan to meet its sustainable development goals. In the future, green hydrogen production through this technology will be used in industries like fertilizers, steel, oil refining, and transportation.

Dr. Hafsa Qamar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
hafsa.qamar@lums.edu.pk

Indigenous Development of a Low-cost and Customizable Inverter for Renewable Energy Applications in Pakistan

Sponsor: HEC
Funding Amount: PKR 10,597,250
Project Initiated in: 2023

The energy crisis is the largest single drain on Pakistan's economy. This energy crisis originates from a huge reliance on fossil fuels in the power generation and transportation sectors. This project is introduced to curtail the challenges related to the energy sector. This project aims to design and develop a low-cost, customizable inverter for renewable energy systems in Pakistan. The inverter is tailored to meet the specific needs of local renewable energy applications. It promotes sustainable energy solutions and reduces dependence on imported technology. The aim is to ensure customizability to meet specific local energy needs. It also helps to promote sustainable energy solutions in Pakistan and to reduce dependence on imported technology. By developing a low-cost, customizable inverter, this project contributes to Pakistan's renewable energy growth and energy independence.

Dr. Hassan Abbas Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
hassan.khan@lums.edu.pk

Low-Cost, Circular, Plug & Play, Off-Grid Energy for Remote Locations Including Hydrogen (LOCEL-H2)

Sponsor: European Commission
Funding Amount: PKR 409,226,298
Project Initiated in: 2023

Almost 800 million people have no reliable access to electricity, primarily in the developing region of Asia. That is why this project is initiated to develop a highly scalable, ultra-low-cost, plug-and-play, renewable-powered microgrid. Moreover, to develop a cost-effective, multi-vector storage system based on batteries. LOCEL-H2 will utilize a modular, plug-and-play system that integrates renewable energy sources (such as solar, wind, and hydropower) with advanced energy storage technologies (like batteries and hydrogen fuel cells). This hybrid approach will enable efficient generation, storage, and distribution of energy, ensuring a reliable and constant power supply. Firstly, it will provide widespread adoption of low-cost, circular, and sustainable off-grid energy, empowering millions of people to access reliable energy and thereby improving their overall quality of life. Secondly, the project's innovative approach to hydrogen production and storage will pave the way for a hydrogen economy in remote areas, enabling the use of hydrogen fuel cells for transportation and power generation, which will help reduce dependence on fossil fuels and mitigate climate change.

Offgrid Electrification for Developing Countries and Africa (LOCEL)

Sponsor: European Commission
Funding Amount: Confidential
Project Initiated in: 2024

This project aims to provide off-grid electrification in developing countries and in Africa. This initiative focuses on supplying the necessary equipment and resources to support electrification efforts in remote areas. The goal is to enhance energy access and improve living conditions through sustainable solutions.

Dr. Irshad Hussain
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
ihussain@lums.edu.pk

Development Of POM-MOF-Based Materials for High-Power Battery Design in Real-Time Applications

Sponsor: HEC
Funding Amount: PKR 7,311,600
Project Initiated in: 2023

This project is about making material for batteries that can be easily charged. It will be suitable for real-time applications like electric vehicles, renewable energy systems, and power backup. The materials being developed are called POM-MOF (Polyoxometalate-Metal Organic Framework) based materials. This project aims to design and develop POM-MOF (Polyoxometalate-Metal Organic Framework) based materials for high-power battery applications. And to optimize the materials' properties for real-time applications, such as fast charging and high discharge rates. Integrating the developed materials into battery prototypes and testing their performance in real-time scenarios is also helpful. By achieving these aims, this project could contribute to the advancement of energy storage technology, enabling the widespread adoption of renewable energy sources and reducing our reliance on fossil fuels.

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

Application of Sociotechnical Systems (STS) Theory to Manage the Transition of Mobility and Manufacturing Value Chains to Sustainable Energy Sources

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

This project aims to contribute to the national efforts to promote the use of sustainable energy through research undertakings in the areas of diffusion of electric mobility in Pakistan and the effects of energy transitions in Pakistan on indigenous manufacturing value chains. The project outcomes will play a role, within the scope and confines of an academic undertaking, in helping the national exchequer save billions of rupees spent each year on the import of petroleum-related products. The savings can later be diverted to more useful purposes of the socio-economic development of the country. Moreover, by helping develop a new industry (EV value chain) and other industrial sectors, the findings of the project will prove to be a catalyst for creating new job opportunities in the country. This will further add to the development of social and economic determinants of the country and lower the rate of unemployment.

Dr. Naveed Arshad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveedarshad@lums.edu.pk

Developing Wind Forecasting System with Sparse Data Using Long Short-Term Memory (LSTM) Neural Networks

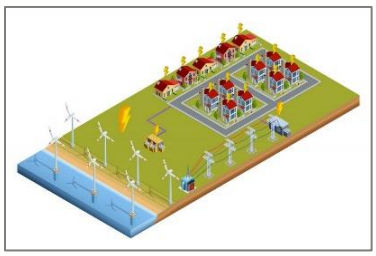
Sponsor: HEC
Funding Amount: PKR 10,714,800
Project Initiated in: 2023

The purpose of this project is to create a system of wind forecasting that can gather data from different locations, like farms. Other systems are working, but with a lot of errors. This Long Short-term Memory Neural Network is an advanced system of the network that collects data from all locations accurately, as good machinery is used in this project. This project aims to create and utilize the LSTM network with full accuracy and to create a system that can effectively handle sparse data for accurate predictions. Through this project reliance of Pakistan on other companies is reduced. It also contributes to gathering on-time and exact data on wind forecasts.

Residential Energy and Weather Dataset (REWD) of Pakistan

Sponsor: Meridian Institute
Funding Amount: PKR 113,035,764
Project Initiated in: 2023

The Residential Energy and Weather Dataset (REWD) of Pakistan project aims to create a comprehensive dataset of energy consumption patterns and weather data for residential buildings in Pakistan. The dataset will be used to analyze and understand the relationship between energy usage and weather variables, such as temperature, humidity, and solar radiation, in the Pakistani context. This research project collects and integrates data from various sources, including energy meters, weather stations, and surveys, to create a robust and representative dataset. The REWD dataset enables researchers, policymakers, and industry professionals to develop energy-efficient solutions. It optimizes energy consumption and promotes sustainable development in Pakistan's residential sector.



Grid Modernization Through Multi-Microgrid-Based Virtual Power Plants

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

High transmission and distribution losses and high reliance on fossil fuels lead to severe energy access issues in Pakistan. This study proposes the modernization of multi-microgrids with smart virtual power plants to enhance renewable energy use at reduced cost. This project provides a roadmap for increasing renewable energy and highlights unreliable energy access, introducing a competitive energy market. The main aims are to improve energy infrastructure, reduce emissions, and support sustainable development goals to alleviate Pakistan's energy crisis.

Dr. Qandeel Almas
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
qandeel.almas@lums.edu.pk

Development of Heterogeneous Catalysts for Bio-Oil Valorization: A Path Towards the Production of Renewable Fuels and Chemicals

Sponsor: HEC
Funding Amount: PKR 14,904,000
Project Initiated in: 2023

This is a comprehensive research proposal that aims at the development of environmentally friendly feedstocks and energy-efficient processes using lignocellulose biomass. This also highlights the potential of lignocellulose biomass as a renewable feedstock to produce renewable fuels. It mainly aims to evaluate the performance of supported metal catalysts and metal-organic framework (MOF) based catalysts for the production and upgrading of lignocellulose-derived chemicals with the help of hydrotreating bio-oils. Secondly, to develop a cascade system using the best-performing catalysts to successively convert bio-oil fractions and increase the yield of certain bio-oil upgrading production. This project will contribute to clean energy and sustainable development goals for Pakistan. it will also help to save millions of dollars in imports of cellulose-derived compounds and will reduce the dependence on fossil fuels, and provide economic development and energy reliability.

Dr. Raheel Zafar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
raheel.zafar@lums.edu.pk

Near Real-Time Co-Optimization Engine for Integrating Utility-Scale Photovoltaics and Battery Storage in Smart Distribution Grids

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This research proposes a near real-time convex optimization-based control framework for the co-optimization of feeder reconfiguration with optimal dispatch of PV inverters and BESS. The feeder reconfiguration problem is nonconvex mainly due to the presence of discrete variables and nonconvex load flow equations. The proposed co-optimization engine can result in economic gains and a sustainable future by minimizing the distribution losses to improve economic gains, mitigating the voltage limit violations to increase the hosting capacity of current distribution grids, which can contribute towards the attainment of Pakistan's 2030 renewable goal and maximizing the load balance among feeders to relieve the anticipated overload, which can defer the feeder reinforcement investments. The outcome of this research will enable more efficient integration of renewable energy sources into the grid, ensuring the stability and sustainability of Pakistan's power distribution system. Additionally, it will provide an advanced, cost-effective solution for smart grid management, facilitating the expansion of clean energy infrastructure while reducing operational costs and enhancing grid resilience. The framework developed in this study can also be adapted to other regions with similar energy challenges, paving the way for a broader transition to green energy solutions globally. By optimizing grid performance, this project will help lower carbon emissions and support the global shift towards renewable energy.

Dr. Basit Yameen
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
basit.yameen@lums.edu.pk

Covalent Conjugates of P3HT and Non-Fullerene Acceptors: Towards Improved Photovoltaic Devices and Accelerated Artificial Photosynthesis

Sponsor: HEC
Funding Amount: PKR 2,123,200
Project Initiated in: 2023

This project focuses on developing innovative materials for use in solar cells and artificial photosynthesis systems by combining two well-known components: P3HT (a polymer commonly used in organic electronics) and non-fullerene acceptors (advanced materials known for their role in next-generation solar technologies). The primary aim is to improve the overall efficiency, performance, and long-term stability of photovoltaic devices, such as solar panels, making them more effective in converting sunlight into usable electricity. In addition to advancing solar cell technology, the project also seeks to accelerate progress in artificial photosynthesis, an area of research that imitates the natural process of photosynthesis in plants to generate environmentally friendly fuels and chemicals using sunlight. By forming covalent conjugates of P3HT and non-fullerene acceptors, the researchers aim to significantly enhance the materials' ability to absorb light, improve the transfer of electrical charges, and ultimately increase the functional output of the devices. The outcomes of this project hold great promise for the field of renewable energy. If successful, the research could lead to major breakthroughs in both clean electricity generation and sustainable fuel production. These advancements would contribute to reducing our dependence on fossil fuels and support the global transition to a greener, more sustainable energy future.

Dr. Hassan Abbas Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
hassan.khan@lums.edu.pk

Solar Nano Grid in Pakistan

Sponsor: Integration Umwelt & Energie GmbH
Funding Amount: PKR 6,903,305
Project Initiated in: 2021

The proposed idea is to unlock the maximum potential of solar in off-grid homes through a Peer to Peer (P2P) power-sharing mechanism. This proposed intervention (enabled through efficient DC microgrids) allows resource maximization, reduces costs, allows higher power utilization (direct impact on socioeconomic status), and creates an energy micro-economy at a village scale to bring people out of poverty through sustainable access to (and trade) electricity.

Village Carbon Insetting: Installation of Two Solar PV Micro Grids

Sponsor: Hima^Verte
Funding Amount: PKR 6,538,000
Project Initiated in: 2021

This ambitious and forward-looking project is designed to deliver clean, sustainable, and reliable electricity to remote and underserved communities in Punjab, Pakistan. The core objective is to harness solar energy by installing two state-of-the-art solar photovoltaic (PV) microgrids. These microgrids will not only provide a dependable source of power to villages that currently lack access to consistent electricity but will also contribute to reducing carbon emissions, supporting Pakistan's broader climate and energy goals. The project encompasses the complete lifecycle of microgrid development—including detailed system design, collaborative installation with local stakeholders, and final commissioning. A key innovation in this initiative is the use of a newly developed direct current (DC) microgrid technology, created by the project's principal investigators (PIs). This cutting-edge technology promises improved efficiency, reduced energy loss, and lower infrastructure costs compared to traditional AC-based systems. By integrating this new DC microgrid model into rural settings, the project not only promotes sustainable development but also builds a scalable and replicable model for other off-grid or energy-deficient areas in Pakistan and beyond. Ultimately, this initiative is expected to empower local communities, improve livelihoods, and serve as a model of village carbon insetting, wherein clean energy investments directly benefit the communities most vulnerable to climate change.

ENVIRONMENT

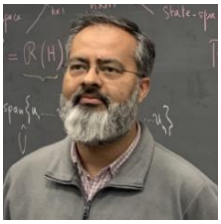
Dr. Ali Cheema
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
cheema@lums.edu.pk

Belief Formation, Signal Quality, and Information Sources: Experimental Evidence on Air Quality from Pakistan

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 3,478,594 | PKR 5,497,429
Project Initiated in: 2021

Adaptation to poor air quality in developing countries may be inadequate due to limited access to information. In Lahore, daily air pollution reports by the local environmental regulator, the Environment Protection Department (EPD), are unreliable, resulting in private initiatives such as the Pakistan Air Quality Initiative (PAQI) providing independent measures. Competition from private sources could improve citizens' access to reliable information and government accountability. Still, their efficacy may depend on how citizens perceive the relative qualities of these sources and whether they modify their beliefs and behaviors in response. This project studies how citizens form their beliefs about air quality and modify their behaviors based on the associated information source.

Dr. Muhammad Abubakr
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
abubakr@lums.edu.pk



A Scalable Off-Grid Early Warning and Communication System for GLOF Risk Reduction, at the Climate-Vulnerable Communities of Gilgit-Baltistan, Pakistan

Sponsor: APNIC Foundation
Funding Amount: PKR 21,364,429
Project Initiated in: 2023

The project aims to deploy cost-effective and open-source IoT technologies (LoRaWAN) to build an off-grid early warning system for flash flood risk reduction in the climate-vulnerable communities of Gilgit-Baltistan. The project also tests the open-source Meshtastic project for a low-cost off-grid short messaging service on Android phones, explores the solution space of telecom and IoT technologies (TV White Space devices, NB-IoT, GSM networks), and helps spread awareness of emerging technologies for future projects in the same region. The project builds the capacity of government agencies and NGOs for disaster risk reduction and mitigation by leveraging open-source and easily accessible technologies to ensure the sustainability and scalability of the technology.

Dr. Muhammad Tahir
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
tahir@lums.edu.pk

Environmental Noise Pollution: It's Mapping and Reduction in an Acoustical Network Framework Based on Wave-Domain Adaptive Techniques

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 10,649,000
Project Initiated in: 2019

The project goal is to address the increasing noise pollution, its impact on the population exposed to it, and its mitigation through Wave-Domain Adaptive Techniques. As the advancements in Information and Communication Technologies (ICT) are increasing, their role to improve the quality of life is also expanding with the proposition and development of solutions for modern healthcare, city infrastructure, better security for citizens, smart and secure city asset management and intelligent transportation etc., therefore, this project is one of the most important project of SBASSE because it proposes to leverage the advances in ICT by developing a system which provides a technological and sustainable solution to the problem of environmental noise pollution which has become one of the major environmental issue.

The Waste We Make: Applying Machine Learning for Analysing and Predicting Household-Level Solid Waste Generation and Composition Patterns

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This project assesses the amount of urban household solid waste by empirical terrestrial data collection and geospatial mapping techniques. The idea is based on the hypothesis that there is a relationship between waste generation patterns and building typology, which represents the socioeconomic conditions of their inhabitants. This, in turn, directly affects their way of life and the corresponding waste generation patterns. By assessing building types and their spatial distribution in Lahore and linking them to information gathered in field surveys, a reliable estimation of the quantity and composition of household solid waste at the city scale is possible. This will lead to a more sustainable management of waste utilization and a more effective disposal infrastructure in the future.

Climate

Prof. Nauman Ahmad Zaffar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
nauman.zaffar@lums.edu.pk

Living Indus - Green Startup Youth Champions Award

Sponsor: Food and Agriculture Organization of the United Nations
Funding Amount: PKR 1,414,683
Project Initiated in: 2023

The 'Living Indus - Green Startup Youth Champions Award' has been designed by UNFAO and UNICEF Pakistan in collaboration with the National Incubation Centre Lahore (NICL) that allows youth to create innovations in waste disposal, renewable energy usage, and other means to protect the environment in response to climate change. Pakistan's emerging green startup space has the potential to solve social, economic, and environmental problems, while also creating livelihood opportunities, particularly for the youth and women. In this regard, NICL to co-design the grant, whose purpose is to encourage young minds to come up with actionable solutions to our present crises. Under this grant, proper marketing strategies will be practiced, and proper training will be provided. It aims to encourage social entrepreneurs to become an integral part of the efforts towards reversing the deteriorating health of the Indus Basin.

Dr. Shahana Khurshid
Syed Babar Ali School of Science and Engineering (SBASSE)
Visiting Associate Professor
shahana.khurshid@lums.edu.pk

Aerosol Chemical Characterization in Lahore

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project is studying the air in Lahore. It's finding out what's inside the air we breathe. This helps us understand what's making the air dirty and how to make it cleaner. This project aims to study the air in Lahore to understand what's in it and how it affects us. This project uses special machines to collect air samples over many days, which helps it learn more about the bad things in the air. This project is also using numbers and statistics to figure out where the bad air comes from and what makes it worse. This project is adding new information to what we know about the air in Lahore. This project is helping us understand what's in the air right now, which is important because the winter smog is getting worse. This project also helps us learn where the bad air comes from and how it can harm our health.

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

Loss and Damage as a Mechanism for Understanding Climate Justice in Pakistan: A Comparative Review and Recommendations

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project explores how climate change affects Pakistan. It looks at ways to make things fair for people affected by climate disasters. It also finds solutions to help Pakistan deal with climate change. This project aims to understand how Pakistan can help countries that are badly affected by big climate disasters. It collects information about different ways that countries are already working together to deal with these disasters. Additionally, it studies how other regions, like South Asia and the Asia-Pacific, share money to help each other after disasters, so it can learn from them and make good changes in Pakistan too. This project helps make better-informed policy recommendations, which ensures that they are sustainable and have a long-term impact. It does this by providing useful information that policymakers can use to make good decisions.

Dr. Tauqeer Abbas
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
tauqeer.abbas@lums.edu.pk

Climate2Equal: Renewable Energy and Environmental Sustainability

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

In this research project, a comprehensive training workshop in the area of renewable energy and environmental sustainability is conducted. The workshop covers key topics such as the adoption of clean energy technologies, energy efficiency practices, and sustainable resource management. Participants are equipped with the knowledge and tools necessary to implement renewable energy solutions within their operations, contributing to both environmental conservation and cost savings. The project also aims to foster a culture of sustainability within the organization, promoting long-term environmental and economic benefits.

Dr. Murtaza Taj
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
murtaza.taj@lums.edu.pk

Early Warning System for Snow Leopard Monitoring

Sponsor: National Geographic Society (NGS) | Worldwide Fund for Nature (WWF-Pakistan)
Funding Amount: PKR 4,293,033 | PKR 1,170,000
Project Initiated in: 2022

The project, in collaboration with WWF-Pakistan along with NGS, is supported by WWF-Italy, WWF-Sweden, and WWF-Belgium to address the human-wildlife conflict in northern Pakistan, particularly concerning snow leopards. The project's primary goal is to tackle the persistent challenge of human-wildlife conflict in northern Pakistan, particularly concerning snow leopards. Historically, such conflicts have inflicted considerable losses on local communities, as snow leopards often prey on domestic animals, directly affecting people's livelihoods. To address this issue, various conservation strategies have been deployed, including community awareness initiatives and surveillance programs. This proposed initiative aims to implement an Early Warning System (EWS) for snow leopards, leveraging image and data processing technologies to promptly notify forest staff of leopard sightings, thereby preventing conflicts and safeguarding both human and leopard populations. Key components of the project include the installation of camera nodes, training for forest officers, real-time monitoring, and sharing of findings to mitigate conflicts and enhance snow leopard conservation efforts. The project's success will be gauged by the system's accuracy, its impact on preserving farmers' livelihoods, and the improved effectiveness of forest officers in resource management. By these means, the project endeavors to minimize conflicts, reduce instances of retaliatory killings, and ultimately contribute to the conservation of snow leopards in Pakistan.

Dr. Faheem Hassan Akhtar
Syed Babar Ali School of Science and Engineering (SBASSE)
Assistant Professor
faheem.akhtar@lums.edu.pk

Upcycling Poly (Ethylene Terephthalate) by Fabricating High-Performance Membranes for Seawater Desalination

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project is giving new life to plastic waste. It's converting plastic waste into filters. These filters will help with important separations around the world. This project has two big benefits: it reduces plastic waste's environmental harm and turns it into a valuable product. This product will help solve difficult water purification problems. The main aim is to extract plastic fibers from waste plastic. These fibers are used to make membranes. Through this project, the developers want to make membranes that can reject most salts but allow water to flow easily. The projected global RO market is estimated to reach from 3.1 billion USD to 5.0 billion USD by 2026 with the help of this project.

Membrane Development and Testing for the Effluent Treatment of Wastewater

Sponsor: Interloop Limited
Funding Amount: PKR 1,000,000
Project Initiated in: 2024

Increasing discharges of industrial wastewater, along with ever-stricter regulations for protecting natural water sources, have amplified the demand for highly efficient water treatment technologies. Here, different nanofibrous membranes enhanced with ion exchange properties are proposed as adsorptive membranes for the treatment of dye-loaded textile wastewater. With the careful selection of monomers, the side chain membranes would be synthesized in a single step and then further decorated with strong cation and anion exchange side groups. A series of dye sorption experiments on the nanofibrous membranes would reveal the adsorption kinetics and the effects of the polymer backbone, the charged side groups, and the hydrophilicity. A recycling study would be conducted to confirm the stability of the adsorbent membranes. These membrane-based solutions have the potential to be promising candidates for the treatment of dye-laden wastewater for the recovery of dyes for sustainable manufacturing.

