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SUPERIOR
UNIVERSITY

RESEARCH

ROUND-UP

QUARTER-1
2023



**Empowering the Next
Generation of Women in Science**

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ORIC

Office of Research, Innovation & Commercialization

RESEARCH ROUNDUP 2022

Newsletter Quarter 1

JANUARY - MARCH, 2023

VISION

To be ranked among leading universities, driving research excellence, and market utility in Pakistan.

MISSION

Promote an innovative, vibrant and entrepreneurial environment to achieve research excellence with the aim of creating social impact, growing the knowledge economy, and formulating collaborative venture.

OUR ETHOS

- Innovation
- Sustainability
- Commercialization
- Ethics
- Inclusivity
- Commitment

ORIC PERFORMANCE

32 KNOWLEDGE EXCHANGE ACTIVITIES

02 MOU

13 SUPERIOR'S RESEARCH JOURNALS

RESEARCH PUBLICATIONS

By conducting significant research across several disciplines, Superior University is trying to establish a vibrant research community in Pakistan. Academic performance is mostly determined by publications, and we are pleased that our faculty are making valuable knowledge contributions to the national and international research community. ORIC feels excited to share the statistics of publications that have so far been published this year.

88

RESEARCH GOVERNANCE

4th Superior Journal Committee Meeting

26 January 2023

ORIC hosted the 4th Superior Journal Committee Meeting with all the journal committee members on 26 January 2023. The Superior Journal Committee discussed Superior Journals in detail and made valuable suggestions to work, develop and ensure best practices concerning quality. The Committee deliberated on the following subjects:

- Manuscript submission rate
- Quantity of Peer-reviewing reports
- Adherence to HEC Plagiarism policy
- Timely publishing
- Efforts for indexing in international indexes.
- Citations
- Compiling of documents for HEC application according to checklist
- Usage of an Open Journal System (OJS) for managing the editorial workflow

Recommendations and suggestions were requested from Editorial members of the journal committee.



EXTERNAL COLLABORATION

We are not growing alone but collaborating with national and international organizations for achieving shared goals of sustainable

development. To date, we have more than 250 plus MoU with leading public universities, research organizations, corporate sectors, and industries for

research, student exchange, joint research events, and other exciting collaborative efforts.

CULTIVATING INDUSTRY-ACADEMIA LINKAGES

SMEDA - Pakistan can be helpful in inculcating industry-academia linkages by providing a platform for industry and academia to interact and collaborate. It can also provide a platform for industry and academia to exchange ideas, share resources, and develop joint research projects. To keep these points in mind delegates from Superior University held a productive and successful strategic meeting with team SMEDA - Pakistan headed by Mr. Javed Afzal - Provincial Chief, SMEDA Punjab to explore avenues for future collaboration and

partnerships. Mr. Muneeb Ahmed - Deputy Director CMACED, Dr. Sami Bajwa - Dean Faculty of Business and Management Sciences, Dr. Humaira Yousaf - Assistant Director Entrepreneurship Teaching & Training Program, and Mr. Hamid Masood - Deputy Director ORIC Superior University, were representatives of the delegation from Superior University.

The representatives discussed potential areas of collaboration, including joint training sessions, consulting services, and research projects. Another discussion area

was how they could collaborate on entrepreneurial excellence awards. Both organizations have a wealth of expertise and knowledge in their respective fields, and there are clear opportunities for collaboration and sharing best practices.



THE SUPERIOR UNIVERSITY INKS A MEMORANDUM OF UNDERSTANDING WITH CLAY AND CLAN

The Superior University and Clay and Clan have signed a Memorandum of Understanding (MoU) to collaborate on a range of initiatives. This MoU was initiated by the School of Art & Design to fully engage the Clay and Clan in various academic and research collaborations for students. **Ms. Farhana Rasheed** Program Leader (Fine Arts program) and **Mr. Imran Nayer** Clay and Clan (Owner) signed the document in a ceremony organized at the Superior University, Main Campus. The MoU is expected to foster a long-term partnership between both parties and create a platform for further collaboration in the future for student development.



EXPANDING SUPERIOR'S RESEARCH FOOTPRINT

Office of Research, Innovation & Commercialization hosted a meeting with Dr. Muhammad Afzal – a globally renowned Scientist of R&D organization of Atomic Energy Commission of Pakistan and Nature Research Award Winner for Driving Global Impact (2021), to discuss the Industrial wastewater management project with one of Superior's multidisciplinary research groups. Superior University is determined to contribute to SDG by solving pressing problems of the society.

The following faculty members attended the meeting.

