Chiniot-Faisalabad Campus

DIRECTOR

Dr Shahzad Sarfraz
Professor
PhD Approved Supervisor
PhD (CS), AIT, Thailand (2012)
MSc (CS), University of Agriculture., Faisalabad (2006)
BCS, University of the Punjab, Lahore (2004)

Situated at the junction of Pakistan's Textile Capital-Faisalabad and the historically rich city of Chiniot in suburbs of River Chenab, the Chiniot-Faisalabad campus is the 5th campus of the university. The campus symbolizes the desirable connection between nature and industry and between tradition and modernity. Its picturesque surroundings in the outskirts of Pakistan's Manchester, the home to the textile industry, represent human advancement from agrarian to industrial and technological society. Spanning around 30 acres along the Faisalabad Sargodha Road, approximately 9 kilometers from the M4 Motorway interchange towards Chiniot, this campus is a testament to academic excellence in both professional and personal realms. Following in the footsteps of its esteemed sister campuses in Islamabad, Lahore, Karachi, and Peshawar, graduates here are highly sought after by both national and multinational corporations, with many holding prominent positions in renowned institutions like Google, Facebook, and Microsoft.

FAST-NUCES Chiniot-Faisalabad is the first residential campus of the University offering Boys and Girls Hostel and allied facilities inside the campus. The campus is home to 1000+ boys and girls residing in campus. Offering programs in Computer Science, Software Engineering, Artificial Intelligence, Electrical Engineering, and Business Administration, the campus boasts a distinguished faculty dedicated to nurturing academic excellence. State-of-the-art facilities, including advanced computing and engineering labs, provide students with hands-on experience and a conducive learning environment.

Moreover, the campus has catalyzed Faisalabad's technological landscape, fostering a surge in technology startups. Its strategic proximity to leading industrial enterprises promises to elevate the standard of professional education across the nation.

Beyond academics, the campus fosters a vibrant student life, fostering holistic development through sports, competitions, and cultural events. From cricket to chess, students engage in a diverse array of activities that enrich their collegiate experience.

The campus has state of the art computing, engineering and other support facilities. Spacious and well-equipped computer and engineering labs impart practical orientation to the students in their respective areas of study. Audio-visually supported and well-furnished classrooms offer a favorable, conducive, and constructive learning environment to the students.

The Campus other than academics offer a very vibrant student life to contribute towards the personality development of the students. Extends sports facilities in both indoor and outdoor games like cricket, football, badminton, table tennis, volleyball, basketball, futsal, and chess. Besides sports, healthy competitions in the fields of information technology, business and arts are frequently organized by the campus.

Programs offered at Chiniot-Faisalabad Campus:

Bachelor of Business Administration

Bachelor of Science (Artificial Intelligence)

Bachelor of Science (Business Analytics)

Bachelor of Science (Computer Science)

Bachelor of Science (Electrical Engineering)

Bachelor of Science (Financial Technology)

Bachelor of Science (Software Engineering)

Master of Business Administration

Master of Science (Computer Science)

Master of Science (Data Science)

Master of Science (Electrical Engineering)

Doctor of Philosophy (Computer Science)

Doctor of Philosophy (Electrical Engineering)

1. Spatial Analytics Research (SAR) Group

Spatial Analytics Research (SAR) Group is led by Dr. Shahzad Sarfraz. SAR group is a multidisciplinary research group established at the Department of Computer Science at the National University of Computer and Emerging Sciences (NUCES-CFD). Our research explores socioeconomic, demographic, and Big Data and relates them to more conventional and well-grounded data infrastructures. Our primary motivation is to visualize, understand, and predict the location and dynamics of human behavior along with natural phenomena. The Group focuses on research and education with regard to Geographical and Spatial Analysis as well as locational planning. SAR Group provides access to hardware, software, and data to conduct research-related activities. Besides providing facilities the group is also providing research project consultations. Moreover, we are also focusing on developing platforms for use with open-source and proprietary GIS systems. SAR's goals are to advance the science and technology of GIScience and earth observing that can further lead to the trans disciplinary application of spatial data science solutions for addressing novel and impactful research questions. We host an active research group that will serve as a platform to foster the domain of Remote Sensing and GIS. SAR is comprised of innovators and trailblazers in the fields of GIScience and spatial analysis. Currently, the student members of this group are working in the following areas.

1. Prediction of disease and crime spread.
2. Career progression trajectory prediction.
3. Temporal and spatiotemporal sentimental analysis for tourist attraction recommendation.
4. Prediction of pollution and its effects on health using remote sensing images and machine learning approaches.
5. Detecting and exploring spatio-temporal profiles of lifestyles and activity patterns.
6. Soliciting, triangulating, and analyzing crowd-sourced volunteered data that link physical and virtual identities.