Waste Management

Dr. Mian Muhammad Awais
Syed Babar Ali School of Science and Engineering (SBASSE)
Professor
awais@lums.edu.pk

Framework Development and Simulation of Holistic and Integrated Waste Management Approach (HIWMA-Sim) for Urban Areas of Pakistan

Sponsor: HEC
Funding Amount: PKR 6,038,400
Project Initiated in: 2023

This research project focuses on creating a new way to handle waste in cities, and instead of dealing with waste in bits and pieces, all waste solutions into one place. It's like a one-stop shop for managing all types of waste in a city. The proposed project aims to conceive, design, and develop a full-on theoretical framework i.e. Holistic and Integrated Waste Management Approach (HIWMA), which would be running four main lines of waste categories to ensure waste is dealt with in the 'unified' pipeline of the waste hierarchy options, in-housed all in one place in a city. The objective outputs of the proposed research, i.e., HIWMA methodology, e-HIWMA, and Data- and knowledge-based benchmarks of typical scenario simulations of the HIWMA application, would assist in explicitly covering the waste management along the three principal dimensions of the sustainable development philosophy, which are social acceptability, environmental gain (both protection and enhancement), and economic viability.

Dr. Naveed Anwar Bhatti
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
naveed.bhatti@lums.edu.pk

Cleanify: AI-Driven Solid Waste Management Using Battery-Less Iot

Sponsor: HEC
Funding Amount: PKR 9,480,000
Project Initiated in: 2024

Pakistan's major cities struggle with significant solid waste disposal issues, causing environmental hazards due to poor waste management infrastructure and delays in waste collection. Cleanify aims to tackle this problem with an AI-driven waste management system that uses battery-less IoT devices powered by harvested energy to optimize waste collection routes and schedules. By automating waste transport and analysis, Cleanify seeks to reduce operational costs and enhance efficiency, promoting sustainable waste management. The project addresses challenges in hardware design, intermittent energy supply, and optimization methods, providing a robust and energy-efficient solution. With a multidisciplinary team, Cleanify strives to offer a practical and sustainable answer to Pakistan's solid waste disposal challenges.

Waste Management

Dr. Salman Noshear Arshad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
salman.arshad@lums.edu.pk

Solar-Catalyzed Valorization of Plastic Waste Using Nanomaterials: A Small-Scale Solution to a Big-Scale Problem.

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2024

Plastic pollution, often termed as “white pollution,” is one of the most critical global challenges because of its persistent nature and the intricate threat that it poses to both living and non-living components of the ecosystem. As plastic can’t be recycled, it breaks into tiny pieces known as microplastics. These microparticles can disrupt food chains and have adverse effects on both human health and the environment. Plastics, made of long carbon-based polymers, are hard to recycle due to their chemical stability. Various methods like thermo-catalysis and biocatalysis have been used, with photocatalysis used to convert plastic waste into valuable fuels using sunlight. However, current methods have limitations, including CO2 emissions. This project aims to develop an efficient photocatalytic system that can effectively harness sunlight to catalyze the conversion of plastic waste into C2 fuels and build a small device to show how it works.

Dr. Tauqeer Abbas
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
tauqeer.abbas@lums.edu.pk

Designing Task-Specific Ionic Liquids for The Removal of Per-And Polyfluoroalkyl Substances from Industrial Wastewater

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project is creating special helpers to clean water. These helpers, called ionic liquids, are removing chemicals from wastewater. This project aims to check how much bad stuff (PFAS) is in the water used by textile factories and in nearby rivers and groundwater. It's also finding special helpers (ionic liquids) that can remove this bad stuff from the water. Then, it's making and testing these helpers to see how well they work in cleaning the water, and how other contaminants in the water might affect their performance. This project helps textile factories clean their water better. It makes a special tool to remove yucky chemicals (PFAS) from the water. This tool is made locally, so our textile industry can use it easily. It also saves money that would have been spent on importing treatment equipment from other countries.

Waste Management

Combining Coagulation and Microalgae for Treatment of Black Liquor Wastewater

Sponsor: Bulleh Shah Packaging
Funding Amount: 5,000,000
Project Initiated in: 2023

This proposal intends to initially treat black liquor wastewater from the paper and pulp industry by separating lignin from black liquor using an environmentally friendly coagulant. After coagulation, the treated wastewater will undergo further treatment with microalgae and/or agricultural waste-based adsorbent to meet the biological oxygen demand (BOD) discharge requirements set by Bulleh Shah Packaging Pvt. Limited (BSP). Black liquor contains high levels of BOD and is harmful to aquatic ecosystems if discharged without treatment. The main objective is to remove lignin from black liquor and reduce BOD levels in wastewater. The research project is anticipated to provide a suitable method for the effective treatment of black liquor wastewater. By combining coagulation and microalgae treatment, this project aims to offer a sustainable and cost-effective solution for the paper and pulp industry, reducing environmental pollution while meeting regulatory discharge standards. The approach not only addresses wastewater treatment but also contributes to the circular economy by utilizing agricultural waste and microalgae, potentially opening new avenues for waste management in industrial sectors. This innovative treatment could be adapted for other industries facing similar environmental challenges, promoting eco-friendly practices and resource recovery on a larger scale.

Water and Waste Management for the Circular Economy

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2024

In this project, a one-day technical training workshop covers various water/wastewater and industrial waste management processes and perspectives in the context of the circular economy. The workshop focuses on sustainable practices aimed at reducing waste generation, optimizing water usage, and recycling materials to create closed-loop systems. It emphasizes the importance of adopting innovative technologies and solutions that contribute to environmental conservation and cost efficiency. Participants will gain practical knowledge on integrating circular economy principles into their operations, fostering long-term sustainability in waste and water management practices. Additionally, the workshop will facilitate networking among industry professionals, allowing them to exchange best practices and collaborate on future initiatives. The project aims to inspire organizations to implement circular economy strategies, ultimately reducing their environmental footprint while improving economic outcomes.

HEALTH

Dr. Agha Ali Raza
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
agha.ali.raza@lums.edu.pk

Impact Evaluation of Super Abbu: A Speech-based MNCH Platform in Pakistan

Sponsor: University of California, Davis
Funding Amount: PKR 22,240,872
Project Initiated in: 2020

Pakistan has the highest neonatal mortality rate in the world (44.2 per 1000 live births), accounting for 7% of the world's neonatal deaths, and among the worst maternal mortality rates in the region (178 per 100,000 live births). Despite efforts by the government and NGOs, these indicators remain high. Punjab has hired 48,000 Lady Health Workers (LHWs), introduced multiple ICT-based health monitoring systems, and launched the Punjab Health Line staffed by 150 doctors 24/7. LHWs' effectiveness is limited given Punjab's large population (100+ million), as they must visit nine homes per day and cover many tasks in a short time. High deployment costs, low smartphone penetration, and low literacy in rural areas have limited ICT-based interventions. This project developed and piloted Super Abbu, a speech-based service connecting expectant fathers to doctors and each other via simple phone calls. Super Abbu targets fathers, generating useful information for public health professionals and supplementing LHWs by providing accessible information between visits for those who are illiterate and without smartphones. Expectant fathers can leave questions without synchronous calls and access past Q&As asked by themselves and others.

Leveraging Polio Helpline for Creating RI+MNCH Awareness

Sponsor: University of Michigan
Funding Amount: PKR 34,000,081
Project Initiated in: 2021

The project seeks to achieve Sehat Tahaffuz 1166 helpline (managed by Islamabad EOC) to add ANC, and PNC to its existing options of immunization and Polio in Pashto and Urdu, making a Health Protection helpline. It also aims to enhance Super Abbu's (Super Dad) capability to answer MNCH and immunization questions comprehensively. Lastly, 1166 is set to be advertised to answer MNCH and immunization-related questions in addition to Polio on all the existing and new channels, including Billboards, TV / Radio ads, and through a speech-based online community like Baang.

Assistive Technology

Dr. Basit Shafiq
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
basit@lums.edu.pk

A Service-Oriented Framework for Developing Personalized Care Plans for At-Home Patients with Infectious Diseases

Sponsor: HEC
Funding Amount: PKR 4,882,800
Project Initiated in: 2023

During the last two decades, different diseases spread throughout the world, but the pandemic of COVID-19 beat them all. It demands personal health care with full privacy at home, so this proposal is given to mediate these challenges. This project aims to create a system that helps create personalized care plans for patients who are isolated at home. It uses a database of healthcare information and rules to create a customized plan for each patient based on their specific needs, health conditions, and location. This helps ensure patients receive the right care and support while they're at home. In this project, a fully structured form of patients' records is collected with privacy, and then research uses them to develop the care plan at home for those patients.

Dr. Basmaa Ali
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Adjunct Faculty Member
basma.ali@lums.edu.pk

AI in Primary Care

Sponsor: Syed Maratib Ali Religious and Charitable Trust Society | Shahid Hussain Foundation
Funding Amount: PKR 1,000,000 | PKR 1,000,000
Project Initiated in: 2023

Pakistan's health department is very weak. The health system faces multiple challenges, including incomplete patient identification and a lack of medical records. To address this issue, an innovative solution has been developed called Darcheeni, an AI-enabled physician assistant (AIPA). This tool listens to the doctor-patient conversation, contextualizes the decision-making, and generates plans for each patient. This project aims to enhance patient care and provide proper and timely treatment. It helps in keeping the medical records of patients. It helps in reducing human medical error and minimizes mistakes in treatment. It also helps in making scalable solutions according to locations. This project helps in making an advanced future.

Assistive Technology

Dr. Maryam Mustafa
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
maryam_mustafa@lums.edu.pk

Digital Street Theatre for Global Maternal and Child Health Education

Sponsor: University of Michigan
Funding Amount: PKR 16,904,312
Project Initiated in: 2019

The research goal is to conduct cross-cultural, interdisciplinary research to identify low-income mothers' health knowledge, attitudes, and behaviors that may lead to a reduction in maternal or infant mortality in those settings and design and test technology-enabled solutions that can help spread health education to low-income mothers in a format that is easily embraced by such communities. The study is aimed at arriving at developing technology or tech-use scenarios to transfer information about pregnancy and childcare to low-income women and reach generalizable lessons that apply broadly in contexts outside of Cape Town, Detroit, and Lahore.

Awaaz-e-Sehat: Empowering Maternal Healthcare with Voice-Enabled EMR

Sponsor: Bill & Melinda Gates Foundation
Funding Amount: PKR 29,833,076
Project Initiated in: 2023

Awaaz-e-Sehat (Voice) is an innovative project helping to revolutionize maternal healthcare in Pakistan. The purpose of Awaaz-e-Sehat is to address the challenges faced by MHCWs in Pakistan, including limited access to technology and inadequate training. which can lead to incomplete record-keeping and compromised care. It develops a voice-enabled, mobile phone-based conversational AI assistant for maternal healthcare workers (MHCWs). This project aims to empower MHCWs with a user-friendly tool to create and manage detailed Electronic Medical Records (EMRs). It also helps to access relevant clinical resources, improving the quality of care for pregnant women and new mothers. By developing Awaaz-e-Sehat, this project has the potential to transform maternal healthcare in Pakistan, improving outcomes, efficiency, and accessibility, while empowering MHCWs to provide the best possible care.

Dr. Muhammad Ali Siddiqi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
m.siddiqi@lums.edu.pk

Mice on the Move: Advancing Cerebellar Neuroscience through Wireless Head Stages

Sponsor: LUMS
Funding Amount: PKR 1,499,400
Project Initiated in: 2024

The primary goal of this research project is to revolutionize the field of cerebellar neuroscience by addressing the pressing need for 'wireless' neural recording in mice for 'prolonged durations' and to help advance our understanding of motor control and brain function. Specifically, this research aims to develop a novel hardware module integrated into wireless head stages for mice, which will significantly reduce data volume to enable local storage, thus eliminating the constraints of wired connections and allowing for extended, naturalistic experiments. By achieving this, the aspiration is to provide neuroscientists with a versatile tool that facilitates prolonged, high-quality neural recordings, enabling a deeper exploration of the cerebellum's role in motor control and other critical brain functions. Ultimately, this research seeks to contribute to the advancement of medical care in Pakistan and globally by laying the groundwork for potential breakthroughs in treating neurological disorders and injuries related to motor functions, thereby improving the quality of life for those affected by such conditions.

Dr. Muhammad Imran Cheema
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
imran.cheema@lums.edu.pk

Towards Developing a Point-of-Care Sensor for Detecting Major Depression

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

Mental health disorders are highly prevalent globally, but their evaluation takes lengthy sessions with psychiatrists spanning days to weeks. Nowadays, the trend has shifted to evaluating various markers such as brain-derived neurotrophic factor (BDNF), cortisol, and serotonin in serum samples related to mental disorders. This project is based on using ELISA to check the markers and to make a portable optical fiber-based sensor for rapidly detecting BDNF and cortisol in serum. The goal of the project is to check the relationship between BDNF and cortisol in depressive disorders. Secondly, to compare the compatibility of optical fiber-based sensor results with ELISA. The successful completion of the project will result in an entirely new approach for depression detection based on a combination of detection biomarkers and optical fiber technology that may be attractive commercially and, at the same time, hold potential for mass adaptability.

CureMD Fellowship Grant - Towards Developing Rapid, Portable Tuberculosis Detector Using Optical Fiber Cavities

Sponsor: CureMD Research & Development
Funding Amount: PKR 1,650,000
Project Initiated in: 2021

This project, supported by the CureMD Fellowship Grant, is focused on the development of a rapid and portable diagnostic device for tuberculosis (TB), one of the most pressing public health concerns in many low- and middle-income countries. The core aim of the project is to design a point-of-care diagnostic tool that utilizes advanced optical fiber cavity technology to detect TB-specific biomarkers found in non-invasive samples such as human breath or urine. This approach offers a significant advantage over traditional diagnostic techniques, which are often invasive, time-consuming, and dependent on expensive laboratory infrastructure and trained personnel. The envisioned device will be compact, user-friendly, and suitable for use in remote or resource-limited settings, where access to medical facilities is often limited and the TB burden is disproportionately high. A major focus of the project is to overcome technical barriers associated with TB diagnostics by developing highly sensitive optical fiber cavities that can accurately detect low concentrations of biomarkers. Additionally, the device will be integrated with a simple and intuitive interface to ensure usability by frontline healthcare workers with minimal training. By addressing these technical and usability challenges, the project aspires to deliver a cost-effective and scalable solution for TB detection that can significantly reduce diagnostic delays and improve patient outcomes. Ultimately, this innovative tool has the potential to strengthen TB control efforts globally, especially in high-burden regions, by enabling early detection, timely treatment initiation, and more efficient disease management at the community level.

A Portable Optical Fiber Sensor for Detecting Aflatoxin M1 and Antibiotic Residues in Fresh Milk

Sponsor: HEC
Funding Amount: PKR 17,374,500
Project Initiated in: 2023

This proposal relates directly to the "food security" priority thematic area of national interest. The proposal will be based on our recent food security works for detecting aflatoxin M1, arsenic, and fluoride in aqueous solutions. This research will demonstrate an optical sensor that will be built by an innovative combination of chemical functionalities and fiber cavity attenuated phase shift spectroscopy to detect antibiotic residues and aflatoxin M1 in fresh milk samples. The primary objectives of the proposal are to fabricate fiber Bragg gratings and sensor heads using a nanojoules femtosecond laser, to develop AR/AFM1 detection surface chemistry protocol on silica optical fibers in terms of surface-nucleated silica/glass nanoparticles augmented polymer brush zippers and to detect AR/AFM1 in milk samples with permissible safe limits using the proposed portable optical sensor. The overarching goal of this project is to demonstrate interdisciplinary innovations to mitigate Pakistan's milk contamination problems.

Dr. Muhammad Shoaib
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
mshoaib@lums.edu.pk

Development of Next-Generation Precision Therapies for Head and Neck Cancer in Pakistan

Sponsor: HEC
Funding Amount: PKR 13,466,500
Project Initiated in: 2022

Head and Neck Squamous Cell Carcinoma (HNSCC) has a global mortality rate of roughly 50%, indicating a pressing need for the development of personalized therapeutic approaches. HNSCC patients are typically treated by induction chemotherapy or concomitant chemoradiotherapy. However, these approaches remain limited as they fail to consider the molecular differences between individual tumors. Consequently, a significant number of HNSCC patients need therapies that are tailored to their mutational signatures. To address this need, the main goal of this research is to employ an in-house next-generation cancer modeling software, “Theatre for in silico Systems Oncology” (TISON), and develop personalized therapies for HNSCC patients. This product is beneficial for patients with unresectable or therapy-resistant tumors. In addition, this product will also be precious in identifying drug response during chemotherapy or targeted therapy.

An Evaluation of Genomics-Guided Precision Therapeutic Outcomes for Triple-Negative Breast Cancer in Pakistan

Sponsor: Health Research Institute (HRI)
Funding Amount: PKR 5,000,000
Project Initiated in: 2022

This project aims to tackle the pressing need for tailored treatment options for triple-negative breast cancer (TNBC) in Pakistan, considering its aggressive nature and limited therapeutic avenues. The goal is to assess personalized therapies guided by genomics, focusing on individual mutational and gene expression profiles. The project seeks to establish a web-based model specific to TNBC for drug evaluation, with key objectives including analyzing gene expression and mutations, validating patient-derived models, and utilizing the TISON cancer simulation platform for personalized therapy computation. Anticipated outcomes involve the creation of TNBC cancer models tailored to Pakistan, enhancing insights into tumor development. The project will introduce an intuitive pipeline for cancer modeling and simulation, streamlining the integration of patient-specific data and rapid prototyping of tissue biopsy structures. Moreover, it aims to devise an in-silico protocol for personalized combination therapies and the discovery of new therapeutic targets, ultimately benefiting TNBC patients in Pakistan.

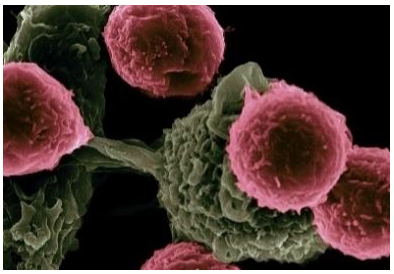
Dr. Nadeem Ahmad Khan
Syed Babar Ali School of Science and Engineering (SBASSE)
Associate Professor
nkhan@lums.edu.pk

Next generation Smart Biopotential Sensors for Ambulatory Patients

Sponsor: HEC
Funding Amount: PKR 11,449,200
Project Initiated in: 2023

Chronic Heart Diseases, Epilepsy, and Migraine are commonly occurring diseases that affect many people's lives in our country. This research aims to develop two advanced features (next generation) biopotential sensors for commonly occurring diseases/neurological disorders like Chronic Heart Disease, Epilepsy, and Migraine. An Electrocardiography (ECG) sensor-based device and an Electroencephalography (EEG) sensor-based device will be developed as a proof-of-concept for the proposed signal processing methodology for Chronic Heart Disease patients and Epilepsy/Migraine patients, respectively. The devices will offer a smaller form factor (compactness) to improve patient convenience and acceptability, low energy consumption for ultra-long service duration, better accuracy for reliability of use, smartness regarding satisfying doctor and patient requirements regarding functionality, and finally, trainability for patient personalization. The project contributes to the country's economy by creating a local solution that reduces the need to buy from other countries and even leads to exports as being of the next generation.

Dr. Safee Ullah Chaudhary
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
safeeullah@lums.edu.pk



Development and Delivery of Personalized Cancer Therapies through a Cloud-based Omics Pipeline and Model Repository

Sponsor: National Centre in Big Data and Cloud Computing (NCBC)
Funding Amount: PKR 14,978,980
Project Initiated in: 2021

Cancer is a complex, multifactorial disease with poor prognosis and limitations in drug response. Despite the development and availability of several treatment regimens, cancer patients continue to suffer from high mortality rates due to drug resistance and drug cytotoxicity. However, scientific and technological developments in the last decade have yielded precise molecular insights from high-throughput genomics and proteomics experiments, which have shed new light on mechanisms underpinning tumour growth and development. Clinical utilization of this omics-based data now represents the state-of-the-art practice in cancer treatment. The project aims to develop a cloud-based multi-scale cancer modelling pipeline and an associated digital modelling repository using omics-based big data towards developing and translating personalized targeted cancer therapeutics. To this end, six clinical case study models of Oral Cancer,

Colorectal Cancer, Pancreatic Cancer, Neuroblastoma, Autophagy, and Warburg Effect are in the process of development by using the new cancer modelling platform “Theatre for in silico systems oncology (TISON)”.

Enhancing Preparedness of Pakistan's Healthcare Ecosystem through Development of a National Health Information Management System

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

Health data digitalization and integration are one of the biggest national challenges in Pakistan and obstruct the effective provision of high-quality healthcare to the public. This project proposes to develop a unified national Health Information Management System (HIMS) that can be made available for ubiquitous deployment across Pakistan’s healthcare ecosystem. The proposed platform is expected to be freely available as an open-source enterprise software solution with components for managing hospital workflows, patient care, clinical practice, laboratory testing, emergency response, reporting dashboards, etc. This project can replace paper-based healthcare practice across the country by developing an HIMS, where incomplete and incorrect medical records frequently lead to inaccurate or unreliable diagnoses and poor management operations. It can help usher in a knowledge-based healthcare ecosystem by leveraging data interoperability, strengthening collaboration among stakeholders such as public and private hospitals, governments, paramedic and forensic services, diagnostic centres, and insurance companies.