- **Prof. Dr. Nabeel Amin** Dean School of Art & Design
- **Dr. Uqba Mehmood**, Associate Professor, HOD Biological Sciences
- **Dr. Abdul Qadir**, Assistant Professor, Faculty of Allied Health Sciences
- **Dr. Samiya Abrar**, Assistant Professor Department of Biological Sciences
- **Dr. Shafique Ahmed Awan** Manager Innovation & Commercialization
- **Mr. Hamid Masood** Deputy Director, ORIC



KNOWLEDGE PARTNER

Superior University has partnered with Pak Pharma & Health Care Expo to provide knowledge and expertise in the field of pharmaceuticals and healthcare. Superior's Faculty of Allied Health Sciences was a knowledge partner in an international conference titled "One Health (Pharma, Food health)" which was organized by National Alliance for food at Expo Centre Lahore. At this Conference, multiple National and International Keynote speakers presented their latest research and Industry experience.



KNOWLEDGE EXCHANGE ACTIVITIES

A initiative for Research skill enhancement

The main goal of knowledge exchange activities is to increase the knowledge base of the participants, to foster collaboration and promote university-wide research. The office of Research Innovation & Commercialization under its "Knowledge Exchange Activities",

organized a series of workshops, training, seminars, and colloquia by renowned professional experts in all disciplines. These Knowledge exchange activities are tailored to meet the needs of the participants. ORIC ensures every faculty member,

and the student has the right knowledge to strengthen their skills to achieve their own and the university's Researcher Agenda. The Following KEA were performed during the year.

07

COLLOQUIAM

03

SEMINARS

22

TRAININGS

02

CONFERENCE AND WEBINAR

Total Knowledge Exchange Activities



CELEBRATING AND COMMUNICATING

FACULTY ACHIEVEMENT

Ascending the work toward sustainability

Fashion designing is an ever-evolving industry that is constantly changing and adapting to the needs of the consumer. As the industry continues to grow, it is important to consider how fashion designers can create sustainable designs that are both fashionable and environmentally friendly.

Mr. Muhammad Fawad Noori Assistant Professor of the School of Art and Design is working on eco-friendly materials and designs. His designs are not only eco-friendly but comfortable and stylish. To recognize his contribution toward sustainability he won an International Award “Best Sustainable Fashion Designer of the year award 2022” by FAM awards powered by Aberdeen Fashion Week Scotland.



EMPOWERING THE NEXT GENERATION OF WOMEN IN SCIENCE

The Supporting Women in Science program is an innovative research capacity-building program for early-career researchers. The program is designed to support and empower women in science, technology, engineering, and mathematics (STEM) disciplines, and to create

a more equitable and inclusive research environment. The program has also helped to raise awareness of the importance of supporting women in STEM disciplines and has encouraged more women to pursue research careers.



The following faculty members are being selected for the first round of the Supporting Women in Science program.



Ms. Fariha Ambreen Ch.

Assistant Professor and Program Leader
Speech-Language Pathology
Faculty of Allied Health Sciences



Ms. Hina Gull

Program leader and lecturer
Department of Mass Communication
Faculty of Social Sciences



Ms. Tayyaba Farhat

Senior Lecturer
Department of Software Engineering,
Faculty of Computer Sciences, and
Information Technology



Ms. Sanya Abdullah

Lecturer
Department of Information Technology,
Faculty of Computer Sciences, and
Information Technology



Ms. Fatima Riaz

Lecturer
Department of Information Technology,
Faculty of Computer Sciences and
Information Technology

**EXPLORE THE WORLD
WITH IFA'S CROSSCULTURE
PROGRAMME**



CrossCultural Programme aims to foster mutual understanding between people from different countries and cultures, to promote intercultural dialogue, and to strengthen the international networks of the participants. Dr. Sambal Shahbaz Assistant Professor, Faculty of Allied Health Sciences has been selected for Cross Cultural Programme 2023 by Institut für Auslandsbeziehungen, Germany.



STUDENT ACHIEVEMENT

Harvard University's Leadership Development Program

Unlock the Potential and Transform Your Career!

The program is designed to provide students with the tools and resources to become successful leaders in their communities and beyond. The program includes a variety of activities, such as workshops, seminars, and mentorship opportunities, as well as access to Harvard faculty and alumni. Participants will have the opportunity to network with other students, develop their communication and problem-solving skills, and gain a better understanding of the global community. Our passionate student Mr. Hams Elahi from BS Economics, The Superior University has qualified for the Aspire Leaders Program 2023, a fully funded Leadership Development Program by Harvard University.