Partnerships and collaborations

Whilst much of our research is HEC-funded, we also undertake research in partnership with several public and private sector institutions. Currently, this group is also running NRPU funding worth 4.87 million.

Research Group Members:

1. Dr. Shahzad Sarfraz
2. Dr. Qamar Uz Zaman
3. Mr. Adeel Ashraf Cheema
4. Mr. Usman Joyia
5. Dr. Usman Ghous
6. Mr. Awais Azam
7. Mr Umer Iqbal

For more information visit the website link: http://sar.org.pk/home/

2. Delta Research (Delta-R) Group

Delta research group is serving under the supervision of Dr. Muhammad Umar Aftab. Delta-R is a multidisciplinary research group established at the department of Computer Science, National University of Computer and Emerging Sciences (NUCES-CFD). Our goal is to create an intersection between various disciplines. Expert faculty having extensive experience in both academia and research are leading the research team according to their area of expertise. In addition, a team of dedicated students is also working under the umbrella of this group.

Our group mates are working in the following fields:

Delta-R towards Secure Systems

Access Control

A secure mechanism to enforce the access decisions and various models are there to implement access control such as role-based access control, attribute-based access control. Our team is working on hybrid access control models. In addition, access control models are considered a good choice with the SCADA dataset for IoT-enabled platforms.

Cryptography

We are currently working on access control in IoT to achieve user authentication and data privacy. We can achieve authentication using the signcryption technique, and through encryption, we achieve data privacy using certain cryptographic techniques such as the Elliptic curve and Hyperelliptic curve. We are also working on the incremental cryptographic technique for block modification to obtain efficient and low-cost results.

Image Steganography

Image steganography is a branch of information security that is used to conceal secret information in images. The image steganography can be used to share secret data like documents and keys of cryptography. The output image having secret information is called stego image. The objective and challenge of image steganography are to generate stego images with a high secret information payload and minimum noise of modification.

Delta-R towards Wireless and Computer Networks

With the help of smart sensor networks and the Internet of Things (IoT), physical phenomena in the real world should be monitored and connected with the digital world, without the unnecessary intervention of the monitored processes. In addition, Edge

computing is an emerging distributed computing paradigm in which computations are mostly performed on distributed device nodes known as smart devices or edge devices as opposed to primarily taking place in a centralized cloud environment.

1. End Nodes Control and Monitoring Applications
2. End Nodes Mobility Management.
3. End Nodes Task Offloading Management
4. Energy Efficient Solutions for Resource Sensitive Networks
5. Geolocation-Aware Data Distribution.
6. Batch Processing with Real-Time Processing Comparisons.
7. Edge Network Expandability and Scalability

Partnerships, collaborations, and Funded Projects

Our research group successfully got the funding against FRSG-2021 (Faculty Research Support Group) worth 0.7 Million rupees. In addition, our group is working with our Chinese collaborators against International Scientific and Technological Innovation Cooperation Project in Sichuan Province (Project ID 2020YFH0062) worth 0.2 Million RMB.

Research Group Members:

1. Mr. Adeel Ashraf Cheema
2. Mr. Muhammad Usman Joyia
3. Mr. Usman Ghous
4. Ms. Momina Tayyaba
5. Mr. Junaid Hassan
6. Mr. Ali Hamza
7. Mr. Haider Ali
8. Mr. Fahad Javed
9. Ms. Aqsa Ghani
10. Ms. Umara Rana

3. Machine Vision and Intelligent Systems (MVIS)

The Machine Vision and Intelli-gent Systems (MVIS) research group is initiated by Dr. Muhammad Fayyaz. MVIS group at the Department of Computer Science, FAST NUCES CFD Campus is successfully exploring and implementing novel techniques in the area of Pedestrian Image Analysis (e.g., pedestrian re-identification, pose estimation, gender classification), and image analytics using computer vision and machine/deep learning algorithms. Currently, few NUCES-CFD students and active researchers are members of this group.

Public Safety and Security: Pedestrian image analysis can be applied in surveillance systems to track and identify individuals in crowded areas. This is crucial for enhancing public safety and security in places like airports, train stations, and public events. Law Enforcement: Law enforcement agencies can use these techniques to identify and track suspects, missing persons, or individuals of interest from surveillance footage. It can aid in criminal investigations and maintain public order. Traffic Management: Pedestrian analysis can be integrated into intelligent transportation systems to improve traffic management and reduce accidents involving pedestrians. For example, it can help in developing warning systems for drivers when pedestrians are in close proximity. Academic and Industrial Research: The research conducted by the MVIS group can also have a significant impact on the field of computer vision and machine learning, contributing to the development of state-of-the-art algorithms and techniques.