Dr. Suleman Shahid
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
suleman.shahid@lums.edu.pk

Digitally Gamified Tools for Screening and Remediation of Developmental Dyslexia in Urdu

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

Dyslexia is a widely underdiagnosed condition in Pakistan, resulting in a lack of facilities and professionals for remediation. This has significant consequences, as low academic achievement associated with dyslexia can lead to depression, anxiety, and even suicide. To address this urgent need, a comprehensive mechanism is required to screen, assess, and remediate individuals with dyslexia in the region. Leveraging technological advancements and the widespread availability of affordable smartphones, a technology-based solution becomes highly accessible. This project aims to develop a gamified dyslexia test battery that can be used for screening purposes and to identify the specific strengths and weaknesses of atypical readers. Additionally, a working prototype of a contextualized remediation tool will be created in the form of a serious game, tailored to children with dyslexia in the Urdu language. Considering the complexities of Urdu's orthography and word formation mechanisms, this

tool will undergo thorough testing before implementation in schools and homes, providing crucial support for children with specific learning difficulties, particularly developmental dyslexia.

Online Mental Health Therapy in the Pakistani Context: Exploring Barriers and Designing a Digital Aid to Improve Mental Health Therapy Experience

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

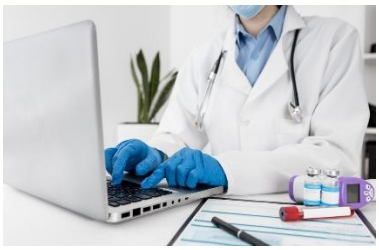
Due to issues like internet connectivity and accessibility in the Pakistan region, online mental health therapy is challenging. The project is to help understand the challenges and possible recommendations to overcome these challenges. The main aim of this project is to build an evidence base regarding online therapy. And to generate a user-friendly tool and design its internal space for the client. This project helps in dealing with many psychological disorders throughout Pakistan. It also replaces the traditional method of mental therapy and converts it into a more accessible environment.

Developing Digital Aids for Early Diagnosis and Intervention of Children with Learning and Developmental Disabilities

Sponsor: Babar Ali Foundation
Funding Amount: PKR 3,720,000
Project Initiated in: 2018

There is a rough estimate that around 2 million children in Pakistan are affected by learning disabilities, and the majority of them are diagnosed at a very late age. This project aims at understanding and addressing the needs of children with learning (Dyslexia) and developmental (Autism) disabilities in Pakistan, thus helping them to perform well academically and socially. For both groups, the emphasis is on helping parents, caregivers, and teachers in early diagnosis and supporting them with digital tools for improving the URDU language skills (reading, speaking, and eventually writing) of children with disabilities. Another key objective is to run a national prevalence study, starting from Lahore and then broadening it to Punjab, to understand the overall pervasiveness of these disabilities. Through the development of digital aids and early intervention strategies, this project will provide a foundation for improving educational outcomes for children with learning and developmental disabilities. Additionally, it will raise awareness about these challenges, advocating for better resources, training, and support systems for families and educators. By utilizing technology, the initiative seeks to create a more inclusive learning environment and ensure that children with disabilities can develop the skills necessary to thrive in their communities.

Dr. Shaper Mirza
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
shaper.mirza@lums.edu.pk



Ferozsons Initiative in Research Excellence for Promoting Clinical and Translational Research

Sponsor: Ferozsons Laboratories
Funding Amount: PKR 50,000,000
Project Initiated in: 2023

This project is for training physicians to perform clinical and population-based research in the fields of communicable and non-communicable diseases with the collaboration of LUMS, FLL, and I-HART. The project aims for the three organizations to work together to design a proper infrastructure, resources, and a specific curriculum for clinical research methodology. The three organizations will send proposals for funds allotment, and in collaboration with others, LUMS provides short courses, diplomas, and laboratories for relevant research and develops training modules for clinicians to learn basic and translational research in the areas of epidemiology, disease pathogenesis, and epigenetics. This will allow Continued Professional Development in the areas of clinical and population research. By enhancing the research capacity of physicians, the initiative will foster a more robust clinical research community in Pakistan. This will lead to better understanding, prevention, and treatment of diseases through evidence-based research. Additionally, the collaboration between LUMS, FLL, and I-HART will create a sustainable model for translating research into practice, ultimately improving healthcare outcomes and contributing to the overall advancement of medical research in Pakistan. The project also aims to foster cross-disciplinary collaboration, enabling physicians to apply advanced research techniques to real-world clinical settings and bridging the gap between scientific discovery and practical healthcare solutions. Moreover, the program's emphasis on training young clinicians and researchers will help build a generation of skilled professionals who can continue driving innovations in healthcare for years to come.

Dr. Basit Yameen
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
basit.yameen@lums.edu.pk

Development of RB221 as a Recognition Element for Sensing Carbohydrate Biomarkers

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

Reactive blue dye (RB221) has a strong attraction for the carbohydrate glycan lipoarabinomannan (LAM), a tuberculosis biomarker. Inspired by this, the study aims to develop RB221-immobilized surfaces to interact with and recognize carbohydrates, potentially creating new carbohydrate-sensing platforms. The research optimizes RB221 immobilization on iron oxide nanoparticles and tapered optical fibers, which may serve as optical sensors for detecting carbohydrate concentrations. This project is leading to low-cost, efficient diagnostic tools for diseases like tuberculosis, which addresses critical healthcare needs in Pakistan.

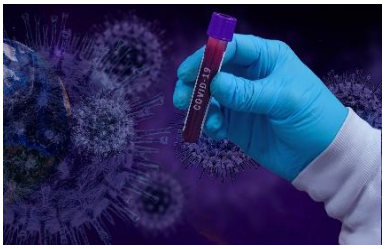
Dr. Muhammad Imran Cheema
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
imran.cheema@lums.edu.pk

Optical Fiber Sensor for Lipoarabinomannan Detection in Human Samples: Advancing Tuberculosis Diagnosis

Sponsor: University of Bergen
Funding Amount: PKR 1,295,239
Project Initiated in: 2024

Tuberculosis (TB) is one of the deadliest global health threats, and various methods have been used for its screening and diagnosis; however, these methods were time-consuming. Now, more sensitive and optimized methods such as nucleic acid amplification tests are in use, but don't show a response to medication once treatment commences, so past time-consuming methods were the only option left. Lipoarabinomannan (LAM), a glycolipid found in the cell walls of TB-causing mycobacteria, has emerged as a promising urine-based TB biomarker, and this project aims to develop an optical fiber TB sensor that would be sensitive and quick in detecting the levels of LAM from human samples. It will be free of hazards, and non-specialists can easily use it. This will allow the diagnosis of TB in a short time.

Dr. Shaper Mirza
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
shaper.mirza@lums.edu.pk

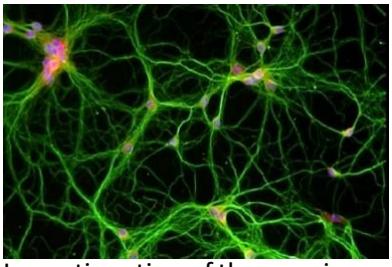


Development of Reagents to Determine COVID-19-IgG Antibodies by ELISA Technique A Proposal for Local Capacity Building

Sponsor: Shahid Hussain Foundation
Funding Amount: PKR 220,000
Project Initiated in: 2021

The pandemic COVID 19 has made it necessary for all to do research and introduce serological assays to measure the level of antibody responses in individuals of Pakistan, because Pakistan is lacking in affordable diagnostic techniques, and most asymptomatic patients remain undiagnosed. So, there is a need to develop rapid diagnostic tests. This project focuses on indigenous ELISA and making reagents to determine Ig antibodies in diseased. The project aims to make household immunoassays first to check antibodies and then make bulk reagents for diagnostic and research purposes. These processes tell the timing and strength of antibody responses and thus allow to use of the blood with antibodies for the treatment of severely ill patients. These steps will make an early diagnosis and control of the pandemic. By establishing a local manufacturing capacity for these diagnostic tools, the project will reduce dependency on imports and increase Pakistan's self-reliance in combating future health crises. Moreover, the development of rapid, low-cost, and accessible diagnostic tests will ensure that more individuals can be tested, facilitating quicker identification and treatment of infected individuals. This initiative will also support the country's broader public health efforts, contributing to the timely control of COVID-19 and enhancing the healthcare system's preparedness for future pandemics.

Dr. Amir Faisal
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
amir.faisal@lums.edu.pk

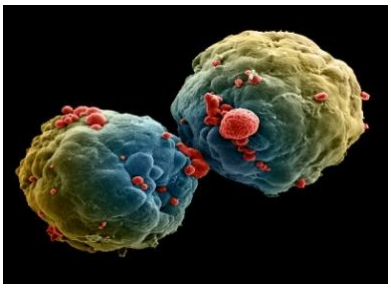


Cellular Assays to Aid Lead Optimization Studies for LDHA Inhibitors

Sponsor: Arctic Pharma
Funding Amount: PKR 3,853,538
Project Initiated in: 2021

In continuation of the ongoing collaboration between the Cancer Therapeutics Lab (CTL) at LUMS and Arctic Pharma, this project focuses on performing cellular assays on potential LDHA PROTAC compounds shipped to LUMS. It aims to produce LDHA protein in bacteria and purify it through affinity chromatography. The cell-based assays include determining the half-life of the LDHA protein via western blotting after protein synthesis inhibition with cycloheximide. It also assesses the reduction of LDHA activity by PROTACs or their precursors using the CyQUANT LDH assay in BT549 cells. The project evaluates LDHA levels in cells treated with PROTACs and studies their antiproliferative activity in BT549 and MiaPaCa2 cells using the SRB assay. Lastly, purified LDHA protein may be used in binding studies with LDHA PROTACs using the NMR facility at LUMS.

Dr. Muhammad Saeed
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
muhammad.saeed@lums.edu.pk

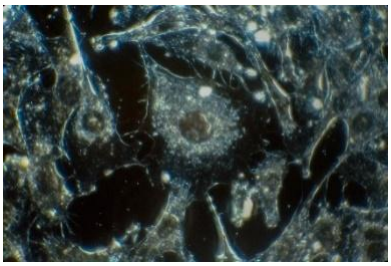


Discovering Etiology-based Strategies for the Prevention and Treatment of Estrogen-induced Breast Cancer

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 2,498,062
Project Initiated in: 2017

This project is focused on the identification, isolation, and characterization of proteins and designing strategies for the prevention and treatment of breast cancer by using the newly discovered proteins as therapeutic targets. The research aims to uncover the molecular mechanisms by which estrogen influences breast cancer development, with a focus on identifying specific biomarkers that could be targeted for more effective therapies. This approach could potentially lead to innovative, targeted treatments that are both more efficient and less invasive.

Dr. Muhammad Shoaib
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
mshoaib@lums.edu.pk



Characterizing a New Class of Cancer Driver Mutations

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This research employs cell-based models to study the genome protection function of the histones and the impact of histone H4 mutations on the integrity of the genome. These assays can help to determine if any given histone H4 mutation has a critical role in cancer development. This study has the potential to pave the way for future mechanistic studies to investigate the role of histone mutation-mediated molecular changes in cancer cells, which will have potential implications in the development of targeted therapies. By identifying specific mutations in histone H4 that may drive cancer progression, the project could lead to new biomarkers for early detection and more effective treatment strategies. The research aims to expand our understanding of the molecular mechanisms behind genomic instability in cancer and how histone mutations contribute to tumorigenesis. Ultimately, the findings could support the development of therapeutic approaches that specifically target these mutations, offering a promising avenue for personalized cancer treatment and improving clinical outcomes for cancer patients.

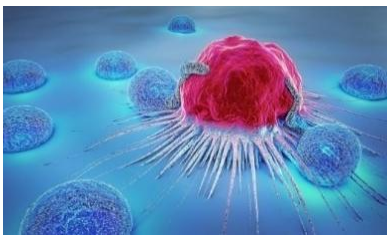
Dr. Muhammad Tariq
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
m.tariq@lums.edu.pk

Chaperoning Epigenetics: Molecular and Genetic Analysis of Polycomb-Chaperonin Nexus Linked to Cell Fate Maintenance

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This project proposes a detailed molecular and genetic analysis of Gene-7/PcG nexus to understand how Gene-7 may alter PcG-mediated gene silencing. Since PcG genes are known tumor suppressors and impaired PcG function leads to the onset of cancer, molecular characterization of this novel chaperone Gene-7/PcG link leads to understanding how cell fates can be altered, resulting in the onset of diseases like cancer. The findings could offer new insights into therapeutic strategies aimed at restoring proper PcG function and preventing cancer progression. Additionally, this research may pave the way for targeted epigenetic therapies that could manipulate gene expression to reverse or prevent disease onset.

Dr. Rahman Shah Zaib Saleem
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
rahman.saleem@lums.edu.pk

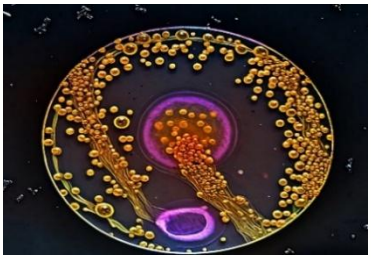


Development of Next-generation Chemotherapeutics Targeting Microtubules and Addressing a Key Concern of Multidrug Resistance in Cancer Cells

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This research synthesizes concise natural product-inspired, computational docking-guided library molecules and evaluates the compounds for their ability to kill cancer cells, ability to stop cell division, binding with microtubules, ability to evade PGP-mediated efflux, and ability to kill cancer cells that are resistant to current medications. The study aims to identify novel molecules that not only effectively target microtubules but also overcome multidrug resistance mechanisms, improving the efficacy of cancer treatment. By optimizing these compounds, the research could lead to the development of more potent and targeted chemotherapeutic agents, offering hope for patients with resistant forms of cancer.

Dr. Shaper Mirza
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
shaper.mirza@lums.edu.pk

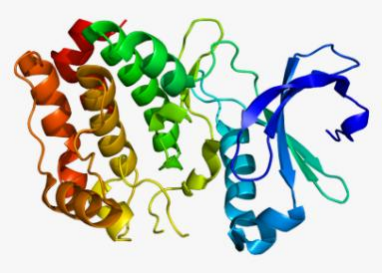


Global Genomic Survey of Streptococcus Agalactiae

Sponsor: Genome Research Limited
Funding Amount: PKR 35,693,552
Project Initiated in: 2023

Streptococcus agalactiae, also known as Group B Streptococcus (GBS), is a bacterium that can cause severe infections in newborns and adults with compromised immune systems. This project seeks to investigate the genetic diversity and global distribution of this harmful bacterium, which poses a significant threat to immunocompromised individuals. By conducting a comprehensive genomic analysis of S. agalactiae isolates from various geographical locations, this project aims to uncover the molecular epidemiology of this pathogen, including its evolution, transmission dynamics, and virulence factors, moreover, to generate a global genomic map of S. agalactiae, revealing its population structure, genetic diversity, and resistance patterns, which will inform the development of effective prevention and treatment strategies. This project will be an international effort that will require the generous participation and commitment of a diverse group of collaborators from around the world to ensure a high-quality outcome.

Dr. Amir Faisal
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
amir.faisal@lums.edu.pk



Characterization of Aminochalcones as Novel Aurora A Specific Inhibitor with an Ability to Overcome Multidrug Resistance

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

The human body is composed of trillions of cells that all derive from a single cell through a tightly controlled process of cell division. An elaborate “cell division machinery” ensures that cells only divide when required; any perturbation of this control can result in diseases like cancer, where cells divide uncontrollably. Many components of this machinery have served as targets for cancer treatment. One such component is the Aurora A protein, which is excessively produced by many cancer types. A chemical compound identified through in-house screening at LUMS blocks Aurora A and kills cancer cells. This compound, part of a library synthesized at LUMS, represents a new class of Aurora A-specific inhibitors and appears to overcome multidrug resistance, a major cause of chemotherapy failure. This project aims to characterize the compound’s specificity for Aurora A, its binding mechanism, its ability to inhibit cell division, and how it overcomes drug resistance.

Evaluation of The Anticancer and Antidiabetic Activities of Plants from the Skardu Region

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

The proposed research aims to investigate the anticancer and antidiabetic activities of plants collected from the unique and unexplored regions in and around Skardu. Skardu, located in northern Pakistan, is characterized by its diverse flora and fauna. It was the site for experiential learning courses offered by LUMS in collaboration with the University of Baltistan (UoB) during the summers of 2022 and 2023. The rich biodiversity of the region has been a source of traditional remedies for locals for hundreds, if not thousands, of years. As part of the Introduction to Lifesciences (BIO 102) course, students collected over 200 unique plants from six locations around Skardu. Although many of these plants have been used traditionally for various diseases, the underlying scientific basis for such biological activities remains largely unexplored. The proposed study, therefore, seeks to identify new sources of natural compounds that can be developed into effective anticancer and antidiabetic drugs. Additionally, this study could provide opportunities for the sustainable use of natural resources and the development of traditional medicine.

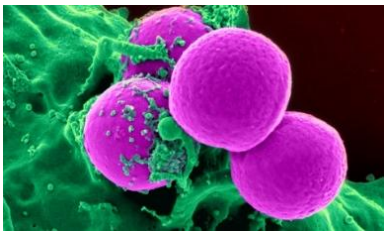
Drug Discovery

Drug Combination Screening with LDHA Inhibitor AP7404 in Cancer Cell Lines of Different Origins

Sponsor: Arctic Pharma
Funding Amount: PKR 6,104,131
Project Initiated in: 2023

The Cancer Therapeutics Lab (CTL) at LUMS and Arctic Pharma work together to find new cancer treatments. They have a drug called AP7404 that is good at stopping a certain protein (LDHA) that helps cancer cells grow. However, AP7404 doesn't work well on its own against many types of cancer cells. The team thinks that combining AP7404 with other drugs might make it more effective and reduce side effects. They want to test AP7404 with 12 other drugs on 20 different types of cancer cells to see which combinations work best. This helps them find new treatments that can target specific types of cancer.

Dr. Ghayoor Abbas Chotana
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Associate Professor
ghayoor.abbas@lums.edu.pk



Design and Synthesis of Electron-Deficient Fluorinated Sulphonamides and Evaluation of Their Antibacterial Efficacy

Sponsor: Shahid Hussain Foundation
Funding Amount: PKR 1,200,000
Project Initiated in: 2021

Urinary tract infections (UTIs) are amongst the common infections caused chiefly by uropathogenic Escherichia coli (UPEC), which account for nearly 80% of such infections. UTIs are becoming increasingly difficult to treat owing to the rapid spread of drug resistance among Gram-negative bacilli, specifically UPEC. The increasing frequency of infections caused by such pathogens, particularly in developing countries, has led to the misuse of broad-spectrum antibiotics, aiding the development of multidrug-resistant (MDR)bacteria and limiting the options for antibiotic therapy. Thus, there is a need to develop new antimicrobials to combat infections caused by these pathogens. This project aims to develop a novel sulfonamide compound with antibiotic efficacy against multidrug-resistant bacteria and determine if the antibacterial capacity of novel fluorinated sulphonamides is greater than currently available antibiotics for the treatment of urinary tract infections, primarily caused by E. coli and other infections caused by S. aureus.

Development of an Environmentally Benign Route for the Synthesis of Sulphonamides for Drug Discovery Programs

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

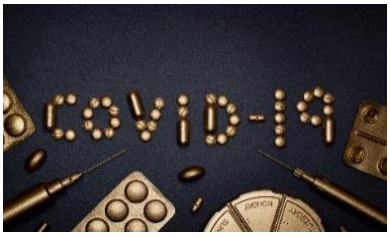
The discovery and development of new antibiotics are crucial to counter the growth of multidrug-resistant pathogens. Sulphonamides are a key structural motif in pharmaceutical and agrochemical industries, with therapeutic applications against various diseases. So, it is vital to provide such an environment where it can be prepared. The main aim of this project is to develop new Green Chemistry methodologies for the synthesis of medicinally active compounds and drugs and to reduce the number of synthetic steps by bypassing the need to use expensive and dangerous/explosive reagents. In the future, it will facilitate the design and synthesis of novel drugs for combating infectious diseases with minimal waste. It will also help in the production of the desired target compound in a more economical way to meet the synthetic challenges associated with medicinal chemistry and drug discovery.

Syntheses and Biological Evaluation of the Selective Inhibitors of 17-Hydroxysteroid Dehydrogenase and Novel Tubulin-Binding Agents: Potential New Drugs for Cancer Treatment

Sponsor: HEC
Funding Amount: PKR 2,685,250
Project Initiated in: 2023

Cancer has been a major global health problem for the past four decades and has had an enormous impact on economies and society. According to the reports released by the World Health Organization (WHO), cancer is considered the second major cause of death globally (after cardiovascular disorders). It is estimated that the number of newly diagnosed tumor cases will increase to 15 million episodes every year. Currently, the most common method used for the treatment of cancer is chemotherapy. However, powerful chemotherapeutics also harm non-cancerous cells (i.e., normal cells), slowing their growth and/or inducing apoptosis (cell death). This research project aims to design, synthesize, and carry out biological evaluations (anticancer and antibacterial activity studies) of fluor alkoxy substituted Di arylthiourea derivatives. It is expected that incorporation of fluor alkoxy groups will facilitate selectivity (in killing cancerous cells as opposed to normal cells) due to the presence of halogen-bonding interaction. If established, this project will lead to the development of new anti-tuberculosis and more selective anti-cancer drugs.