HAMS ELAHI
BS Economics
The Superior University

SUPERIOR RESEARCH JOURNALS

The superior university believes in offering value to the community of researchers through various knowledge exchange and dissemination activities. Quality journals play an

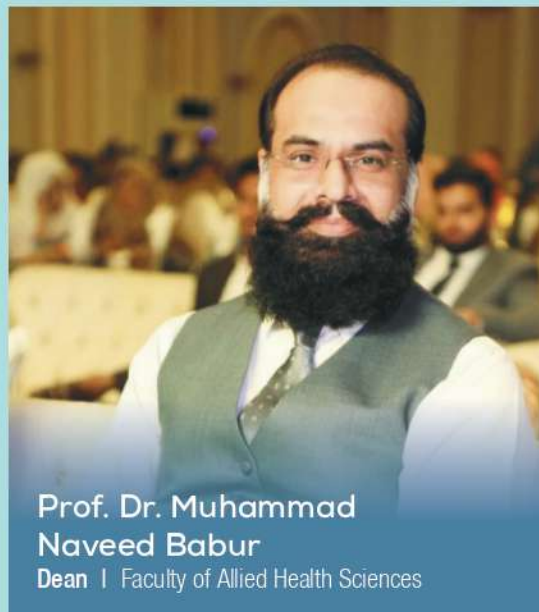
important role in promoting research culture and knowledge exchange among academics. To contribute to quality research, Superior University publishes 12 Journals out of which

6 journals are recognized by the HEC Journal Recognition System (HJRS) has published their issues. We are pleased to share that the following journals of Superior University:

1. **International Journal of Management Research and Emerging Sciences (HEC Recognized)**
2. **Journal of Biological and Allied Health Sciences (HEC Recognized)**
3. **The Superior Journal of Physical Therapy & Rehabilitation (HEC Recognized)**
4. **International Journal of Pharmacy and Integrated Health Sciences (HEC Recognized)**
5. **Journal of Media and Entrepreneurial Studies (HEC Recognized)**
6. **Journal of Entrepreneurship and Business Venturing (HEC Recognized)**
7. **International Journal of Research in Economics and Commerce**
8. **International Journal of Business and Finance Implications**
9. **Journal of Innovative Computing and Emerging Technologies**
10. **International Journal of Sciences and Emerging Technologies**
11. **Superior Journal of Medical Education**
12. **South Asian Journal of Medical Sciences**

TAILORING HEALTH SYSTEMS TOWARD REHABILITATION REQUIREMENTS

The World Health Organization (WHO) and US Agency for International Development (USAID) are two of the most influential organizations in the world when it comes to global health and development. WHO and USAID held an Inception meeting of a technical working group with the agenda “systematic assessment of rehabilitation situation (STARS) and assistive technologies in Pakistan under Relab-HS” addressing the health and development needs of the people of Pakistan. The meeting provided an opportunity to all stakeholders to come together and discuss the current situation and identify ways to improve the availability and accessibility of rehabilitation services and assistive technologies in the country. Prof. Dr. Muhammad Naveed Babur, Dean, Faculty of Allied Health Sciences - Superior University Lahore participated and suggested in the panel discussion the view of tools for Systematic Assessment of Rehabilitation Situation (STARS) And Assistive Technology (AT) and Policy Advocacy to sensitive GoP for appropriate revision of policies to spread wings of Rehab in Pakistan.



Prof. Dr. Muhammad Naveed Babur
Dean | Faculty of Allied Health Sciences



CREATING INTER-DEPARTMENTAL SYNERGIES

Inter-department synergies are essential part of better performance as it enables departments to share resources, knowledge, and expertise. Inter-department synergies help to reduce costs, increase efficiency, and improve the quality of output. It also leads toward better problem-solving and decision-making. For this purpose, the Office of Research Innovation & Commercialization arranged a meeting with ORIC Research Advisors on 27th January 2023. Dr. Usman Sadiq Assistant Director SEP discussed the SDG Hub and related activities. Additionally, Mr. Hamid Masood, Deputy Director, ORIC discussed ORIC-related tasks of advisors and their progress tracking.



BLOG:

2D MATERIAL FOR PHOTONICS AND LASER MATTER INTERACTION: OPENING DOOR FOR FUTURE TECHNOLOGIES

Muhammad Haseeb Shakil, Dr. Shafique Ahmed

Photonics is the physical science of light waves. It deals with the science behind the generation, detection, and manipulation of light. Light has a dual nature known as the wave-particle duality. That is to say that light has characteristics of both a continuous electromagnetic wave and a particle (photon). Photonics plays an important role in driving innovation across an increasing number of fields. The application of photonics spreads across several sectors, from optical data communications to imaging, lighting and displays, to the manufacturing sector, to life sciences, health care, security, and safety.