Considering the existing literature on human gender classification, a comprehensive survey on human gender prediction is 80% completed. We will complete this survey and submit it in the 3rd quarter. Moreover, we designed the framework for pedestrian orientation estimation (POE) which consists of three modules: (deep features-based POE, fine-tuned deep CNN models-based POE, and vision transformer-based POE. In this regard, the implementation of the first module has been completed and we are working on the second module. Research assistants (MS students) are engaged in this work and are motivated to complete it according to plan. Our target is to submit a survey paper as well as a technical paper this quarter. Jr. Software Eng. is also involved in this work and they are collectively doing the implementations and showing progress weekly.

Collaboration

I am doing collaborative research work with Usman Asim, Associate Researcher, at DeltaX, Seoul, South Korea, Dr. Muhammad Bilal, Postdoctoral Associate, University of Florida, Gainesville, Florida, United States, and Dr. Muhammad Imran Babar, Assistant Professor, University of Southampton, Malaysia. We are focusing on deep learning-based models for tasks related to multi-view medical images and vision transformers for pedestrian image analysis.

Research Group Members:

1. Dr. Muhammad Fayyaz
2. Dr. Khalid Hussain
3. Dr. Hikmat Ullah Khan
4. Mr. Muhammad Waleed Zafar
5. Ms. Amna Hussain
6. Mr. Muhammad Hamza Naseer
7. Mr. Muhammad Shoaib
8. Mr. Adnan Sami

4. Data Mining and Analytics Lab

Data Mining and Analytics Lab (DMAL) was initiated as a virtual lab at FAST-CFD Campus by Dr. Rabia Maqsood and Dr. Muhammad Bilal in 2022. The DMAL aims to focus on investigating real-world problems that fall under the domains of data mining, social media data analytics, learning analytics, and user profiling. The team has been working on different research

problems to produce effective and innovative solutions. Significant achievements of the DMAL include:

1. Successful completion of two ORIC-NUCES funded projects for a total worth of Rs. 0.83 million.
2. An undergraduate FYP titled Programmers' Battle qualified for the final round of the Prime Minister's National Innovation Award, 2023.

Research Group Members:

3. Dr. Rabia Maqsood
4. Dr. Muhammad Bilal
5. Mr. Muhammad Hannan Farooq
6. Mr. Anas Hafeez Awan

5. Centre for Advanced Research in Energy (CARE)

CFD Campus, Chiniot is focusing on addressing the Challenges faced by the Energy Sector of Pakistan that includes i.e. developing a road map for "Solar Systems Engineering Laboratory to educate students, practicing engineers, technicians, and researchers through training. Development, and research experiences in areas related to solar energy systems engineering and developing low cost micro grids to sustainably electrifying the remote communities, developing isolated electric vehicle charging stations and introducing low cost sodium-ion batteries in Pakistan through a Project Titled "Isolated Smart Microgrids for Remote Communities and Electric Vehicles Charging by using Earth Abundant Energy Storage Materials. Planning, Design and Control"

Collaborations (National)

1. Syed Babar Ali School of Science and Engineering (SBASSE), Lahore University of Management Sciences (LUMS), Lahore
2. U.S. Pakistan Centre for Advanced Studies in Energy (USPCASE), National University of Science and Technology, Islamabad

3. Sino-Pak Centre of Artificial Intelligence (SPCAI), Pak-Austria Fachhochschule Institute of Applied Sciences and Technology (PAF-IAST), Haripur
4. Department of Materials Science and Engineering, Institute of Space Technology, Islamabad
5. Tesla Industries (Pvt) Ltd
6. Strongmen Industries (Pvt) Ltd
7. OMECTA International (Pvt) Ltd
8. Faisalabad Chamber of Commerce and Industry (FCCI), Faisalabad

Collaborations (International)

1. Battery Technology Centre, Samsung SDI America Inc.
2. Department of Chemical and Petroleum Engineering, University of Calgary, Canada
3. State Key Laboratory of Advanced Electromagnetic Engineering and Technology (AEET), HUST, China

Dr. Muhammad Shoaib Khalid

Professor EE is Head of CARE Research

6. AI, Intelligent Machines and Systems (AIMS) Lab

AIMS Lab focuses on applied research using emerging technologies such as Artificial Intelligence (AI) and Internet of Things (IoT) for solving real-world problems. Industry 4.0 refers to the concept of enabling smart factories, smart cities and smart society in general using the fusion of cyber and physical world. The vision is to have smart connected machines augmented with wireless connectivity and sensors. The goal of AIMS Lab is to conceive, design and develop AI based embedded/IoT systems that can recognize and understand their environment to make informed decisions and provide actionable insights. The demand of developing intelligent automation systems using advanced engineering and innovative

technologies is increasing. The team of AIMS Lab is developing industrial automation solutions using advanced engineering principles and with the help of innovative approaches. For this purpose, we closely work with our collaborators from industry and academia. We have developed state-of-the-art labs and experimentation setup in different domains of electrical engineering.