Dr. Muhammad Saeed
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
muhammad.saeed@lums.edu.pk



Computational Designing, Synthesis, and Evaluation of Benzothiophenes as Antiviral Drugs for the Treatment of COVID-19

Sponsor: LUMS
Funding Amount: 1,000,000
Project Initiated in: 2021

A surge of coronavirus Covid-19 cases in the world, especially in Pakistan, has put pressure on several infrastructural facilities, hindered the functionality of the workforce in all sectors, and burdened the economic as well as social stability of the country. Hence, the development of an effective therapeutic against this virus would undoubtedly be a breakthrough in medicinal sciences, both nationally and internationally. Once a potential drug-like molecule has been identified and further developed into a potential drug with the help of the local pharmaceutical company, this pioneering research would hugely impact the capacity building of the local pharmaceutical infrastructure. The goal of this project is to synthesize the computationally designed parent molecules, prepare libraries of their analogues, and then evaluate their antiviral properties in the conventional biochemical (antiviral) assays. This rational drug discovery approach is based on targeting (and inhibiting) the biological role of essential factors (so-called viral targets) of the virus and thereby hitting the viral reproductive system directly, without eliciting any side effects.

Design, Synthesis, and Optimization of Novel Compound Libraries for the Discovery and Development of Potential Antiviral Therapeutics

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

The COVID-19 pandemic is still a problem because the virus can change quickly. This means vaccines might not work well against new strains. We need to find new medicines to fight the virus. Schools in Pakistan should work hard to prepare and find solutions to this problem. Thus, institutes of higher education in Pakistan must be proactive in developing comprehensive paraphernalia. A new generation of benzothiophene derivatives will be synthesized using a successful organic synthesis strategy. These derivatives will contain an interesting scaffold of gallic acid, which has been computationally designed. So, the main aim is to synthesize compounds using the 96-well plate biochemical assays to identify them. And the conduct of NMR-based experiments to observe the atomic-level details of the interaction between the drug molecule and the viral target protein in the native form, and optimize the substituent pattern on the molecule. In the future, through this project, the development of an effective therapeutic against viral strains prevalent in Pakistan would undoubtedly alleviate these concerns and improve the status of Pakistan.

Synthesis and Evaluation of Novel Heterocyclic Compounds for Early-Phase Discovery of Potential Antiviral Drugs by Targeting Viral Proteases

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This research aims to address public health concerns in Pakistan regarding dengue and COVID-19 infections by developing potential antiviral compounds. With recurring dengue outbreaks and the threat of mutated strains of COVID-19, there's a critical need for specific antiviral drugs. The project focuses on synthesizing and evaluating new compounds to disrupt the reproductive cycles of these viruses, potentially leading to effective treatments. Additionally, training students in drug discovery and biochemical sciences not only strengthens local capacity in pharmaceutical research but also contributes to future healthcare advancements.

Dr. Muhammad Shoaib
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
mshoaib@lums.edu.pk

Developing a Targeted Drug Delivery Method for Incurable Prostate Cancer

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

The treatment of cancer targeting prostate cancer membrane antigen (PSMA) using radioisotopes for prostate cancer could revolutionize the treatment of incurable prostate cancer. To overcome the problems associated with current therapies, the major goal of this proposal is to develop a drug delivery method for the specific targeting of prostate cancer cells. In this regard, this project proposes chemical synthesis of the PSMA ligand, expressing and purifying cytotoxic protein(s), chemically mixing them with the PSMA ligand, and finally testing its targetability and killing efficiency in prostate cancer cells. The development of this delivery system provides an opportunity to cure prostate cancer. Furthermore, its employability is broader and, in principle, can be applied to treat other cancer types as well.

Dr. Safee Ullah Chaudhary
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
safeeullah@lums.edu.pk

Genomics-Guided Precision Therapeutic Outcomes for Triple-Negative Breast Cancer in Pakistan

Sponsor: LUMS
Funding Amount: PKR 999,600
Project Initiated in: 2023

One in every nine Pakistani women is suffering from breast cancer. Therefore, there is a big need for personalized therapies that are tailored to each patient's unique tumor profile. This would help patients get the most benefit from treatment with the least number of side effects. In this project, therapies for breast cancer are generated by the combination of unique molecular markers of the patients. This project aims to compute personalized therapy for the patients' tumor models and to compute personalized data of the patients to determine the exact targeting of the drugs on patients' tumor cells. This project is helping in minimizing the need for big laboratories for the treatment of breast cancer in a more economical way.

Dr. Shaper Mirza
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
shaper.mirza@lums.edu.pk

Pakistan Antibiotic Consumption Data Analysis and Policy Recommendations

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

The Grants intend to develop and implement a thorough plan for AMR. Every country has data related to antibiotic use by which AMR can be analyzed, but Pakistan has limited surveillance data, so the Fleming Fund Country Grant is aiming to set a baseline for AMC in Pakistan and monitor trends in AMC across three years at the national and provincial/regional levels. The project will assist the Fleming Fund Country Grant in providing an estimation of the number of grams of each antibiotic and provide information by mode of intake, so that a defined daily dose is measured. This project aims to assess the Antibiotic consumption rate and then get an idea of AMR in Pakistan.

Dr. Adnan Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
adnan.khan@lums.edu.pk

A Game Theoretic Approach to Evaluate Vaccine Efficacy for COVID-19

Sponsor: LUMS
Funding Amount: PKR 960,000
Project Initiated in: 2022

The proposed study aims to develop a game-theoretic framework to evaluate vaccination and social distancing as individual control measures. Starting with a mechanistic model for COVID-19 transmission dynamics, it incorporates key pathways, including asymptomatic cases and both high-risk and low-risk susceptible groups. Social distancing reduces contact rates, while vaccination decreases the number of individuals susceptible to infection. The study considers that the vaccine is imperfect, and some vaccinated individuals may still fall ill. The virus is assumed to mutate over time, reducing vaccine efficacy and requiring updated vaccines. Individuals' decisions to vaccinate depend on disease prevalence, mortality risk, and perceived vaccine harms. The study will determine equilibrium conditions based on parameters like vaccine efficacy, virus mutation rate, and vaccine reluctance.

Dr. Shaper Mirza
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
shaper.mirza@lums.edu.pk

Rapid Evaluation of the Hepatitis Control Program in Punjab (HCP)

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

The current national Hepatitis C prevalence is estimated to be 7.5% by medical experts. Most of the health service delivery programs at the Federal level have now cascaded down to the provincial levels. Punjab, being the largest province in terms of population, receives a proportionate budget for healthcare service delivery. The hepatitis control program aims to control the disease through prevention, testing, and treatment, as well as increasing awareness about the disease and its risk factors. The project will ensure that a robust program is implemented across the country to reduce disease burden.

HUMAN RIGHTS

Dr. Muhammad Fareed Zaffar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
fareed.zaffar@lums.edu.pk

UNICEF Pakistan Development of Child Protection Case Management and Referral System

Sponsor: Oxford Policy Management
Funding Amount: PKR 27,057,570
Project Initiated in: 2019

Establishing and strengthening a child protection case management and referral system is the primary focus of UNICEF's technical engagement in child protection with provincial governments. In this context, the project entails the provision of technical assistance by the consulting firm to support the respective governments of Balochistan, GB, Sindh, and KP towards establishing their respective provincial public child protection case management and referral systems, including a child protection information management system.

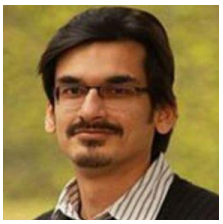
Dr. Sikander Ahmed Shah
Shaikh Ahmad Hassan School of Law (SAHSOL)
Associate Professor
sikander@lums.edu.pk

Protecting and Promoting Children's Rights in Pakistan

Sponsor: American Bar Association (ABA)
Funding Amount: PKR 28,773,567
Project Initiated in: 2020

This study aims to expand access to legal services for victims of child abuse and their families. The LUMS team is working with ABA-ROLI to deliver training in Lahore, Multan, and Islamabad on Standard Operating Procedures for paralegals to respond to and support survivors of child sexual abuse. They are undertaking a gap analysis of Pakistan's existing domestic legislation in comparison to Pakistan's international commitments concerning the protection and promotion of child rights. The discrepancies between international and domestic standards are compiled in a policy report. This report will be presented to all key stakeholders in the government, members of the judicial system, and civil society organizations. The project is beneficial to government and civil society representatives who attend the virtual conference, as the training workshops will equip them with crucial knowledge on responding to victims and survivors at the pre-trial and trial stages. This process will benefit the justice system in this pertinent area of concern.

Dr. Ali Raza
Mushtaq Ahmad Gurmani School of Humanities & Social Sciences (MGSHSS)
Associate Professor
aliraza@lums.edu.pk



Embracing Social Identities

Sponsor: Education Justice and Memory Network (EdJAM)
Funding Amount: PKR 10,167,474
Project Initiated in: 2022

This project investigates the social history of the transgender khwajasira community in Pakistan. The study encompasses three potential themes: an introduction to the community and its distinct characteristics, a social history of injustice, and a legal history of advancement. The project aims to retell stories of this community's culture, social integration, and violent history through the active participation of this community in the content creation and delivery.

Dr. Faiza Ali
Suleman Dawood School of Business (SDSB)
Associate Professor
faiza.ali@lums.edu.pk

Promoting Gender Equality in Pakistan HE: How to Break the Ceiling Despite the Caring Responsibilities

Sponsor: University of Southampton
Funding Amount: PKR 6,937,141
Project Initiated in: 2022

This project aims to promote gender equality in Pakistan's Higher Education (HE), specifically among women academics with caring responsibilities. Given that studies of minority academics in the Global North dominate the literature and tend to inform the current practices, this project contributes to academic women's career development by offering voices from women in Pakistan, a country in the Global South with significant gender career development disparity and traditional gender roles. This project particularly aims to include women with caring responsibilities as a group who have been shown to face several challenges while navigating academia. The purpose of this multistage project is to bridge gender disparity in Pakistan HE institutions by addressing equality and diversity issues among women academics with caring responsibilities.

Dr. Hadia Majid
Mushtaq Ahmad Gurmani School of Humanities & Social Sciences (MGSHSS)
Associate Professor
hadia.majid@lums.edu.pk

Reform Impacts: Analysing How Merit-based Medical Admissions have Affected Doctor Outcomes in Pakistan

Sponsor: Shahid Hussain Foundation | Colgate University
Funding Amount: PKR 1,500,000 | PKR 160,000
Project Initiated in: 2021

This project evaluates the impact of a medical admissions reform on doctor outcomes. In 1992, a pre-existing quota on female medical students was removed, and admissions were changed to being merit-based. Subsequently, many more women entered medicine, and gender ratios in the field were substantially altered. Using a mixed methods approach, the project fields 1000 quantitative and 125 qualitative surveys of doctors across Pakistan, including some doctors who attended medical school before the reform and some who attended it after the reform. In doing so, detailed information is gathered on pay scales, work hours, mentorship access, and reproductive burdens, among other outcomes, by gender. Using this data and exploiting gender ratio variation across medical specialties, the research explores how the reform affected medical outcomes while highlighting crucial gaps. In the end, the project looks to develop a detailed database on gender differences and factors affecting doctor outcomes, thereby paving the way for structuring policy reform aimed at improving doctor and ultimately patient well-being.

Towards an Intersectional Analysis of Urban Spatial Inequalities in Pakistan

Sponsor: University of Cambridge
Funding Amount: PKR 130,200
Project Initiated in: 2021

The interdisciplinary research project investigates the socio-spatial distribution of energy infrastructure in formal/informal urban settlements in Lahore, Pakistan. It addresses the government's inability to meet growing housing demands that result in the socio-spatial exclusion and marginalization of the income poor, specifically women, who are further disadvantaged through their inability to access essential resources and infrastructures of energy. The project aims to address the gap in current research on the reconstitution of architectural and urban spaces for equitable access to energy infrastructure in the Global South. It intends to take a multidisciplinary approach to the investigation, drawing from concepts in Architecture, Geography, and energy research**.** It caters to analyses of women's everyday practices and engagement with the energy infrastructure through fieldwork.

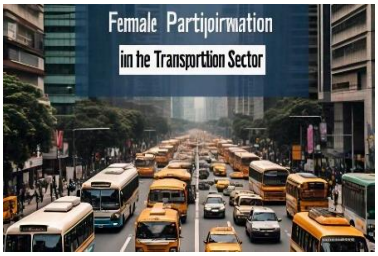
Inclusivity

Dr. Kashif Zaheer Malik
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
kashif.malik@lums.edu.pk

Increasing Female Employment in the Transportation Sector in Pakistan

Sponsor: JPAL The Abdul Latif Jameel Poverty Action Lab
Funding Amount: PKR 11,505,876
Project Initiated in: 2021

Pakistan has a particularly low female labor force participation rate. Public transport is often unsafe for women, adding further constraints to female employment opportunities. This project is a collaboration with the largest transportation network company in the region, Careem (a subsidiary of Uber). A pilot study was conducted where female job seekers were offered a potentially transformative income source while providing their customers with safe transportation. In this pilot, 50 women were offered a high-quality auto-rickshaw (with enhanced security features) and membership in Careem's driver program. The cost of the vehicle was financed with a flexible interest-free loan provided by a large microfinance institution. To measure impacts on female earnings and other household-level outcomes, another 50 women were selected as controls (only receiving information about earnings opportunities available through such work), and utilized high-frequency administrative data, phone surveys, and qualitative work to explore the potential engagement of women with the transportation sector.



Increase Female Participation in the Transportation Sector in Pakistan

Sponsor: University of Oxford
Funding Amount: PKR 21,739,015
Project Initiated in: 2023

Pakistan has a meager female labour force participation rate. Public transport is often unsafe for women, adding further constraints to female employment opportunities. This project aims to increase female participation in the transportation sector in Pakistan. It also addresses the gender gap and promotes gender equality. The project identifies barriers, creates awareness, and provides training and support to empower women. This helps to pursue careers in transportation, ultimately improving the sector's diversity and inclusivity. This project contributes to a more inclusive and diverse workforce, promoting gender equality, economic empowerment, and social progress in Pakistan. Additionally, the project advocates for policy reforms and infrastructural improvements that prioritize the safety and accessibility of women in public transport. By engaging key stakeholders such as government bodies, private companies, and community organizations, the initiative seeks to create a sustainable ecosystem that supports women's active participation in the workforce. This will not only improve women's economic mobility but also foster a cultural shift towards more inclusive professional environments across sectors. Through its long-term impact, the project will contribute significantly to narrowing the gender gap in Pakistan's workforce and enhancing women's role in economic development.

Dr. Maryam Mustafa
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
maryam_mustafa@lums.edu.pk

Exploring Changing Forms of Gender Issues in Urban Contexts of Pakistan

Sponsor: Oxfam
Funding Amount: PKR 1,830,834
Project Initiated in: 2022

With the imbalance in financial power resulting in reduced financial autonomy for women, and consequently, unequal power relations within the family and outside, women's financial empowerment is instrumental in addressing unequal power relations. This research aims to not only understand the prospects of going digital for women's socio-economic empowerment but also to help organizations and government bodies chart practical pathways for women's digital inclusion and inclusion in the economy. Women's increasing involvement in the economy and increased financial independence are expected to challenge the power imbalance within the family and social norms that label women primarily as caretakers and not breadwinners.

Impact of Workplace Harassment on Women in Patriarchal Contexts

Sponsor: International Development Research Centre (IDRC)
Funding Amount: PKR 4,451,996
Project Initiated in: 2020

The project delves into the experiences of female factory workers in Punjab, Pakistan, who endure harassment and gender-based violence. The primary objective is to gain a comprehensive understanding of the challenges these women face in their workplaces. The study also investigates the potential role of technology in empowering these workers by facilitating equal access to employment opportunities and providing safe spaces for sharing their narratives of workplace violence and harassment. By exploring innovative technological solutions, this project aims to contribute in creating a more inclusive and supportive environment for female workers, fostering a shift towards gender equality and safer working conditions.

Inclusivity

Dr. Saba Pirzadeh
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
saba.pirzadeh@lums.edu.pk

Women in Public Service in Pakistan - Oral History Archive

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This project aims to collect, transcribe, and archive oral history interviews of women in public service in Pakistan. The project focuses on the gendered experiences of participation and service in government in Pakistan, and its impact on individuals as well as institutions and communities. This research supplies unique and important documentation of the experiences of women in government.

Dr. Sher Afghan Asad
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
sherafghan@lums.edu.pk

Discrimination in Online Marketplaces

Sponsor: Sewanee: The University of the South
Funding Amount: PKR 470,213
Project Initiated in: 2022

This study conducted an audit of an online marketplace in a typical patriarchal context of Pakistan and performed an experimental evaluation to measure gender bias. Based on a repeated weekly census of listings on the marketplace, selected sellers who regularly sell on the marketplace were contacted through buyer profiles that unambiguously signaled gender without revealing caste, ethnicity, or other economic markers. Economic variables such as offered prices, delivery discounts, and product characteristics for each gender were recorded and analyzed. In addition, any unsolicited attempts from sellers to communicate with each gender, such as messages, phone calls, friend requests, etc, were recorded. This paper presents unique evidence on not just gender discrimination in prices and product characteristics but also on other facets of online interactions that may be a hurdle in the inclusion of women in the online marketplaces of patriarchal societies such as Pakistan.

Dr. Suleman Shahid
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
suleman.shahid@lums.edu.pk

Updating, Adapting, and Expanding for Non-Android Phones of VAW/G Of Humqadam App

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

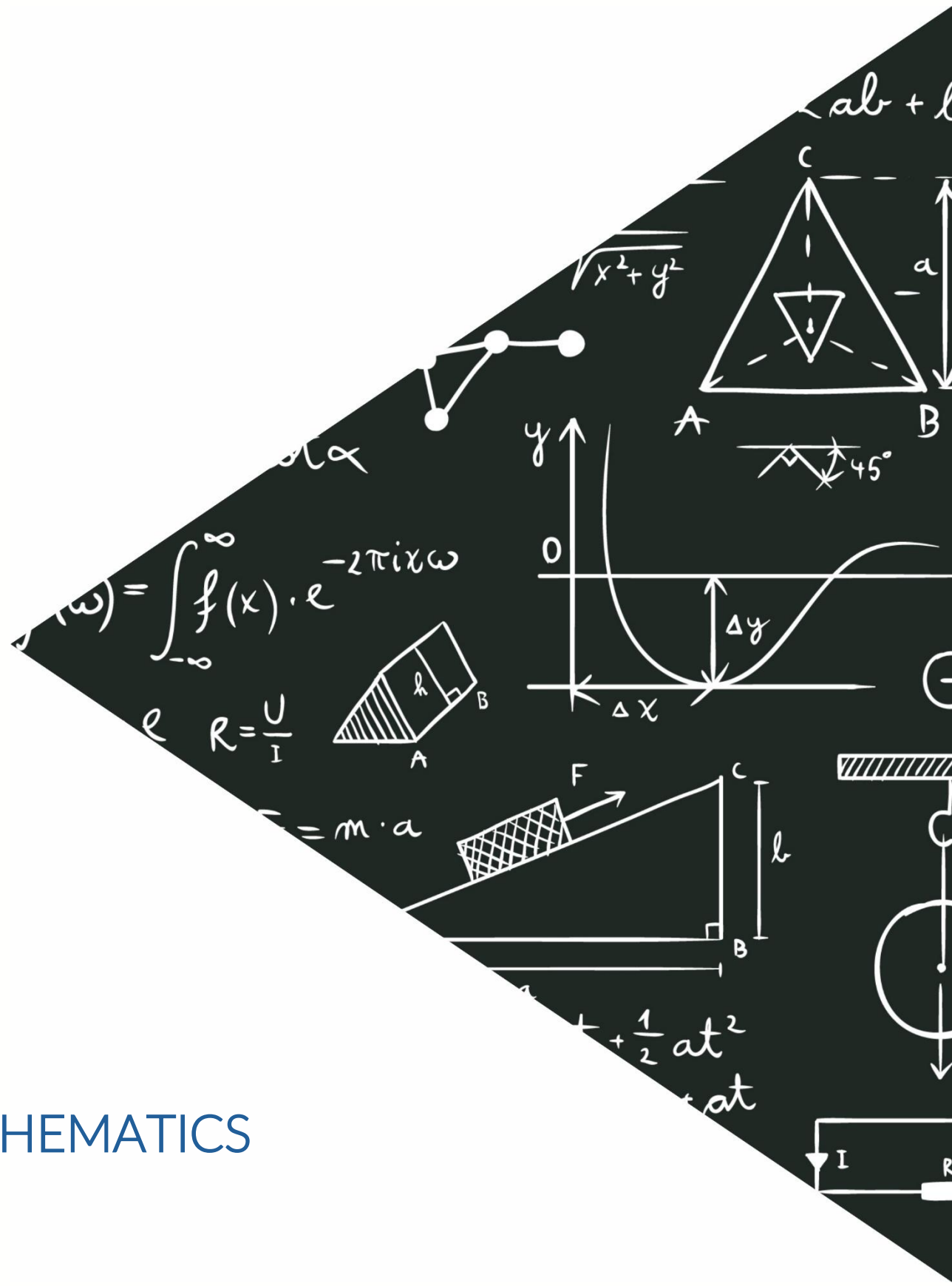
The project aims to enhance and broaden the reach of the HumQadam App, a vital tool for survivors of violence and abuse. The project seeks to update and adapt the app for non-Android devices, expanding its accessibility to a wider range of users. The purposes of this project include increasing the app's compatibility and user base, improving its features and functionality, and ensuring its availability to marginalized communities. By achieving these aims, the project aims to provide a safe, secure, and supportive platform for survivors of violence and abuse. Enables them to access essential resources, information, and services. Ultimately, the project seeks to promote gender equality, empower women and marginalized groups, and contribute to the prevention of violence and abuse.