Using light instead of electricity, integrated photonic technology provides a solution to the limitations of electronics like integration and heat generation, taking devices to the next level, the so-called "more than Moore" concept to increase capacity and speed of data transmission. An integrated circuit containing electronic components that form a functional circuit, such

as those embedded inside your smart phone, computer, and other electronic devices; a photonic integrated circuit (PIC) is a chip that contains photonic components, which are components that work with light (photons). With electronic integrated circuits arriving at the end of their integration capacity, PICs have the potential to be the preferred technology for data communications (inter- and intra-datacenter communications).

Due to abrupt development in neuromorphic circuits, artificial intelligence (AI) has gained more importance that strive to process brain energy efficiently. From data driven economy point of view, powerful computing systems are more important for hasty technological progress. However, due to high demanding computing power, there is a huge gap between existing and required technology and to overcome this gap non-volatile memory (NVM) based on magnetic tunnel junctions, resistive switches and phase change memory devices are necessary that are building

blocks for neural networks implementation and required additional multi terminal device concept. Rapid growth in data transfer has marginally costs associated with complementary metal oxide semiconductor (CMOS) and von Neuman architecture and there is a need of technology that will play a vital role in future computing systems such that spintronics, memristive and Ultra-wide bandgap semiconductor (UWBG) and two dimensional (2D) materials-based electronics. Here are some examples of the device types that are emerging candidates to replace CMOS in specific applications.

1. **Memristors**
2. **Nanoscale Vacuum Electronics**
3. **Neuromorphic Devices**
4. **Printed Electronics**
5. **Spintronic Devices**
6. **Graphene and 2D Material Electronics**
7. **Carbon Nanotube Electronics**
8. **Plasmonic Devices**

Emerging research devices based on 2D materials are the future of CMOS industry and can bring a disaster change by replacing old technology. Deriving from their atomically thin structure, WBG and 2D materials have superior optical, electrical, and mechanical properties that makes them forefront material in research. Hybrid devices and layer by layer materials have reached to limits and now they are replacing with 2D materials that promises a variety of new technologies that opened stimulating door for future technologies.

Wide bandgap semiconductors, especially GaN, are known as future Si of microelectronic Industry. Devices fabricated using SiC, GaN have superior performance, and both in DC, and AC domain compared to GaAs based devices. By using WBG based materials, a quality work can be done in the following areas:

1. High-field laser physics
2. Frequency combs
3. Attosecond science
4. Plasma-based laser accelerator schemes
5. Laser acceleration in vacuum (ultrashort laser pulse interactions and crossed-beam geometries)
6. Relativistic quantum dynamics

2D and WBG based materials has vast usage in different high power and high frequency applications. The major applications include:

1. Wireless Communication, RADAR, etc.
2. Microwave Circuits
3. Power Amplifiers
4. Attenuators/Mixers/Oscillators/LNA
5. Power added efficiency >30%
6. RF gain >10 dB
7. Unity Gain Frequency, FT ~ 30 GHz

A project for developing a RF device using WBG and 2D based FET for high power applications is under process at the Superior University, Lahore. The proposed project has been designed to go through phases of experimentation, development, and implementation in a creative environment, so a close engagement with industrial partners is very likely. It will provide with a better CMOS technology perspective of the challenges. The research has following major objectives and scope:

1. To develop the start of art robust method to predict the electrical and optical properties of the WBG and 2D based materials and comparison with existing techniques.
2. To develop a model that can be generalized for a wide range of materials and system variables.
3. To integrate the proposed model with some practical application.
4. To transfer the technology from the lab to industrial partners
5. To disseminate the research results to the scientific community, industrial partners, manufacturing companies, and policymakers

SOCIETAL IMPACT OF PHOTONICS

Photonic technologies enable sustainable, resource-efficient production processes. Modern lighting methods contribute to protecting the environment. Some societal Impacts are as follows:

1. Immunity from electromagnetic interference (EMI)
2. Freedom from electrical short circuits or ground loops
3. Safety in combustible environment
4. Security from monitoring
5. Low-loss transmission
6. Large bandwidth (i.e., multiplexing capability)
7. Small size, light weight
8. Inexpensive

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EXCITING INITIATIVES COMING UP..

RESEARCH WEEK

The Office of Research, Innovation & Commercialization is hosting a university-wide event which celebrates the excellence of research performance in university. It's a unique platform to bring together researchers including students and faculty, Industrial officials, public sector officials, policy makers and other stakeholders and recognized the research performance of faculty members. This platform not only aims to showcase the undertaken research but also targets the integration of research into policy formulation and implementation.

You can attend the happenings throughout the week.

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