Core Research Areas

AIMS Lab is currently working in the following research fields:

1. AI and Deep Learning
2. Computer Vision
3. Internet of Things
4. Robotics and Automation

AIMS Lab is working on different external and internal funded projects. We are working on Computer vision based projects for automation of tasks such as automatic vehicle license plate detection, face recognition, tracking and human activity detection. We are also developing IoT based solutions for warehouse automation, energy management and industrial process monitoring. AIMS Lab is also working on a project funded by National Center for Robotics and Automation (NCRA).

Funded R&D Projects

1. Development and Implementation of Optimized Neural Architectures for Real-time AI Inference on Edge Computing Devices (Ongoing)
2. Development of a Customer Service ChatBot Using State-of-the-Art LLMs (Ongoing)
3. Warehouse Automation of a Textile Factory using Industry 4.0 Technologies. (Completed)
4. Design and Implementation of an Autonomous Multi-Unmanned Air Vehicle (UAV) System Using a Hardware-In-The-Loop (HIL) Real-Time Platform. (Completed)

5. Automatic Weapon Detection in Real-time Videos for Identification of Potential Terrorists and Robbers. (Completed)

6. Development of an Automatic Number Plate Recognition (ANPR) system for car parks and vehicle access control using Computer Vision and Deep Learning. (Completed)

Collaborations

1. National Center for Robotics and Automation (NCRA), Islamabad
2. College of EME, National University of Science and Technology, Islamabad
3. Crescent Textile Mills Ltd
4. Invictus Solutions (Pvt) Ltd

Dr. Muhammad Gufran Khan

Professor EE is Head of the AIMS Research Lab.

7. Advanced Control Systems (ACS) lab

Dr. Arslan Ahmed Amin Associate Professor (EE) leads the Advanced Control Systems (ACS) lab in FAST NUCES CFD Campus and is very much focused on developing advanced control algorithms for critical industrial applications such as fault-tolerant control for IC engines as these are some of the most used components as prime movers in the process industry. Moreover, modern applications such as electric vehicles and drones are also being researched from a reliability enhancement point of view. The challenging control problems are also being addressed for power and smart grid applications. More than 40 publications in reputed impact factor journals have been completed and many papers have been submitted that are currently under review. The vision is to become the best control system lab in the country with aggressive research output and ample amount of funding from local as well as foreign universities.

Research Projects

In-Progress:

1. Design of advanced fault-tolerant control systems for autonomous vehicles and drones, 1.2 Million Rs. FAST- NUCES FRSG 2023.

Completed:

1. Applications of Artificial Intelligence in Fault-Diagnosis and Fault-Tolerant Control for Industrial Applications Funding Agency: Najran University, Electrical Engineering Department , Kingdom of Saudi Arabia: 50,000 SAR

2. Performance, Safety, and Reliability Enhancement of Industrial Applications using Advanced Control Systems Techniques, Funding Agency: Najran University, Electrical Engineering Department, Kingdom of Saudi Arabia: 50,000 SAR

3. Design of Advanced Fault-Tolerant Emergency Breaking with Sensor Fusion

4. Remaining Useful Life Prediction of Induction Motor Using Artificial Neural Network and IoT

5. Design of Active Fault-Tolerant Control for Four Wheel Independently Driven Electric Vehicle Drive System by Fuzzy Neural Network

8. Sustainable Solutions Lab (SSL)

1. The Sustainability Solutions Lab (SSL) aims to provide students with an experience of professional development while working on sustainability-oriented research projects, especially related to Pakistan electrical power infrastructure.

2. In SSL students are working with faculty, staff, and field experts to define and solve some of our greatest challenges faces by the current electrical power infrastructure of Pakistan.

Ongoing funded research project

Designing of a reliable and resilient framework: A road map to next generation sustainable solutions for Pakistan electrical power infrastructure (0.9 million PKR).

Main theme of the funded Int research project

Due to Pakistan fragile electrical Title power infrastructure, any unexpected event, i.e., technical fault causes severe damage to power grids that can lead to a complete blackout. Therefore, designing a resilient and reliable power system network is an inevitable requirement for Pakistan electrical power infrastructure. This research project investigates the effect of these unexpected events on the power system network based on the recent blackout in Pakistan electrical power infrastructure. For example: A recent technical fault that occurred at the Guddu power plant triggered a sudden drop in the frequency of power systems that leads a chain reaction in the form of cascading failures and subsequently shut down various power plants in Pakistan electrical power infrastructure, choking about 10,320 megawatts of electricity. Considering this scenario, the major contribution of this research project will be designing a reliable and resilient power system that integrates phasor measurement units (PMUs) and distributed unified power flow controller to provide stability to the electrical power infrastructure of Pakistan in case of these unexpected events.

Dr. Muhammad Adnan

Assistant Professor EE is Head of the SSL Lab.