Mr. Uzair Jamil Kayani
Shaikh Ahmad Hassan School of Law (SAHSOL)
Associate Professor
uzair.kayani@lums.edu.pk

Testing Gender Sensitivity in Pakistan

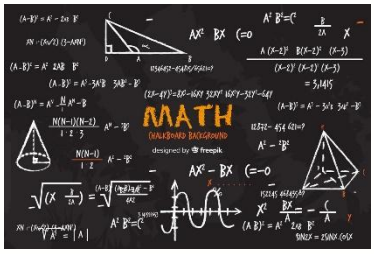
Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This project aims to enhance understanding of gender and its influence on Pakistan's social structure and opportunities. It fills a research gap by testing implicit gender biases among 500 law enforcement officials, lawyers, and civil servants. The study will form a basis for future research on bias in various professional groups and examine how such biases contribute to disparities for women, especially in legal contexts. It will also inform policy recommendations to improve gender equity in the legal and law enforcement sectors. The findings will support the development of training programs to reduce implicit gender bias and foster inclusive workplaces. Ultimately, the project seeks to promote a more gender-sensitive legal system that ensures fair access to opportunities for all.



MATHEMATICS

Dr. Ali Ashher Zaidi
Syed Babar Ali School of Science and Engineering (SBASSE)
Associate Professor
ali.zaidi@lums.edu.pk



Functional Differential Equations

Sponsor: HEC
Funding Amount: PKR 1,708,200
Project Initiated in: 2023

The presence of functional terms in partial differential equations creates complexity that requires deeper analysis. The challenge is that there are no general methods to solve such problems analytically owing to functional terms. This project proposes new mathematical techniques to solve certain functional partial differential equations. These equations have not been solved before because there haven't been enough solution techniques available. These equations appear in a variety of applications, including internet protocols, fragmentation in polymers, and cell division. Since it is a study based on theoretical science, it aims to develop the mathematical theory of functional differential equations.

Dr. Haniya Azam
Syed Babar Ali School of Science and Engineering (SBASSE)
Assistant Professor
haniya.azam@lums.edu.pk

(Co)Homology of Spaces and Its Applications in Topological Data Analysis

Sponsor: HEC
Funding Amount: PKR 9,211,500
Project Initiated in: 2023

This project aims to develop homology theoretical tools to study the topology (a branch of mathematics) of certain topological spaces and to compute cohomology for these spaces. Apart from this, researchers are interested in developing applied algebraic topology theoretical tools for application to Data analysis of digital image sets. This is where they step into computational topology, which dwells on tools such as Persistent homology that encodes topological features of shapes, point clouds, or functions. aims to fund and train PhD and MS students in Algebraic topology and Topological Data Analysis (TDA). The proposed research project will fund 2 PhD students and 1 MS student at LUMS, Lahore, and 1 PhD and 1 MS student at IBA, Karachi. These graduate students will acquire expertise in Algebraic Topology along with the necessary skills to conduct Topological Data Analysis.

Dr. Imran Anwar
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
imran.anwar@lums.edu.pk

Asymptotic Study of Symmetric Ideals Associated with Geometric Objects

Sponsor: HEC
Funding Amount: PKR 2,287,200
Project Initiated in: 2022

The proposed project is about symmetric ideals. This is related to Algebra, a core area in Mathematical sciences, and exploring the recently developed theories and getting the attention of top researchers across the globe. This type of research is gaining popularity in the top-ranked mathematics journals. This project serves to establish fundamental research in algebra in highly regarded mathematical journals. This project addresses a central problem and contributes directly to the development of the theory. The study will focus on the asymptotic behaviour of symmetric ideals, particularly in the context of geometric objects, and examine how these ideals interact with different structures. By analysing these ideals, the project aims to provide deeper insights into their applications in both algebraic geometry and combinatorics. The findings are expected to further enhance the understanding of their role in solving open problems in mathematics, potentially offering new techniques for researchers working in related fields. This research could also have broader implications for fields like computer science and cryptography, where algebraic structures are frequently applied.

MEDIA

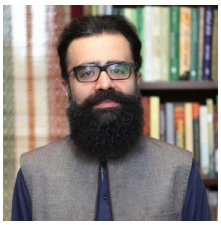
Dr. Ayesha Ali
Mushtaq Ahmad Gurmani School of Humanities & Social Sciences (MGSHSS)
Assistant Professor
ayeshaali@lums.edu.pk

Gamifying Media Literacy Interventions for Low Digital Literacy Populations

Sponsor: Meta
Funding Amount: PKR 13,767,293
Project Initiated in: 2023

This project aims to create a fun and interactive game to help people with low digital literacy skills learn how to critically evaluate online information and media. The main aim is to create a game that engagingly teaches media literacy skills. It helps people with low digital literacy skills develop critical thinking and online evaluation skills. It improves digital inclusion and empowerment. The project makes media literacy education accessible and enjoyable. The goal is to make media literacy education accessible and enjoyable for everyone, especially those who may not have the skills or confidence to navigate the online world effectively. By integrating game-based learning into media literacy education, this project seeks to overcome common barriers to learning, such as a lack of motivation or intimidation by technical content. It aims to reach underserved communities, including older adults, rural populations, and economically disadvantaged groups, empowering them to identify misinformation, recognize bias, and make informed decisions in the digital landscape. This approach not only builds essential skills but also fosters greater digital citizenship, promoting a safer and more informed online environment.

Dr. Ali Usman Qasmi
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
ali.qasmi@lums.edu.pk



The One with the Rumor: Diffusion of Covid-19 Related Misinformation in Pakistani Twitter Conversations

Sponsor: Social Science Research Council (SSRC)
Funding Amount: PKR 853,483
Project Initiated in: 2020

This project outlines the debates about science, rationality, and medicine that continue to inform the public debate on such a critical issue as COVID-19. This project studies the content of Pakistan-based Covid-19-related tweets with a specific focus on political content, health-related content, risk framing, and rumours. The argument is that by recognizing the historical imperative of responses to modern science and medicine, characterizations of information/misinformation on social media can be more effectively understood. In other words, it is not simply important to document different types of rumours and misinformation circulating on social media but to explore the reasons for which they come into circulation in the first instance and their resonance in a particular political context.

Dr. Ayesha Ali
Mushtaq Ahmad Gurmani School of Humanities & Social Sciences (MGSHSS)
Assistant Professor
ayeshaali@lums.edu.pk

Evidence-based Educational Interventions for Countering Fake News in Pakistan

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 2,470,800
Project Initiated in: 2021

The increasing availability of low-cost mobile phones and Internet access in Pakistan has led to widespread use of social media platforms like Facebook and WhatsApp, making them key sources of news and civic engagement. This has brought many users online, including those with limited digital literacy. Misinformation can significantly influence individuals and society, from election interference to polarization and violence. This project evaluates educational interventions for low digital literacy populations to help them use the internet responsibly and reduce the spread of misinformation. The study explores how misinformation shapes beliefs and attitudes toward key issues, aiming to empower users to recognize false information and promote positive social outcomes.

Interactive Media

Countering Deepfake Misinformation Among Low-Digital-Literacy Populations

Sponsor: Meta
Funding Amount: PKR 14,249,917
Project Initiated in: 2020

This research project focuses on addressing the issue of deepfake misinformation among individuals with low digital literacy skills. Deep Fakes are manipulated media files that can be difficult to distinguish from reality and can have serious consequences if spread as misinformation. This project aims to understand why low digital literacy populations are more susceptible to deepfakes and develop effective countermeasures to combat their spread. The project investigates the factors contributing to the vulnerability of these populations. It tests various interventions aimed at improving their digital literacy and critical thinking skills. The ultimate goal is to empower low digital literacy populations with the skills and knowledge needed to navigate the digital landscape with confidence and resist the manipulation of deep fake misinformation.

Understanding the Impact of Digital Literacy on Misinformation in Pakistan

Sponsor: Meta
Funding Amount: PKR 6,986,250
Project Initiated in: 2019

This research project explores the relationship between digital literacy and the spreading of misinformation in Pakistan. With the increasing use of digital technologies, misinformation has become a significant concern in the country, leading to social, political, and economic consequences. This project aims to investigate how digital literacy levels among Pakistanis influence their susceptibility to misinformation and identify the factors that contribute to the spread of false information. The study will also examine the role of social media platforms, online news sources, and other digital channels in perpetuating misinformation. It evaluates the effectiveness of existing fact-checking initiatives and digital literacy programs in combating this issue. This project seeks to inform the development of targeted interventions and strategies to promote fact-based information and critical thinking skills among Pakistani citizens.

Dr. Momin Ayub Uppal
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
momin.uppal@lums.edu.pk

Countering Extremism with Data: A Data-Analytic Framework for Assessing Extremism using Social Media and its Impact on Urban Sentiment

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This project aims to develop a data analysis framework for extremist content evaluation and moderation. Through the framework, the objective is to investigate the effects of online extremism on urban sentiment. This idea is based on the hypothesis that there are strong links between online social media content and events in the offline world. The data analysis performed on online data available on social media platforms can provide valuable insights about these links. Their identification through appropriate tools, developed also as part of this project, may lead to effective policy-level decisions to control, regulate, and moderate such content in the long run.

Dr. Nida Yasmeen Kirmani
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
nida.kirmani@lums.edu.pk

Social Media as a Space for Rights Advocacy in Pakistan: Democracy's Final Frontier

Sponsor: LUMS
Funding Amount: PKR 560,000
Project Initiated in: 2022

Social media in Pakistan is increasingly becoming a battleground for political actors. Despite this, research on the relationship between social media and democracy remains scant. This study aims to explore the use of social media as a forum for marginalized groups to assert their rights in Pakistan. It focuses on three movements/campaigns: gender equality, the Pashtun Tahaffuz Movement, and campaigns for the recovery of missing persons. The research aims to provide insights to scholars and policymakers interested in widening the space for democratic expression in Pakistan. The study will investigate the role of social media in mobilizing public opinion, raising awareness about human rights issues, and providing a platform for dissent in a country where traditional media is often limited or controlled. It will also examine how these movements have leveraged social media tools to challenge state authority, promote social justice, and engage in public discourse. By analyzing the impact of social media on democratic practices and rights advocacy, this project seeks to contribute to a broader understanding of the evolving relationship between digital platforms and political expression in contemporary Pakistan.

NATURAL SCIENCES

Dr. Ammar Ahmed Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
ammar.ahmed@lums.edu.pk

Directed Self-Assembly of Topological Defects and Photonic Bandgap Engineering in Organic and Aqueous Liquid Crystal Devices

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2024

This project combines applied and fundamental research on self-assembled liquid crystal (LC) structures and photonic band gaps in both organic and aqueous LCs. Organic LCs are commonly used in displays, while aqueous LCs form micelles and membranes in biological cells. The project aims to develop protocols and facilities for advanced LC-based soft matter studies and to train researchers in experimental soft condensed matter physics, an underdeveloped field in Pakistan. Its interdisciplinary nature—drawing from chemistry, biology, and physics- aligns with national goals to support cross-disciplinary research and train students in complex, multidimensional topics.

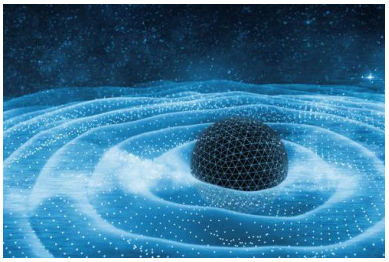
Dr. Ijaz Haider Naqvi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ijaznaqvi@lums.edu.pk

Diagnostics and Prognostics Upgrade to Existing Battery Management System of Lithium-Ion Battery Packs

Sponsor: HEC
Funding Amount: PKR 10,005,000
Project Initiated in: 2022

A Battery Management System (BMS) is like the control centre for battery storage systems. It's made up of custom-built electronic boards and/or embedded systems that manage and control the battery packs. The BMS has a built-in processor that runs algorithms to ensure key functions. The main aim of this project is to develop a robust BMS that ensures the safety of operators and prevents battery damage or degradation, and to implement algorithms and controls to prevent overcharging, over-discharging, and other hazardous conditions. This project has the potential to scale up its impact by expanding its reach to more Asian countries, it will foster a regional network of experts and will promote South-South cooperation in climate change mitigation, ultimately contributing to a globally coordinated effort to limit global warming to 1.5°C above pre-industrial levels and achieve a sustainable, environmentally friendly future for all.

Dr. Muhammad Sabieh Anwar
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Professor
sabieh@lums.edu.pk



Outreach and Learning with Cosmic Ray Muons, Augmented Reality and Astrophysics Laboratory Experiments

Sponsor: National Centre of GIS and Space Applications (NCGSA)
Funding Amount: PKR 8,004,000
Project Initiated in: 2021

This is a multifaceted project whose main aim is to create awareness in the public sphere and educational institutions. The project promises the creation of new linkages and a new curriculum for astrophysical investigations in the astronomy, physics, or astrophysics laboratories. New products, processes, software, and firmware are also expected to emerge from this research. Additionally, the initiative will utilize cutting-edge augmented reality tools to enhance hands-on learning experiences, making complex astrophysical concepts more accessible to students and the public.

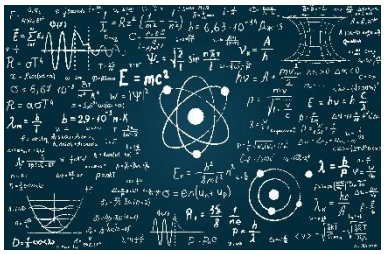
Dr. Salman Noshear Arshad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
salman.arshad@lums.edu.pk

Capacity Building for Reduction Electrocatalysis by Developing Lab-Scale Prototype of Metal-Air Battery

Sponsor: LUMS
Funding Amount: PKR 990,000
Project Initiated in: 2023

This project is working on creating a better type of battery called a metal-air battery. Right now, the reactions inside these batteries are slow and use expensive materials. One big problem is that our current batteries are running out of power quickly, and we need better ones to keep our devices working. This project aims to make a small-scale prototype of a metal-air battery that can solve these problems. It also aims to create a new material for zinc-air batteries that works better than what we have now. Moreover, it designed a special structure that helps the battery in the absorption and desorption of oxygen easily, making it charge and discharge faster. By doing this, we can create a more efficient and cost-effective battery that can be used on many devices. This project is important because it can help us develop new technologies that can store energy better and help us move away from using fossil fuels.

Dr. Syed Moeez Hassan
Syed Babar Ali School of Science and Engineering (SBASSE)
Assistant Professor
syed_hassan@lums.edu.pk



Quantum Gravity with Polymer Matter

Sponsor: HEC
Funding Amount: PKR 3,091,400
Project Initiated in: 2023

This project proposes to study the dynamics of quantized gravity coupled with polymer quantized matter (polymer quantization is distinct from standard Schrodinger quantization and is motivated by a certain approach to quantizing gravity). While the standard classical theory of gravity, General Relativity (GR), can explain phenomena on a wide range of scales, there are certain regimes where it breaks down. On the smallest scales, GR leads to singularities, and on the largest scales, there are phenomena (e.g., dark matter) that GR cannot explain. This project aims to combine both observations in a unified theoretical description by quantizing some modified theory of gravity, coupled with polymer-quantized matter. The expectation is that this will lead to singularity resolution at the small scales, a description of dark matter at the large scales, and a reduction to standard GR in the intermediary regimes. The ultimate goal of this research is to establish a more comprehensive understanding of the fabric of spacetime, particularly at the quantum level. By exploring polymer quantization, which is rooted in non-commutative geometry, the project intends to overcome some of the limitations of conventional quantum gravity approaches. This work could have significant implications for both cosmology and theoretical physics, especially in understanding phenomena such as black holes, the nature of dark energy, and the fundamental structure of the universe. If successful, the project may contribute to resolving some of the most challenging open questions in physics today and may provide insights into the unification of quantum mechanics and general relativity.

Dr. Basit Yameen
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
basit.yameen@lums.edu.pk

Decoding the Physicochemical Properties of Coating for the Flexible Packaging Industry

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2024

Understanding the physicochemical properties of coatings is critical to optimizing performance in the flexible packaging industry. The coating properties directly influence print quality, durability, and process efficiency. In high-speed printing environments, even minor variations can lead to defects like poor ink transfer, smudging, or delamination. Decoding these properties enables the formulation of inks and substrates that are better suited, leading to enhanced compatibility and reduced waste. It also supports the shift toward sustainable and recyclable materials by ensuring functional coatings maintain performance standards. The support provided to the industry in this activity helped create knowledge to drive innovation, quality control, and cost-effectiveness, as well as develop solutions for modern and evolving flexible packaging applications.

Development of Water-Based Adhesive for Paper Straw

Sponsor: Packages
Funding Amount: PKR 726,000
Project Initiated in: 2023

This project aims to develop a water-based adhesive for paper straws, providing a sustainable and eco-friendly alternative to traditional plastic straws. The project seeks to create a cost-effective, non-toxic, and biodegradable adhesive that meets the requirements of paper straw manufacturers. The goals of this project are to formulate a water-based adhesive with suitable properties for paper straw production and to optimize the adhesive's performance, ensuring strong bonding and durability with water. Also, to test and validate the adhesive's performance in paper straw production. Most importantly, a cost-effective system is introduced in the market through this project that can replace plastic market. This project helps in reducing environmental pollution, provides innovation and technological advancement in the market, and helps in producing an opportunity to run and develop a water adhesive market.

Material Science

Dr. Faheem Hassan Akhtar
Syed Babar Ali School of Science and Engineering (SBASSE)
Assistant Professor
faheem.akhtar@lums.edu.pk

Selection of Block Copolymer Membranes for Gas and Vapor Separation

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

Block copolymers are an interesting class of polymers and are extensively studied because of their ability to self-assemble into nanoscale morphologies upon microphase separation. The chemical incorporation of sulphonic acid with a polymer backbone is important. Nexar, a class of sulfonated copolymers with a high degree of sulfonation, maintains its mechanical integrity in the hydrated state because of the glassy end blocks. Dense films, membranes, and coatings with ultra-high hydrophilicity can be produced due to their modular structure. This project demonstrates the successful making of membranes with ion-rich pathways and a hollow fibre membrane with a thin layer of Penta block copolymer. These membranes have gas dehumidification, gas dehydration, and many other applications.

Dr. Muhammad Sabieh Anwar
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Professor
sabieh@lums.edu.pk

Box Compression Testing

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

This project focuses on conducting compression tests on various types of paper boxes to assess their strength and durability. By applying different levels of pressure, the study will evaluate how well these boxes withstand compression forces. The results will help determine the quality and reliability of the boxes for packaging and shipping purposes.

Material Science

Dr. Tauqeer Abbas
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
tauqeer.abbas@lums.edu.pk

Characterization and Analysis of Different Paper-Based Products

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

This project aims to conduct qualitative and quantitative analyses of two paperboard samples. It proposes to characterize the properties of these samples to better understand their composition and performance.

The Influence of Paper's Structure and Surface Chemistry on Its Properties

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

This project aims to study qualitative and quantitative analyses of different paperboards and how their makeup and surface details affect their features. In this project, various paperboards are looked at closely, and their properties are measured to understand these effects. The goal is to find out how to improve paperboards for different uses.

Dr. Ghayoor Abbas Chotana
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Associate Professor
ghayoor.abbas@lums.edu.pk

Fused (hetero) ArylPyrazines for Potential Applications in Material and Biological Sciences

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 14,952,000
Project Initiated in: 2022

This project aims to design and synthesize some novel aromatic building blocks that are highly sought in the fields of optical/electronic organic materials and organic polymers. Some of the synthesized new heteroaromatics are also expected to have interesting biological activities (anti-bacterial and anti-cancer). Specifically, new structural patterns of fused heteroaromatics, such as phenazines, can be synthesized and completely characterized. They are analysed for their medicinal properties.

Dr. Qandeel Almas
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
qandeel.almas@lums.edu.pk

Development of Ca- and Mg-Based Bifunctional Catalysts for the Synthesis of Drug Intermediates

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

Drug intermediates are synthesized during the process of developing a pharmaceutical drug but are not the final drug product. They are important in drug discovery, offering a diverse range of chemical structures that accelerate lead identification and optimization. One such drug intermediate is the dihydropyrimidine derivative. Dihydropyrimidines (DHPMs) have various medicinal uses and are synthesized using the Biginelli reaction, which is challenging due to low yields and complex catalysts. To improve the yield of DHPMs, researchers have used organic and inorganic acids, bases, transition metal-based materials, and enzymes in the reaction. This project aims to develop new, greener conditions for the Biginelli reaction that address the challenges listed above. The focus is on functionalizing Ca and Mg oxide-based materials with acidic moieties and producing eco-friendly conditions using Ca and Mg oxide-based materials as catalysts. Preliminary tests show promising results.

Medicinal Chemistry

Dr. Rahman Shah Zaib Saleem
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
rahman.saleem@lums.edu.pk

Development of Next-Generation Microtubule Targeting Lead Capable of Overcoming Multidrug Resistance in Cancer Cells

Sponsor: Pakistan Science Foundation (PSF)
Funding Amount: PKR 3,757,450
Project Initiated in: 2023

Cancer, a leading cause of mortality around the globe, is characterized by the uncontrolled growth of cells that spread to various parts of the body. The commonly used anticancer drugs aim to interrupt the cell division process by targeting the molecular machinery involved in this process. Microtubules are one such target that has been successfully and extensively targeted for cancer therapeutics. Drugs such as vincristine, vinblastine, paclitaxel, and docetaxel disrupt the microtubule dynamics, causing cells to complete mitosis, which ultimately leads to apoptotic cell death. The most common mechanism involved in the development of resistance to several microtubule-targeting drugs is the overexpression of efflux pumps such as P-glycoprotein (Pgp). In this regard, the work of this project is on an indigenous research program to develop novel microtubule-targeting drugs that are not affected by Pgp efflux pumps and kill normal and drug-resistant cancer cells alike. Preliminary work has led to the identification of the hit compound SSE15206, a pyrazoline thioamide derivative that has nanomolar antiproliferative activities in 13 cancer cell lines of different origins. This research project involves understanding the scope of substitution on the 2nd phenyl ring, aromatization of the pyrazoline ring, and the impact of the substitution of the thioamide moiety with other groups, considering the data generated from the pharmacokinetic and pharmacodynamic studies. The project aims to deliver a patentable lead compound with at least two-digit nanomolar activity and a profile ensuring its push into preclinical studies. The project will also lead to the generation of new knowledge in the field of microtubule targeting agents (MTAs). The successful development of this next-generation microtubule-targeting agent will provide a new therapeutic option for patients who have developed resistance to traditional chemotherapies. The project will offer a deepened understanding of how specific chemical modifications affect the efficacy of MTA compounds and could open new avenues for targeted cancer therapy. In addition, the discovery of a compound capable of overcoming multidrug resistance could have significant clinical implications, particularly for cancers that are currently difficult to treat. The eventual goal is to enter preclinical studies with a compound that shows both efficacy and safety, ultimately contributing to improved cancer treatments.

Dr. Muhammad Shoaib
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
mshoaib@lums.edu.pk

Funding for Research Collaboration with the University of Copenhagen

Sponsor: Copenhagen University
Funding Amount: PKR 746,894
Project Initiated in: 2023

This is about research collaboration with the University of Copenhagen. The title of the collaborative research project is "SET8 safeguards genome stability by regulating replication fork speed and suppressing excessive nuclease processing." The project aims to explore the molecular mechanisms through which the SET8 protein regulates DNA replication, ensuring genomic integrity. By understanding how SET8 modulates replication fork dynamics, this research could provide valuable insights into the prevention of genomic instability, a key factor in the development of various diseases, including cancer. The collaboration also promises to foster knowledge exchange between the two institutions, advancing the field of molecular biology.

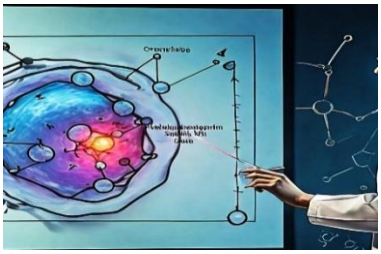
Dr. Muhammad Tariq
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
m.tariq@lums.edu.pk

Urokinase Plasminogen Activator (Upa) and Its Receptor (Upar) Interaction in Tumor Microenvironment, Therapeutic Implications

Sponsor: McGill University
Funding Amount: PKR 7,677,685
Project Initiated in: 2023

This project explores the therapeutic potential of targeting Mbd2, an epigenetic regulator associated with cancer. Research has shown that depleting Mbd2 reduces metastasis and delays tumor onset. The study aims to identify effective combinations with Mbd2 depletion or inhibition using KCC-07, a small molecule inhibitor. By screening compound libraries that target kinases, GPCRs, and other epigenetic regulators, the project seeks to find synergistic combinations for enhanced cancer treatment. Additionally, efforts will focus on synthesizing more potent derivatives of KCC-07 to improve therapeutic outcomes.

Molecular Biology

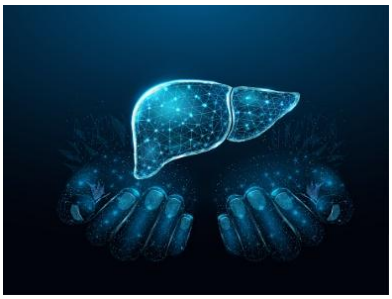


Unmasking the Role of Multiple Ankyrin Repeats Single Kh Domain in Cell Fate Maintenance and Human Cancers

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This project is trying to understand how our cells work and how they can sometimes go wrong and lead to cancer. Our cells have tiny things called proteins that help them know what to do and how to grow. One of these proteins is called Multiple Ankyrin Repeats Single KH Domain. This project wants to figure out how this protein helps our cells stay healthy and what happens when it doesn't work right. This project aims to create a human embryonic kidney with 293 cells lacking the human Mask gene. To analyze the effects of the human Mask gene on global gene expression patterns. This project is going to help in the treatment of cancer and help in getting financial support from other states to invest in this field.

Dr. Syed Shahzad Ul Hussan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
shahzad.hussan@lums.edu.pk



Identification of New Inhibitors of Drug-Resistant Variants of Hepatitis C Virus RNA-Dependent RNA Polymerase and Its Structural Investigation

Sponsor: German Pakistani Research Cooperation Program - DAAD
Funding Amount: PKR 3,235,975
Project Initiated in: 2021

Hepatitis C virus (HCV) infections occur in approximately 2.8% of the world population, and these infections continue to be a major global health concern. In Pakistan, over 5% of the population is infected with this virus. In recent years, several direct-acting antiviral (DAA) regimens against HCV have been approved that can treat the infection. However, due to the rapidly evolving nature of the virus, drug-resistant viral variants emerge quickly – resistance against most of the currently used DAAs has already been reported in 10 to 30% of individuals. This scenario signifies a continuous effort to develop new drugs against HCV against drug-resistant variants. HCV is a positive-sense RNA virus that requires RNA-templated RNA synthesis during its replication. Viral RNA-dependent RNA polymerase (RdRp) catalyses this process of new viral RNA synthesis, thereby playing a crucial role in viral replication, and therefore represents an important target for therapeutic intervention. This project aims to identify new inhibitors of RdRp of HCV genotype-3a, which is the most prevalent genotype in Pakistan, and of its drug-resistant variants, and to solve crystal and/or cryo-EM structures of these RdRps in complex with identified inhibitors or smaller fragments.

Dr. Ata Ulhaq
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
ata.haq@lums.edu.pk

Advanced Photonic Devices using Two-dimensional Semiconductors

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This project proposes the development of a quantum light photonic device based on a 2D semiconductor, which can not only be useful for traditional photonics applications but also be employable in futuristic quantum technology applications. The project utilizes the resources available within the Physics department as well as the central labs at LUMS to fully develop the device from material processing to device fabrication to testing and characterization. The resulting procedures can form a template for further research within LUMS for the development of advanced photonic devices, not only for the traditional photonic industry, as well as devices meant for quantum technology applications. By leveraging the unique properties of two-dimensional semiconductors, such as their high surface-to-volume ratio and exceptional electronic characteristics, this research aims to push the boundaries of light manipulation at the quantum level. The devices being developed could enable advancements in fields such as quantum communication, computing, and sensing. Furthermore, this project will help establish LUMS as a leading centre for research in quantum photonics, attracting collaborations and contributing to the development of next-generation technologies. Ultimately, this research aims to foster innovation that bridges the gap between classical and quantum photonics, driving progress in both academic and commercial sectors.

Dr. Habib-ur-Rehman
Syed Babar Ali School of Science and Engineering
Associate Professor
habib.rehman@lums.edu.pk

Design and Synthesis of Novel Catalysts for the Economical Production of Hydrogen

Sponsor: LUMS
Funding Amount: PKR 965,000
Project Initiated in: 2022

Hydrogen (H2) is a key component of many vital industrial processes. For example, ammonia, fertilizers, oil refineries, and petrochemicals are among the few industries that consume over 25 million tons of hydrogen each year. Currently, over 90% of H2 is being produced through a steam reforming process (SRP), which strongly mandates that alternative hydrogen production sources and other processes are abundant and extensively explored. As only surface atoms take part in catalytic reactions, by increasing the number of surface atoms catalytic performance of a catalyst can be significantly enhanced. This project aims to achieve Metal NPs NP-supported Titania catalysts for the economical production of hydrogen. This project also aims to lower the catalytic nanoparticle to below 1g/m2. Common supports used for such catalysts are highly micro-structured metal films. This project will replace the expensive supports with much cheaper metal oxide-based supports such as TiO2. This is original and novel research, as there is hardly any report in the literature that employs ultra-low loading of Au NPs.

Dr. Irshad Hussain
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Professor
ihussain@lums.edu.pk

Design and Development of Highly Efficient Photocatalyst for the Capture and Conversion of Carbon Dioxide to Fuel - A Step towards Carbon Circular Economy

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This project proposes to develop composites of gold-doped titania nanoparticles, MOPs, and graphene acting as a channel for carriers' transport and improve the efficiency of carriers' separation and transport; and solve the key problems in the photoconversion of CO_2 such as weak adsorption ability of traditional catalysts for CO_2 molecules, low conversion efficiency, and selectivity, through the pore structure design of microporous polymer and the adjustment of the metal catalytic activity center.

Organic-Inorganic Hybrid Microporous Polymeric Nanocomposites for the Capture and Conversion of CO_2 - Applications in Environment and Energy Technologies

Sponsor: Pakistan Science Foundation (PSF)
Funding Amount: PKR 6,300,000
Project Initiated in: 2021

The capture and conversion of carbon dioxide (CO_2) is of the utmost importance to alleviate global warming and the greenhouse gas effect by reducing the reliance on fossil fuel energy. However, the capture and conversion of low concentrations of CO_2 in the atmosphere under mild conditions is a formidable challenge in this regard. To address the problems associated with low adsorption capacity and low efficiency of catalytic conversion of CO_2 (photocatalysis and chemical conversion), this project proposes to combine the high specific area of hyper crosslinked microporous polymer (HCPs) with highly efficient nano catalysts through the cooperation of China and Pakistan by exploiting the research experience of both sides to achieve high efficiency of CO_2 adsorption and chemical/photo reduction under mild conditions.

Dr. Muhammad Zaheer
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
muhammad.zaheer@lums.edu.pk

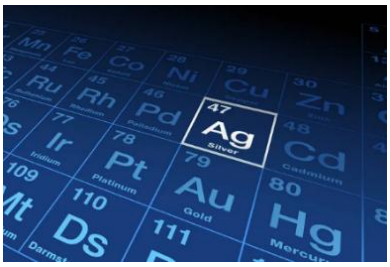
Complete Valorization of Crop Residues into Industrially Relevant Chemicals via Efficient Catalyst Design

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

Efficient utilization of biomass in a biorefinery to produce fine chemicals requires the isolation of its stubborn constituent lignin, followed by its selective breaking to obtain aromatic compounds. However, the refractory nature of the bonds contained by lignin makes its degradation challenging. Additionally, all attractive forces (bonds) among the building blocks of lignin must be broken to achieve a high yield of monomeric products. This project aims to develop materials (catalysts) capable of breaking attractive forces in lignin to achieve a high yield of chemical products. The proposed research will explore the design of novel catalytic systems, including both homogeneous and heterogeneous catalysts, that can efficiently break down lignin into valuable aromatic monomers. These monomers can be further processed to produce a range of industrially relevant chemicals, contributing to the development of a more sustainable and cost-effective biorefinery.

Sustainable Chemistry

Dr. Rahman Shah Zaib Saleem
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
rahman.saleem@lums.edu.pk



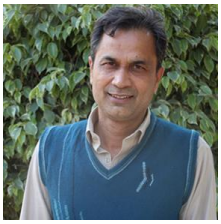
Synthetic Applications of Transition Metal Catalysed Borylation and Suzuki Coupling

Sponsor: University of Hail
Funding Amount: PKR 1,414,873
Project Initiated in: 2021

There are multiple synthetic routes available to create small organic molecules for the pharmaceutical and agrochemical industries. Recently, efficient "coupling" reactions have been developed, combining two molecules to form a new carbon-carbon (C-C) bond. The Suzuki coupling reaction is a useful method that earned its inventors the 2010 Nobel Prize in Chemistry for its broader significance in building complex molecules. This reaction uses aryl-boronic esters to form C-C bonds, which are traditionally prepared through a long synthetic procedure. However, a new iridium-catalysed reaction has been developed that forms organoboron compounds directly from a hydrocarbon feedstock, making it a highly efficient method that is tolerant to a variety of functional groups. This technology has been extensively applied to various aromatic derivatives, but its application to heteroaromatics such as substituted pyridines has not been fully examined. This research project aims to synthesize new heteroaryl boronic esters of pyridines, which are highly sought-after building blocks in the pharmaceutical and organic electronic materials industries. The aim is to demonstrate the application of aryl boronic esters in the preparation of bioactive molecules, such as carbazoles and agrochemicals like Boscalid derivatives. This study will further investigate the scalability of the iridium-catalysed reactions for industrial applications, aiming to enhance reaction efficiency and reduce costs. By applying these methods to heteroaromatic systems, this research will also explore the synthesis of new classes of bioactive molecules and materials. This could lead to advancements in both pharmaceuticals and electronic materials.

POLICY MAKING

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



Extending Sexual Harassment and Workplace to Broader World of Work in Society: Developing a Legal Framework for ILO Violence and Harassment Convention 190 (C-190)

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This project imagines the world of work beyond the traditional 'workplace,' from the subcontracting of Global Value Chains (GVCs) to the extent of home-based workers. Its aim is to enlarge and develop a labor law framework and institutional mechanism to accommodate legal requirements outlined in the C-190. Instead of courts and police, it wants to rely on available institutional mechanisms of labor representation and organizing for the redressal of grievances in harassment and violence cases.

Dr. Sadaf Ahmad
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
sadafah@lums.edu.pk

Pakistani Policewomen: A Study of Intersectional Navigations at Work

Sponsor: LUMS
Funding Amount: PKR 648,450
Project Initiated in: 2022

The research project aims to explore the experiences of Pakistani policewomen and how they navigate their roles in a male-dominated profession while dealing with societal expectations and cultural norms. This study aims to investigate the challenges faced by Pakistani policewomen. It examines how intersectional factors such as gender, class, ethnicity, and religion affect their experiences. It identifies strategies and coping mechanisms policewomen use to navigate these challenges and provides recommendations for policy and practice to support the inclusion and empowerment of women in the police force. This research aims to promote gender equality, challenge patriarchal norms, and contribute to a more inclusive and equitable society.

Dr. Sadaf Aziz
Shaikh Ahmad Hassan School of Law (SAHSOL)
Associate Professor
sadafaziz@lums.edu.pk

Law Instruction Pedagogy Workshop

Sponsor: Law and Justice Commission of Pakistan
Funding Amount: PKR 3,000,000
Project Initiated in: 2024

The Project Law Instruction Pedagogy Workshop has several objectives. It seeks to establish a group of law school instructors capable of critically engaging with legal analysis and jurisprudence. It aims to refine the ability to navigate extensive volumes of case law and identify precedents that contribute significantly to the legal evolution of specific fields. It will also facilitate a groundbreaking collaboration among law faculties nationwide, representing institutions authorized to award the B.A., LL.B. degree in Pakistan. Moreover, participating faculty members will engage in a comprehensive three-day workshop featuring active learning sessions focused on course structure and design, instructional methodologies, substantive discussions covering various legal domains, and opportunities to showcase their acquired knowledge and skills among peers. This approach aims to give instructors what they need for better legal education and research.

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

Poverty Alleviation and Socioeconomic Uplift: Lessons Learned from the Chinese Model

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2021

This study intends to examine the policies, techniques, and methods employed by the Chinese Government to alleviate poverty and effect the socioeconomic uplift of economically depressed segments of Chinese society. Analyzing these systems, as applied within historically poorer Chinese counties, can provide insights that can subsequently be adapted to develop a similar policy framework applicable to the Pakistani context, which would help domestic public efforts in alleviating poverty from parts of Pakistan that remain economically underserved.

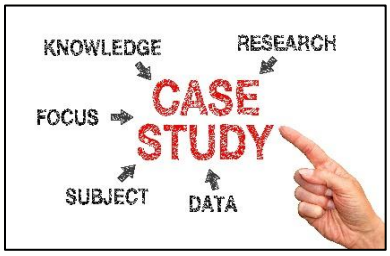
Law and Policy

Stateless Communities in Pakistan: Challenges and Prospects

Sponsor: United Nations High Commissioner for Refugees (UNHCR)
Funding Amount: PKR 3,544,464
Project Initiated in: 2023

This project aims to develop a sustainable roadmap for limiting and addressing the adverse impact on stateless communities in Pakistan. To delineate the hurdles faced by stateless communities in acquiring legal identity (including birth registration forms and CNICs), an extensive outreach exercise is to be carried out with various stakeholders who have prior knowledge, experience, and expertise on the issue of statelessness in Pakistan. Pakistan grapples with a statelessness crisis affecting around three million individuals, concentrated in Karachi's 126 stateless communities. Historical refugee flows from Afghanistan worsen the situation, compounded by bureaucratic inefficiencies hindering documentation. Despite government acknowledgment, little progress has been made, perpetuating economic and social marginalization. Deep-seated perceptions of refugees, bureaucratic hurdles, governance failures, and ethnic tensions sustain the statelessness issue. Significantly, the scope of the research focuses on the historical, legal, bureaucratic, political, and economic barriers as well as underlying negative cultural perceptions that hinder the proper assimilation of stateless communities in Pakistan.

Dr. Summaiya Zaidi
Shaikh Ahmad Hassan School of Law (SAHSOL)
Assistant Professor
summaiya.zaidi@lums.edu.pk



A History of Women Lawyering: Case Study for Sindh

Sponsor: LUMS
Funding Amount: PKR 1,335,000
Project Initiated in: 2024

This project aims to study the history of women's inclusion in the legal profession after the Partition in Sindh. It proposes that the expectation that women are best suited for family law has historical roots. The project examines how early women lawyers' practices were limited by their gender and how societal perceptions restricted their movement in the profession, impacting their exit rates. These enrolment and attrition rates have never been investigated, making this the first study to highlight the silent struggle of women lawyers, culminating in the appointment of the first female High Court judge in Sindh in 1994. The project will explore systemic barriers such as gender bias and societal expectations, shedding light on how women overcame these challenges. The findings will also offer insights for current efforts to improve gender equality in Pakistan's legal field.

Dr. Ali Cheema
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
cheema@lums.edu.pk

Modelling the Climate Politics of Pakistan: Political Decision-Making and Priorities

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 13,830,100
Project Initiated in: 2023

This project aims to understand and model the climate politics of Pakistan. It examines the political decision-making processes and priorities that shape the country's response to climate change. The project seeks to identify key drivers, barriers, and opportunities for effective climate action. It also informs evidence-based policy recommendations to support Pakistan's climate resilience and sustainable development. This project aims to analyze the complex political landscape of Pakistan and its impact on climate policy. It also helps to develop solutions tailored to Pakistan's political and economic context. This project sheds light on the complex political dynamics shaping the country's response to climate change. It supports the development of effective, context-specific solutions to address this critical global challenge.

Dr. Asma ul Husna Faiz
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
asma.faiz@lums.edu.pk

Re-Imagining Federalism in Pakistan: Issues of Devolution and Reform

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2020

In the year 2020, the leading constitutional debate in Pakistan relates to the controversy about the 18th Amendment, which has the potential to become an explosive issue between the government and the opposition. The current research project addresses this issue in the context of the growing gap between the design and practice of federalism in Pakistan. Given the context of a deficit of provincial autonomy that cost Pakistan heavily in the form of the separation of East Pakistan, the ongoing contention over the re-negotiation of the National Finance Commission Award (NFC) poses a great challenge to the federalist project. Another layer of complexity is the unsettled tertiary transfer of power to the local governments. With the entry of the China-Pakistan Economic Corridor (CPEC) into the picture, yet another controversy has emerged over the potential beneficiaries of this massive development scheme. This research project seeks to answer these crucial questions surrounding the evolving nature of federalism in Pakistan.

Politics

Ethnic Parties and Nationalist Politics in Balochistan

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

This research aims to explore the role of ethnic parties in nationalist politics in Balochistan, Pakistan. Existing literature lacks sufficient attention to the agency of these parties in shaping narratives and influencing politics. By conducting interdisciplinary research, including fieldwork and analysis of political and sociological sources, this study fills this gap and deepens understanding of identity politics, voter behaviour, and centre-province relations. The research addresses key questions regarding party fragmentation, conflict-cooperation dynamics, and responses to emerging forms of resistance, while also considering the impact of technology on nationalist politics. The findings contribute to academic debates and inform teaching across various disciplines at LUMS, enriching courses in Pakistan Studies, Political Science, Sociology, and History, and potentially inspiring a new course on political mobilization by ethnic parties globally.

Dr. Hasan Haider Karrar
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
hkarrar@lums.edu.pk

Chinese Global Orders

Sponsor: London School of Economics & Political Science
Funding Amount: PKR 15,868,682
Project Initiated in: 2023

This collaborative project is an exploration of Chinese global orders, past and present. China's increasing global influence challenges traditional Euro-American-centric perspectives on global norms and orders. The study explores the nature and impact of Chinese global orders from diverse perspectives. By examining Chinese engagements across Asia, Africa, and Europe, the aim is to redefine global orders beyond simplistic East-West dichotomies. This research utilizes empirical data, visual representations, and textual evidence to understand the complexities of Chinese influence on global dynamics. The study includes a global convening approach to bring together scholars from different regions and disciplines, acknowledging the varied and fragmented nature of China's impact. Through this approach, the project intends to generate new insights into the formation and contestation of global orders in the context of Chinese power. It seeks to contribute to a more nuanced understanding of how non-Western actors shape global systems. Ultimately, the project aspires to influence policy and academic discourse on international relations and global governance.

Dr. Mohammad Waseem
Mushtaq Ahmed Gurmani School of Humanities and Social Sciences (MGSHSS)
Professor
waseem@lums.edu.pk

Re-Imagining Federalism in Pakistan

Sponsor: Higher Education Commission (HEC)| Embassy of France in Pakistan
Funding Amount: PKR 1,250,000 | PKR 827,814
Project Initiated in: 2019 | 2020

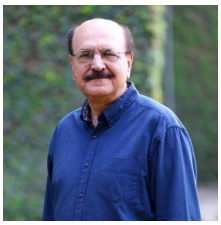
Federalism in Pakistan is directly related to contention between the policies of the state and the autonomist aspirations of ethnicities. The current project attempts to map out the institutional design, policy framework, and politics of federalism in Pakistan. The study aims to point out various anomalies in both the design and the operational dynamics of federalism. The idea is to develop certain policy guidelines to make the federation more stable, harmonious, and productive by bringing the constituent parts of the country closer together and by removing the sources of mistrust. Apart from discussing various issues that present periodical challenges to the stable functioning of federalism in Pakistan, the research addresses various low-intensity grievances among the smaller provinces. It is expected that the findings of the current project will highlight the gaps in theory and practice of federalism in the country and put together a policy framework for the resolution of various intractable problems that stand in the way of making Pakistan a workable, enduring, and exemplary federation in the region**.**

Democracy on Trial: A Study of the 2024 Elections in Pakistan

Sponsor: Pakistan Institute of Development Economics (PIDE)
Funding Amount: PKR 2,500,000
Project Initiated in: 2024

This research project attempts to analyse the forthcoming elections in Pakistan through the agency of various institutions at the heart of the electoral process. The plan is to adopt a multi-dimensional approach to study the 2024 elections that will include the development of a conceptual framework by covering the available scholarly and policy research, intensive fieldwork in federal and provincial capitals, and analysis of primary documents released by various institutions, including the Elections Commission and political parties. This project will capture the key issues reflected through the narrative produced by political parties. This project will track the input of key stakeholders in the exercise of mass polls. In addition, the project will seek to trace the broader contours of public debate about the procedure as well as the outcome of elections in Pakistan.

Dr. Abid Aman Burki
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Professor Emeritus
burki@lums.edu.pk

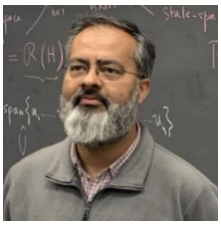


Determining the Health Costs of Inadequate Water, Sanitation and Hygiene

Sponsor: WaterAid
Funding Amount: PKR 3,800,000
Project Initiated in: 2022

This project aims to quantify the health costs of inadequate water, sanitation, and hygiene (WASH) in Pakistan, examining the impact on healthcare utilization, treatment costs, and lost productivity. It helps to assess the impact on healthcare utilization, treatment costs, and lost productivity. The study investigates the relationship between WASH access and health outcomes. it identifies the most vulnerable populations and provides evidence-based policy recommendations. That helps to improve WASH infrastructure and health equity. By determining the health costs of inadequate WASH, this project provides crucial insights to inform policy and resource allocation decisions, ultimately improving health equity and reducing the economic burden of WASH-related illnesses in Pakistan.

Dr. Muhammad Abubakr
Syed Babar Ali School of Science and Engineering (SBASSE)
Associate Professor
abubakr@lums.edu.pk



Climate Policy Assessment and Mitigation Modelling to Integrate National and Global Transition Pathways for Environmental-Friendly Development

Sponsor: European Commission
Funding Amount: PKR 26,214,230
Project Initiated in: 2023

The project aims to enhance the accuracy and effectiveness of GHG emissions modeling, enabling governments to make informed decisions and implement evidence-based policies for sustainable development. The main aim of this project is to help fight climate change by teaching Asian experts how to make good models to measure greenhouse gas emissions. By working together with European experts, this project makes these models better and more useful, so governments can make good decisions and create policies that are good for the environment. In the future, this project will lead the way for Asian countries to fight climate change by expanding this project and creating a network of experts who can work together and share knowledge. Furthermore, integrating the project's outputs into global climate policy frameworks, such as the Paris Agreement, to support the development of nationally determined contributions (NDCs) and long-term low-emission development strategies (LEDS).

Strategic Planning

Dr. Adeel Tariq
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
adeel.tariq@lums.edu.pk

Job Quality Study

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

This project includes a job quality study, reviewing literature and current practices, as well as conducting primary research (both qualitative and survey) to construct an index of job quality.

Dr. Ali Cheema
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Associate Professor
cheema@lums.edu.pk

Urban Property Tax Reform in Punjab: Using Evidence to Reform the Method of Valuation

Sponsor: International Growth Centre (IGC)
Funding Amount: PKR 4,504,923
Project Initiated in: 2021

In this project, the novel integrated property database for Lahore and Sargodha is utilized to examine the two valuation methods in terms of distributional fairness, revenue potential, and buoyancy. The distributional impact of shifting from the ARV system to a CV system is simulated, which uses DC rates as proxies for market values. The DC rates are based on property value surveys conducted by revenue officials and the land value declarations made by buyers at the time of purchase in the Government's online estamping system. The study estimates how the property tax burden changes for existing taxpayers who fall in different asset value bands under an area-based quasi-CV system, under the assumption that the tax rate is set to generate the same tax collection demand under both systems. The research also simulates the effect this change has on property values if it were to be fully capitalized into market prices and analyzes the distributional implications of this change.

Strategic Planning

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

Consulting project for the Development of Strategic Vision 2030

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

The project assists in developing a strategy and vision for 2030. This project aims to develop strategies with proper missions and then implement these strategies. Proper feedback from clinical, academic, and administrative staff and their heads will allow us to evaluate the outcome of the strategies. Besides these, long-term strategies are also developed for long-term goals.

Dr. Jawad Syed
Suleman Dawood School of Business (SDSB)
Professor
jawad.syed@lums.edu.pk

Strategic Review and Building Leadership Capabilities

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2021

The objective of this project is to enable the monthly review of the first strategic plan of the collaborative partner and facilitate Board Meetings and mentoring of young directors. The aim is to institutionalize strategic thinking and systematic management in this family-run business. This project also focuses on building leadership capabilities within the company, ensuring a smooth transition of responsibilities across generations. By enhancing governance practices, the project seeks to strengthen the group's competitive position in the market.

Strategic Planning

Dr. Qasim Imtiaz
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
qasim.pasha@lums.edu.pk

Optimum Use of Existing Resources: A Prototype Model on Road Safety

Sponsor: HEC / Quaid-e-Azam University
Funding Amount: PKR 10,790,850
Project Initiated in: 2022

Rampant urbanization, high population density, road crashes, and traffic congestion have become serious issues in the world. Pakistan is one of the most vulnerable countries to road crashes, with an estimated more than 2500 deaths each year. This project intends to contribute to better urban planning and safe and healthy dwellings. This research project aims to design a replicable prototype model of Smart Public Transport (SPT) and Smart Parking by employing and optimizing the existing resources and infrastructure, to Increase the efficiency of the Electronic Surveillance System, the system will monitor traffic effectively, to maximize the road safety, to create a way to measure air pollution from vehicles on the road. This will help reduce the amount of carbon emissions from vehicles. And to prepare strategies for human behavior modification for safe road usage practices through social research, advocacy, and lobbying to update laws and transport policy. The project impact will be a reduction in road accidents and traffic congestion, better health, and social and economic well-being of the citizens, and environmental conservation.

Dr. Rashid Memon
Mushtaq Ahmad Gurmani School of Humanities & Social Sciences (MGSHSS)
Assistant Professor
rashid.memon@lums.edu.pk

Aligning Migration Management and the Migration-Development Nexus

Sponsor: European Union
Funding Amount: PKR 31,740,544
Project Initiated in: 2018

To manage the long-term challenges of global migration, Europe must create effective and coherent policies for engaging with countries of origin and transit. The project aims to get a better understanding of the linkage between development and migration through extensive research that will allow effective and coherent management of migration. For further accessing the linkage between development and migration, the project uses principles of disaggregation that will highlight local mechanisms, and for analysis, combining old methods with qualitative comparative analysis, which is a technique that allows for identifying complex causal relationships based on in-depth case studies.

Strategic Planning

Dr. Sher Afghan Asad
Mushtaq Ahmad Gurmani School of Humanities and Social Sciences (MGSHSS)
Assistant Professor
sherafghan@lums.edu.pk

Organizational Effectiveness and Tax Compliance in Punjab, Pakistan

Sponsor: JPAL The Abdul Latif Jameel Poverty Action Lab | International Growth Centre (IGC)
Funding Amount: PKR 874,873 | PKR 4,596,851
Project Initiated in: 2021

Governments in developing countries are characterized by low tax capacity, driven by limited bureaucratic effectiveness and significant constraints on enforcement. In this project, the focus is on three less-studied areas of reform. First, how governments can increase access to information trails to improve enforcement capacity. Second, whether and how technology can help the tax authority improve its capacity to process and manage taxpayer appeals cases in the courts. Third, how the tax authority can improve its organizational capacity by leveraging the detailed information captured in a range of newly implemented software systems. To address these issues, the project team at LUMS has partnered with the Punjab Revenue Authority (PRA) in Punjab, Pakistan, the Mahbub ul Haq Research Centre (MHRC) based at the Lahore University of Management Sciences (LUMS), and internationally based researchers at Columbia, Harvard, and LSE.

Dr. Muhammad Imran Cheema
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
imran.cheema@lums.edu.pk

Portable and Rapid Petrol Adulteration Sensor

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

By developing a Raman spectroscopy-based portable sensor to detect adulterants in petrol samples, this interdisciplinary project aims to combat fuel adulteration. Machine learning algorithms quantify adulterants, and petrol quality is classified based on testing from Lahore petrol stations. The project seeks to influence national policy on fuel standards and lead to industry collaborations for commercializing the sensor. Additionally, the research findings extend to other sectors like agriculture and environmental monitoring, enhancing sustainability efforts.

Dr. Naveed Arshad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveedarshad@lums.edu.pk

Unleashing the Potential of Pakistan's IT Industry: Building a Roadmap for Massive Software Export Growth

Sponsor: Pakistan Institute of Development Economics (PIDE)
Funding Amount: PKR 3,755,000
Project Initiated in: 2023

This proposal aims to investigate factors influencing the growth and competitiveness of Pakistan's software export industry and how the industry can be developed to improve its global market position, given the upcoming fifth industrial revolution. This proposal identifies the factors that contribute to the industry's growth and competitiveness, including government policies, education and training programs, innovation and R&D, and market dynamics. The study also explores potential strategies for further developing the industry, such as using AI technologies, smart contracts, augmented and virtual reality, big data and cloud, robotics, cybersecurity, blockchain, and others. Finally, the research aims to provide recommendations that can inform policy and practice for strengthening Pakistan's software export industry and driving its economic growth in the fifth industrial revolution.

Dr. Zubair Khalid
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
zubair.khalid@lums.edu.pk

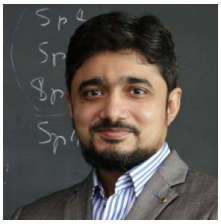
Managing Mobility Using Technology and Data-Driven Travel Demand Management

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

Travel demand management (TDM) refers to the utilization of methods, policies, initiatives, and strategies to reduce or manage travel demand across multiple transportation modes. The proposed research on TDM strategies will consider both the technological advancements and the social and economic inclusivity to ensure that the implementation of TDM will not result in unforeseen complexities for the existing infrastructure and the transport system. The main aim of this project is the review the strategies and technological solutions developed to address the traffic problems. And to evaluate the relationship between social, economic, environmental, and traffic conditions in the walled city of Lahore. In the future, this project will help in infrastructure for the suitability of TDM strategies, utilizing the technology for traffic analysis and modelling, and carrying out on-field surveys. This project also aims to identify the potential benefits of integrating data-driven solutions, such as real-time traffic monitoring, predictive analytics, and smart traffic signals, to improve the efficiency of travel demand management. It will evaluate how these technologies can be adapted to meet the unique needs of the Walled City of Lahore, a historically significant area with dense traffic and limited road space. The project will involve collaboration with local authorities and transportation experts to develop feasible recommendations for optimizing traffic flow, reducing congestion, and enhancing mobility for all residents. Ultimately, the research aims to contribute to the sustainable urban mobility framework, improving the quality of life for citizens while preserving Lahore's heritage.

TECHNOLOGY

Dr. Agha Ali Raza
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
agha.ali.raza@lums.edu.pk



Promotion of Urdu Language Using an Interactive Urdu Audiobook Reader

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

Traditionally, a language is learned by reading books, conversing with natives, and practicing writing. These methods require assistance from others. This project will help to supplement some of these processes through the audio reader software. The main aims of this project are to reduce barriers to learning Urdu and to evaluate the effectiveness of the development of this system. Most importantly, to preserve and promote the Urdu language. This project is doing something new and important by studying how to use technology to read Urdu texts aloud. This project is helping people learn Urdu by using this technology. This project is especially helpful for people who struggle with reading and writing.

Dr. Hassan Jaleel
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
hassan.jaleel@lums.edu.pk

A Robotic Solution for Digital Plant Phenotyping and Intelligent Decision Support System for Smart Farm Management

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 11,988,600
Project Initiated in: 2022

The objective of the proposed research is to evaluate the potential of Sustainable Intensification in Pakistan through digital phenotyping. Plant phenotyping refers to monitoring the structural, physiological, and temporal characteristics of a plant, such as the leaf shape and count, stem height, leaf chlorophyll content, NDVI, and canopy size, to determine its growth rate and predict yield under various biotic and abiotic stresses. This project constitutes a first-of-its-kind research activity in Pakistan in which the impact of SI in the local environment is analysed through a rigorous data-driven approach using modern robotics and sensing technologies.

Dr. Ihsan Ayub Qazi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ihsan.qazi@lums.edu.pk

Improving Wateen's Operational Efficiency and Effectiveness Using Artificial Intelligence and Machine Learning

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

The project aims to harness the power of AI and ML to optimize Wateen's operations, enhance customer experience, and drive business growth. The project seeks to achieve this by implementing AI-powered predictive maintenance to reduce network downtime. It develops an ML-based traffic management system to optimize resource allocation, creates a chatbot using NLP to enhance customer support, and automates decision-making processes using AI insights. However, the project also acknowledges the challenges of integrating AI and ML into existing systems and infrastructure, addressing potential job displacement concerns, and ensuring ethical considerations in AI development and deployment. By overcoming these challenges, Wateen can improve its overall performance, reduce costs, and enhance customer experience, ultimately leading to increased competitiveness and success in the market.

Dr. Imdad Ullah Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
imdad.khan@lums.edu.pk

A Computational Approach to Design Antibodies for Biological Research and Disease Diagnosis

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

This project aims to develop an end-to-end computational pipeline with a graphical user interface for designing specific antibodies for target antigens by leveraging machine learning coupled with various data analytical techniques. The specific objectives of this study are to predict the three-dimensional structure of antigens and antibodies from their sequences. Developing computational models and algorithms to predict the binding sites, binding strengths, and specificity of antibody-antigen interactions. Develop a user-friendly graphical user interface and intuitive workflows that can be readily used by researchers and industry professionals for the design of new antibodies. This project will have a significant impact on the biotechnology (biopharmaceutical) Industry, the healthcare sector, and teaching and research in computational and machine learning approaches in biology.

Dr. Momin Ayub Uppal
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
momin.uppal@lums.edu.pk

Creating Technological Foundations of Data-Driven Policy Making for Sustainable Urban Development

Sponsor: HEC
Funding Amount: PKR 210,221,860
Project Initiated in: 2021

The project aims to utilize technological innovations for data gathering, analytics, and decision-making in addressing complex urban issues in Pakistan. Over the three-year duration, activities focus on six interrelated verticals spanning urban sprawl, environment, health, and mobility. Each vertical is supported by linked horizontal themes, ensuring transdisciplinary collaboration and long-term impact. Key horizontals include technology development, equity, transparency, and social acceptability. The project also emphasizes advancing data-driven decision-making, evidence-based policy design, and capacity building for stakeholders, fostering sustainable change in Pakistan's urban landscape.

Urban Heat Island Effect: Creating Vulnerability Index Maps and Exploring Links with Green Infrastructure

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

According to the Global Climate Risk Index, Pakistan is the 8th most vulnerable country to the effects of climate change, particularly extreme events like droughts, heatwaves, and floods. Heatwaves have been particularly deadly, causing thousands of deaths and economic losses. The country has suffered over $30 billion and desperately needs a fundamental shift in policy implementation through building data-centric climate adaptation strategies. To address this need, the proposed initiative aims to develop tools and methodologies for mapping spatial vulnerability and resilience to heatwave risks in an urban environment by using Lahore as a test case. By analysing satellite data and using AI, the project aims to identify factors like building density, green spaces, and industrial zones that affect urban heat. This will help policymakers develop better plans to protect people from heat waves. The project will also explore the role of green infrastructure, such as parks, green roofs, and urban forests, in mitigating the Urban Heat Island (UHI) effect. Integrating climate models with vulnerability index maps will provide actionable insights for urban planning and design, promoting green spaces as a critical solution for climate resilience.

Dr. Murtaza Taj
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
murtaza.taj@lums.edu.pk

Artificial Intelligence: Images, Gestures, Ancient Materials. Machine Learning for the Multidimensional Perception of Objects in Archaeology

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 1,500,000
Project Initiated in: 2021

This project aims to develop algorithms dedicated to archaeological research for the formal study of artefacts (recognition of the object and its shape) and their reconstitution from fragments. It allows the comparison of research results with hypothesis tests (contextual viability of the reconstructions proposed by archaeologists by implementing knowledge of the mechanics of materials), and the experimental approach in archaeology with field scenarios. The objective is to develop links between digital humanities and archaeology (non-existent in Pakistan), to support the protection of archaeological sites, and to help prevent the trafficking of antiquities.

Auto Surveying: Estimating Building Footprint and Height Via Satellite Imagery

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

With the advancement in modern machine learning, many methods have been proposed for automated surveys. Many methods have also been proposed for the extraction of building attributes, especially footprints. However, the extraction of other attributes, such as height estimation, is still an open problem. So, this project is to deal with such problems. The main aim is to obtain a generalized and interpretable solution that can be applied to local Scenarios. It also aims to combine both the known mathematical frameworks with data-driven machine learning to propose a solution for the estimation of building attributes. This project would help government/semi-government organizations like the Urban Unit to update their database by developing sustainable solutions for urban management planning.

Artificial Intelligence

Mr. Waqar Ahmad
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor of Practice
waqar.ahmad@lums.edu.pk

Development of Large-Language Models to Assist in Deep Energy Analytics

Sponsor: LUMS
Funding Amount: PKR 1,500,000
Project Initiated in: 2024

Large language models (LLMs) like ChatGPT, Google Bard, and Large Language Model Meta AI (LLaMA) are powerful tools for extracting/generating knowledge. However, a challenge with these models is their tendency to provide generic answers that lack domain-specific relevance, which can be problematic in specialized fields like energy consumption analysis, where precise insights are essential for informed decision-making. To address this issue, this project aims to develop an Assistance Program for Large-language Models (APLM) that will enable these models to provide domain-specific insights into the field of energy consumption. In this study, ChatGPT will be considered and utilized as an LLM. The primary goal is to make it more useful for energy users, analysts, and decision-makers. This project also aims to help ChatGPT understand and provide specific insights about energy usage patterns by feeding it precise prompts based on real data.

Dr. Zubair Khalid
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Associate Professor
zubair.khalid@lums.edu.pk

Catalysing Industry 4.0: Development of Framework and IoT and Machine Vision Testbeds for Providing Automation Roadmap to the Industries

Sponsor: National Centre for Robotics and Automation (NCRA)
Funding Amount: PKR 10,321,000
Project Initiated in: 2021

The industrial sector is undergoing a transformation through Industry 4.0, driven by digitalization, which uses smart data and information technologies to boost efficiency and productivity. This project focuses on developing a framework to guide local industries in their digital transformation. It helps assess manufacturing maturity in terms of interactions between man, machines, and methods. The framework also supports innovation analysis in technology and processes. Additionally, the project will create IoT and machine vision testbeds to help industries test and implement digital solutions. The results aim to provide a roadmap for Industry 4.0 adoption and enhance industrial competitiveness in Pakistan.

Dr. Naveed Ul Hassan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveed.hassan@lums.edu.pk

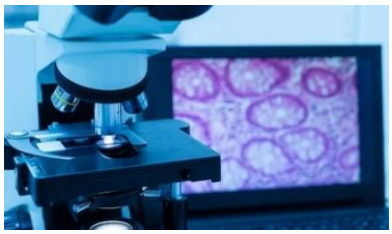
Peer-to-peer (P2P) Energy Trading in Prosumer-Oriented Electricity Markets Enabled Through Blockchain Technology

Sponsor: HEC
Funding Amount: PKR 10,231,200
Project Initiated in: 2023

The project is about creating a system where the electricity generators for household or commercial purposes could have full command of their electricity. The energy produced through solar panels can be distributed in the community around them, called peer-to-peer energy trading. This system uses a technology called blockchain for more secure trade. This project aims to design and develop a peer-to-peer (P2P) energy trading system enabling individuals to buy and sell excess energy directly. to create a prosumer-oriented electricity market that empowers individuals to actively participate in energy production and consumption. and to utilize blockchain technology to ensure secure, transparent, and fair energy transactions in the P2P energy trading system. Energy without waste can be transferred into the community through this P2P project. This method also provides secure technological energy distribution while reducing the dependence on government companies. The project also seeks to optimize energy distribution by creating a decentralized platform that allows prosumers (producers and consumers) to engage in direct energy exchanges without relying on traditional utility companies. Leveraging blockchain technology ensures the integrity of transactions and reduces the potential for fraud or manipulation. This system not only promotes sustainability by encouraging the use of renewable energy sources but also aims to decrease energy costs for consumers and reduce the overall strain on the national grid. Ultimately, this P2P energy trading model can revolutionize the energy sector, creating a more resilient and efficient energy market.

Computer Vision

Dr. Ammar Ahmed Khan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
ammar.ahmed@lums.edu.pk

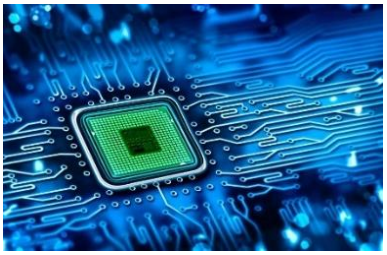


Developing a Modular 3D-Printed Platform for High-Resolution Microscopes with Advanced Imaging Applications

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

This project proposes the development of a versatile, modular optical imaging system capable of performing conventional as well as digital microscopy. The project intends to establish a multi-purpose platform that uses a mixture of 3D-printed and machined parts that can be developed, repaired, and scaled locally.

Dr. Muhammad Adeel Ahmed Pasha
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
adeel.pasha@lums.edu.pk



Real-time Display of High Dynamic Range (HDR) Images and Videos Using Embedded Tone-Mapping Operators

Sponsor: LUMS
Funding Amount: PKR 980,000
Project Initiated in: 2022

The proposed research tackles the need for huge computational requirements of modern TMOs by exploring hardware-efficient FPGA-based implementations as a short-term goal. The FPGA-based solutions can then, in the future, be translated into ASIC-based custom hardware circuits that can be deployed into end consumer-electronics devices such as Set-Top Boxes (STBs) for LDR displays.

Computer Vision

Dr. Muhammad Imran Cheema
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
imran.cheema@lums.edu.pk

Measurement of Water Content on the Paper Machine

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

Measuring water content in the fibers at different stages of the paper-making process is essential. The machinery's power consumption is high as the components maintain a high amount of pressure and heat, regardless of the varying moisture content in the fibres, resulting in the paper quality being inconsistent and considerable power wastage. Most paper manufacturing processes have good automation, but intermediate steps lack reliable sensors to check moisture. This project aims to have the sensors with good results. The project identifies three sensors: MOISTECH's IR3000, Valmet's IQ IR Moisture Sensor, and Delmhorst Instruments' Moisture meters. All of them have advantages and drawbacks. A good sensor will allow better moisture content estimation and improve paper quality.

Dr. Nadeem Ahmad Khan
Syed Babar Ali School of Science and Engineering (SBASSE)
Associate Professor
nkhan@lums.edu.pk

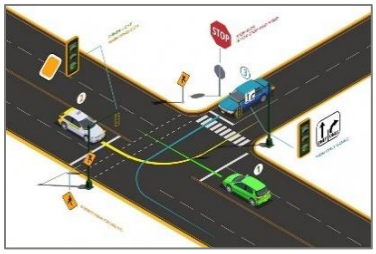
Addressing Critical Limitations of Current Industrial and Commercial Vision Systems

Sponsor: LUMS
Funding Amount: PKR 999,000
Project Initiated in: 2023

The project is about improving special machines called Vision Systems that help industries and businesses work better. The project is finding ways to make these machines work even better without throwing away the old ones. This project aims to collect many pictures of things on conveyor belts to help machines learn and work better, and to work on making machines smarter and better at recognizing things, so they can help industries work more efficiently. This project is to build a special machine called an industrial vision system that can help industries work better, using parts that are easily available and affordable. This project is helping make special machines called Vision Systems work better, and making them better will help many industries and businesses work more efficiently and effectively.

Computer Vision

Dr. Shahid Masud
Syed Babar Ali School of Science and Engineering (SBASSE)
Professor
smasud@lums.edu.pk



Adapting Advanced Driver Assistance Systems (ADAS) to Pakistani Roads and Highways? An Embedded Systems Perspective

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

While 2D CNNs have been used in camera-based ADAS designs, the more advanced 3D CNNs have yet to be explored, despite their suitability for video datasets due to their ability to process image data and optical flows. This research aims to implement 3D CNNs on embedded systems for ADAS, addressing challenges of energy efficiency and performance in resource-constrained environments. It focuses on detecting road conditions and boundaries using a camera-based system to improve safety on Pakistan's highways. The study explores the trade-offs in accuracy, quantization, and resource consumption to optimize 3D CNN mapping for ADAS applications.

Dr. Zubair Khalid
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Associate Professor
zubair.khalid@lums.edu.pk

Development of System for the Detection of Edge Cracks in Production Process

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2021

The paper (board) of different web widths is produced and is supplied to different customers to produce end products. During the board production process, cracks of varying sizes may develop on the edges of the paper on either side of the process line due to the variations in the production process. These cracks are undesirable as the cracks may cause web breaks at the winding machine, resulting in production loss and a decrease in the throughput at the winder and/or customer end. There is a need to devise a system to detect the cracks on the edges during the production or slitting process. This project is aimed at enhancing process efficiency, reducing production loss and waste, and limiting customer claims. Such detections can facilitate the process engineers or operators to appropriately review the production process and raw materials. Later, the data collected by the system may also be reviewed offline to assess the production/material quality.

Development of System for the Detection of Spots in the Production Process using Machine Vision

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2020

This study includes the development of a system that exploits machine vision algorithms to identify spots from the video stream of the web running at high rates in real-time. To ensure simplicity in design, commercial shelf components are used. In addition, to address computational overhead state-of-the-art machine vision algorithm is utilized. The developed system is robust enough to capture the spots at speeds up to 200 meters per minute.

Dr. Basit Shafiq
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
basit@lums.edu.pk

Enhancing Power Sector Data Security, Risk Assessment and Cyber Resilience

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2022

This project focuses on conducting an in-depth cybersecurity vulnerability study for PITC-supported systems. The study comprises an in-depth security diagnosis of the existing PITC-supported ICT infrastructure and systems, power management systems, and external networks connected to the PITC systems. Researchers are conducting a review of any existing cybersecurity tools, systems, protocols, processes, and procedures deployed in the current environment.

Rethinking Cyber Security in Pakistan—Human Factor's Essential Role

Sponsor: University of Saarland
Funding Amount: PKR 26,437,662
Project Initiated in: 2021

With increased digitization in Pakistan, cyber threats to citizens, the government, and industry have become more severe. Pakistan's poorly protected critical infrastructure makes even basic cyberattacks a serious risk. As internet use grows, so do these threats. IT graduates lack analytical and complex problem-solving skills crucial for cybersecurity, where attack methods are constantly evolving. Strengthening links between higher education and industry is essential to improve IT students' employability in cybersecurity. This project aims to make university cybersecurity programs more immersive and experience-based to address these training gaps.

Cyber Security

Dr. Zartash Afzal Uzmi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
zartash@lums.edu.pk

Internet Security and Privacy Lab

Sponsor: HEC
Funding Amount: PKR 91,390,000
Project Initiated in: 2018

Fortifying IT systems is crucial as dependence on computing and ICT grows, despite frequent privacy breaches. In Pakistan, the rising number of online users highlights the need for robust cybersecurity. This project proposes a lab affiliated with the National Centre for Cyber Security to protect users through policy intervention, raise cybersecurity awareness, and trace threat sources. By limiting software to essential functions, we reduce attack surfaces. Collaborating with cybersecurity, data mining, and networking experts, this project aims to enhance security and minimize privacy risks.

Dr. Ihsan Ayub Qazi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ihsan.qazi@lums.edu.pk

Distributed Computing Lab of the National Centre in Big Data and Cloud Computing

Sponsor: HEC
Funding Amount: PKR 78,467,207
Project Initiated in: 2018

Cloud computing is widely viewed as an area of vital importance to nations as it provides a critical infrastructure for powering today's massive online services. Nowadays, the emergence of new technologies like robotics, artificial intelligence, etc., has made it challenging for cloud computing to meet this requirement. This project proposes a lab that aims to bring edge computing into a function that seems to minimize challenges. The goal of this lab is to make a highly available distributed cloud infrastructure for delivering ultra-low latency and high bandwidth to users to help Pakistan gain a competitive edge in the world. To this end, we will design and develop a massively distributed cloud infrastructure comprising tens of thousands of mini data centres, possibly located at cellular base stations.

Dr. Ihsan Ayub Qazi, Dr. Zafar Ayub Qazi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor|Assistant Professor
ihsan.qazi@lums.edu.pk|zafar.qazi@lums.edu.pk

Improving Web Performance over Low-end Smartphones in the Developing World

Sponsor: Google
Funding Amount: PKR 3,087,500
Project Initiated in: 2018

This research project, awarded by Google to Dr. Ihsan Ayub Qazi and Dr. Zafar Ayub Qazi, aims to improve the web browsing experience for users in the developing world who access the internet through low-end smartphones. Despite the growing availability of smartphones, many users in these regions face slow and unreliable internet connectivity. It leads to frustration and limited access to online information and services. This project seeks to address this issue by developing and implementing innovative solutions to optimize web performance on low-end smartphones. It includes optimizing website content and improving network efficiency. The project also investigates the specific challenges and needs of users in the developing world. It collaborates with local stakeholders to ensure the solutions developed are tailored to their context and requirements.

Dr. Momin Ayub Uppal
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
momin.uppal@lums.edu.pk

Sinking Cities: Remote Sensing of Land Subsidence for Urban Flooding Risk Assessment

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

To help prevent flooding in cities, this project is to identify which areas are most at risk. This project is studying how the city's infrastructure, like roads and drainage systems, affects flooding. It uses satellite images and other data, like maps of the city's infrastructure and building locations, to understand where flooding is most likely to happen. This project aims to research and explore different datasets to understand land subsidence and flooding risks. It also aims to investigate how satellite data can help detect and measure land subsidence and create a detailed 3D map of a city. This project is helping to create a plan to reduce flooding in cities and keep people and property safe. It also helps policymakers to give them a way to focus on the required areas.

Dr. Muhammad Adeel Ahmed Pasha
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
adeel.pasha@lums.edu.pk

Greencomm: Toward Developing an Energy-Efficient Next Generation Communication Platform for Enabling Internet of Things (IoT)

Sponsor: Higher Education Commission (HEC)
Funding Amount: PKR 3,758,512
Project Initiated in: 2020

This project aims to contribute towards designing next-generation energy-efficient (green) communication platforms that would steer the future technologically more-connected society towards a more energy-efficient (green) society. The evolution of the internet, short-distance communication, and embedded sensor design has enabled us to convert our daily-life objects (things) (such as home appliances, electrical sockets, power meters, vehicles, etc.) into smart objects that can “think”, analyse, and react to their environment. Such “things” form the basic fabric of the Internet of Things (IoT) and enable novel computing and communication applications. This phenomenon is expected to lead to a new global industrial and economic revolution soon.

Dr. Murtaza Taj
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
murtaza.taj@lums.edu.pk

Forest Fire Monitoring System

Sponsor: IMC Worldwide
Funding Amount: PKR 11,061,435
Project Initiated in: 2022

The project proposes the use of thermal sensors and machine learning to devise an early warning system to both prevent and manage wildfires in Siran Forest, Mansehra. It will use thermal sensors to identify areas that are vulnerable to catching fire, integrating data from sources such as weather forecasts, etc. The goal of this project is to make AI camera-based sensors that will detect fire early. In addition, IoT air quality sensors, IoT automatic weather stations, GIS mapping for fire hazard risk and management, and IoT off-grid communication systems will be developed that will detect fire along with weather changes that may spread the fire. These steps also assess the fire risk of forests, and this research will help in getting rapid control and early management of forest fires before they can spread.

Follow-on Funding for Forest Fire Detection and Early Warning System

Sponsor: Foreign, Commonwealth and Development Office (FCDO)
Funding Amount: PKR 6,880,989
Project Initiated in: 2023

This project and its work scope defines activities and deliverables as part of Follow-on Funding, provided by DT Global, about the continued work of the Lahore University of Management Sciences (LUMS) and Worldwide Fund for Nature (WWF) Pakistan in developing an early-warning and response system combining AI, Computer Vision, IoT, and remote sensing technologies for the application of forest fires in Pakistan.

Dr. Suleman Shahid
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
suleman.shahid@lums.edu.pk

Development of Application and Website

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2019

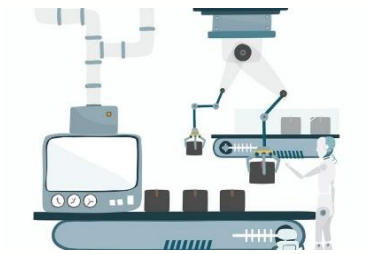
Initiated as a small voluntary women's collective in Pakistan in 1975, the collaborative organization of this consulting project became the country's first self-avowed feminist platform and has played a pivotal role in the women's movement. It has established itself as a leading resource centre for advocacy, capacity building, knowledge production, and dissemination on women's rights. The organization also houses historical archives related to the rights and laws concerning women and minorities from Pakistan's early years. This project involves the development of an app and website, along with a project report detailing the design, features, and limitations of the initiative.

Dr. Zubair Khalid
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
zubair.khalid@lums.edu.pk

Illuminating the Eyes of Industry 4.0: Design and Development of Robust Algorithms, Real-time Systems, and Industrial Grade Applications for Machine Vision

Sponsor: HEC
Funding Amount: PKR 10,584,000
Project Initiated in: 2023

This research project aims to address the question, "How to improve the performance of the machine vision to align it with the requirements of Industry 4.0 and enable it to achieve step-function improvements in the industries?" In this context, this research seeks to create new and better machine vision algorithms that work quickly and reliably. It also plans to invent new lighting methods, teach workers about machine vision, make courses for industry experts, and execute industrial-grade pilot projects in collaboration with industrial partners. The proposed development in the project will support local industries in using machine vision technology to improve the reliability of the process and quality of the end products.

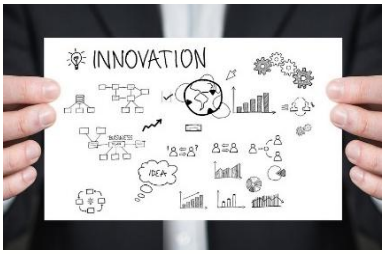


Research and Development Collaboration for Bottom Reels Inspection Systems

Sponsor: Confidential
Funding Amount: Confidential
Project Initiated in: 2023

The project aims to design and develop an automated machine vision system for inspecting bottom reels. It enables efficient and accurate quality control in the manufacturing process. The objectives of this project include developing a robust and reliable machine vision system. To improve inspection accuracy and speed. It also aims to reduce manual inspection errors and increase overall productivity. This project enables companies to produce high-quality products with minimal defects. By automating the inspection process, companies can also reduce labour costs, improve worker safety, and increase their competitiveness in the global market. Overall, this project has the potential to transform the manufacturing industry by providing a cutting-edge solution for quality control and inspection.

Dr. Muhammad Sabieh Anwar
Syed Babar Ali School of Sciences & Engineering (SBASSE)
Professor
sabieh@lums.edu.pk



Syed Babar Ali Research Award

Sponsor: Babar Ali Foundation
Funding Amount: PKR 40,000,000
Project Initiated in: 2020

The Syed Babar Ali (SBA) Research Awards Program recognizes and supports outstanding PhD students in the Syed Babar Ali School of Science and Engineering, LUMS. The recipients of this award, called SBA Fellows, are expected to pursue research and scholarly activities that support knowledge creation and innovation in science and engineering as well as contribute to the economic well-being of society at large. This prestigious award also provides fellows with opportunities to collaborate with leading researchers and industry experts, fostering an environment of academic excellence and global impact.

Science, Society, and Culture: Research Studies

Sponsor: Health Lynks
Funding Amount: PKR 1,156,456
Project Initiated in: 2023

This research project aims to provide resources in LUMS that bring together scholars from science and engineering, humanities and social sciences, legal studies, and other areas to engage in interdisciplinary and collaborative inquiry on “Big Issues” that lie at the intersection of Science, Society, and Culture (SSC). The project seeks to foster a deeper understanding of how scientific advancements and technological innovations impact societal values, culture, and policymaking. By encouraging cross-disciplinary dialogues, it aims to generate solutions to complex global challenges, ensuring that scientific progress aligns with social good and ethical considerations. The project also aims to bridge the gap between academic disciplines, fostering collaboration among experts from diverse fields to address critical issues such as climate change, public health, and the ethical implications of emerging technologies. Through workshops, conferences, and collaborative research initiatives, it will create a platform for scholars to share knowledge, challenge assumptions, and generate actionable insights. Ultimately, this initiative aspires to influence policy and contribute to societal well-being by ensuring that scientific and technological developments are guided by ethical frameworks and consider their broader impact on society and culture.

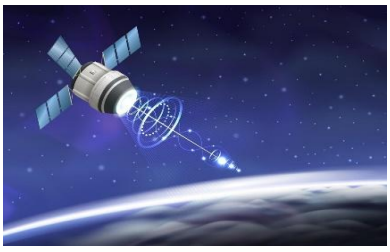
Dr. Ijaz Haider Naqvi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
ijaznaqvi@lums.edu.pk

Reconfigurable Intelligent Surfaces (RIS) Assisted Radar-based Drone Detection and Urban Security Surveillance Solution

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2022

Radar technology has numerous military and civil applications. In most cases, it requires a “Line of Sight (LOS)” between the transmitter and the target. The target means that there is no obstacle in the path between the transmitter and the target. The simulations can encompass a wide range of problems. The main objective of the project is to demonstrate the utility of RIS-assisted radar through analytical performance bounds. This project is for investigating the performance of radar systems with RIS under different configurations. In the future, this project will help in the training of individuals to utilize this IS for the tremendous opportunities across the globe. These opportunities exist in both industry and higher studies.

Dr. Naveed Ul Hassan
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
naveed.hassan@lums.edu.pk



Network Convergence to Connect the Unconnected

Sponsor: United Nations Educational, Scientific, and Cultural Organization (UNESCO)
Funding Amount: Confidential
Project Initiated in: 2022

This project aims to make the internet available to more people, especially in places where it's hard to access. The idea is to use different kinds of networks in the space to make this happen. The goal of this project is to bridge the digital divide by providing affordable and efficient connectivity to underserved areas. To achieve this, the project proposes several solutions like Satellite Constellations, High-Altitude Platforms (HAP), FSO and RF Communication, Converged Networks, and Sustainability. In short, the project aims to connect the unconnected by using various network technologies while considering sustainability and cost-effectiveness. This way, the internet can be provided without harming the planet.

Floating Wireless Sensor Network and Its Localization for the Monitoring of Aquatic Environments

Sponsor: LUMS
Funding Amount: PKR 1,000,000
Project Initiated in: 2023

A wireless sensor network system is used to monitor the activities underwater over a river or canal. But due to water pollution, the monitors do not give us a true picture of life under the water bodies. Due to this, there is a need to develop a floating water system that could give information from different regions. The main aim of this project is to make an appropriate design for low-cost batteries for floating devices. It also aims to test these WSNs with floating nodes to see their localization. This project is going to help in the deployment of low-cost WSN technology in Pakistan. Moreover, it is going to give a clear picture of the environment underwater.

Dr. Zafar Ayyub Qazi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Assistant Professor
zafar.qazi@lums.edu.pk

Redesigning Cellular Control Plane for Emerging Edge Applications

Sponsor: HEC
Funding Amount: PKR 6,678,000
Project Initiated in: 2023

5G promises to help enable the fourth industrial revolution, where everything will be connected and transformative technologies like artificial intelligence, augmented and virtual reality, blockchain, and self-driving cars will permeate our lives. The challenge is that current cellular networks are too slow to handle these applications. This research aims to develop a faster and more reliable system for cellular networks, especially for 5G and future 6G networks. This will allow 5G to be used for things like remote surgery and self-driving cars. The project will also train students and professionals on the latest cellular technologies and will contribute towards the development of an ecosystem around cellular research and development.

Dr. Zartash Afzal Uzmi
Syed Babar Ali School of Sciences and Engineering (SBASSE)
Associate Professor
zartash@lums.edu.pk

Exploring Pakistan's Internet Connectivity (EPIC): Assessing the Resiliency of the Internet in the Face of Climate Change-Induced Hazards

Sponsor: HEC
Funding Amount: PKR 3,695,000
Project Initiated in: 2023

The Exploring Pakistan's Internet Connectivity (EPIC) project assesses the resilience of Pakistan's Internet infrastructure in the face of climate change-induced hazards. Despite rapid growth in internet usage, Pakistan's network infrastructure remains vulnerable to disruptions, particularly due to climate-related events like floods. The EPIC project aims to assess the impact of climate change-induced hazards on Pakistan's internet infrastructure and to identify vulnerabilities in the network infrastructure to develop strategies to enhance the resilience of internet connectivity in Pakistan. The EPIC project will help Pakistan develop a robust and climate-resilient internet infrastructure, ensuring uninterrupted internet services during natural disasters and climate-related events. By strengthening internet connectivity, Pakistan can reduce the risk of disruptions to essential services like online banking, e-commerce, and healthcare, ultimately contributing to the country's overall development and stability.

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Designed:

Hamza Habib, Head of OR Operations

Content:

Sheza Mustasim, Grants & Operations Associate

Aumama Tanveer, RA-Creative Writer

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