Saif Ur Rahman

1010 Springfield Ave, Apt 301, Urbana IL 61801

+1 (443) 864-1755 | saifu2@illinois.edu | isens.cs.illinois.edu | Saif2098 | saif98

Education

University of Illinois Urbana-Champaign — *Urbana, IL*

DOCTOR OF PHILOSOPHY COMPUTER SCIENCE | GPA: 4.00/4.00 — *Jan 2023 - Present*

Lahore University of Management Sciences — *Lahore, Pakistan*

BACHELOR OF SCIENCE ELECTRICAL ENGINEERING | MINOR COMPUTER SCIENCE | GPA: 3.98/4.00 — *Aug 2018 - May 2022*

Research Interests

Wireless Sensing and Networking | Machine Learning for Signal Processing | Joint Wireless Communication & Sensing

Projects

Wireless Signal Multi-Path Characterization via Neural Radiance Fields (Ongoing)

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN | PROF. ELAHE SOLTANAGHAI

- Design and implementation of a **neural radiance field (NeRF)** like multi-layer perceptron (MLP) that models wireless signal multipath propagation of an indoor scene under arbitrary transmitter (Tx) locations.
- The scene is represented by a continuous 3D volumetric function parameterized by a MLP that has 3D spatial coordinates as input and outputs the spatially varying complex **channel state information (CSI)** using forward rendering.
- The NeRF MLP implicitly learns scene geometry, material properties, and wireless signal propagation characteristics.

Free Body Motion Breathing Rate Estimation with Passive UHF RFID Backscatter Tags

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES | PROF. M. TAHIR, PROF. MOMIN UPPAL

- **Ultra High Frequency (UHF) RFID tags** are attached to various body parts of a person under free body motion, and RFID phase data collected using RFID reader to infer total body movement power using signal processing techniques.
- LSTM model employed to estimate the breathing rate of an individual using total body movement power.

Soil Moisture Sensing using Radio Frequency Signals

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES | PROF. M. TAHIR, PROF. MOMIN UPPAL

- **USRP software-defined radio** transceiver employed to find the RSSI of OFDM modulated WiFi signals directed towards a soil sample using log-periodic antennas.
- Return loss (RL) of the signal was calculated for different soil samples, which was used to estimate the water moisture percentage in the soil with the help of Topp's Equation.

Social Media Data Analysis with BERT Language Model

CENTER FOR URBAN INFORMATICS, TECHNOLOGY, & POLICY AT LUMS | PROF. MOMIN UPPAL

- Designed a public perception and sentiment analysis pipeline for social media data regarding social issues present in Lahore city, like women's mobility and smog. A fine-tuned natural language processing **BERT transformer model** was employed for **topic modeling** and **sentiment classification** of the collected data.
- Data was scrapped from popular social media forums like Twitter, and a pipeline, along with a GUI, was developed for the real-time monitoring of any identified social issue.

Raft Based Key-Value Storage System | ***Go***

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES

- Designed a scalable, fault-tolerant key-value storage system for Distributed Systems course.
- **Raft** based consensus protocol was implemented to run several key-value servers.

Blockchain Framework Marketplace Design

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES

- Initial development done on a concept marketplace for trading collectible digital Pokemon cards using an underlying blockchain backbone. Each block in the blockchain refers to a card and includes metadata like digital signatures.
- Majority consensus was conducted to verify the ownership of the card at the invocation of a trade request.

Principal Courses

UIUC	Advanced Wireless Networks and the Internet of Thing | Machine Learning for Signal Processing | Real World Algorithms for IoT & Data Science | Advanced Computer Networks
LUMS	Digital Signal Processing | Deep Learning | Distributed Systems | Information Theory & ML

Honors & Awards

2023	**Ray Ozzie Computer Science Fellowship**, Awarded Ray Ozzie Fellowship upon admission at UIUC	*UIUC*
2022	**National Management Foundation (NMF) Gold Medal**, Top student of electrical engineering batch	*LUMS*
2019-2022	**Dean's Honor List Award**, Placed on the list for four consecutive years based on outstanding GPA	*LUMS*
2018-2022	**LUMS Merit Scholarship Award**, 100% scholarship for the entire duration of degree	*LUMS*
2020	**Winner LUMS Marathon**,	*LUMS*
2020	**Color Award**, LUMS Squash Team	*LUMS*

Skills

Programming	Python (Proficient) | Go (Intermediate) | C++ (Intermediate) | C# (Amateur)
Data Visualisation	Streamlit | Matplotlib | Seaborn | Plotly
Data Analysis	PyTorch | TensorFlow | Pandas | Scikit-Learn | Numpy | NLTK
Computation Libraries	Wireless Insite | Matlab (GUI and Simulink)
SDRs	USRP 2922 Radios | ADLAM-PLUTO
Radar	Texas Instruments mmWave FMCW radar
Languages	English (Fluent) | Urdu (Native) | Punjabi

Professional Experience

Research Assistant at Wireless, Sensing, & Embedded Networked Systems Lab

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN | PROF. ELAHE SOLTANAGHAI — *Jan 2023 - Present*

- Research towards joint communication & sensing for wireless and cellular networks.
- Channel State Information and Angle of Arrival data collection using Nexmon-CSI router framework.
- Utilize radars such as Texas Instruments FMCW radar.
- Design and implementation of neural radiance field (NeRF) like deep learning model to characterize wireless multipath propagation in an indoor environment.

Research Assistant at Center for Urban Informatics, Technology, & Policy at LUMS

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES | PROF. MOMIN UPPAL — *Aug 2022 - Nov 2022*

- Initiated work on the Community-Based Insights for Better City Management avenue as part of a government-funded project, backed by the World Bank with a **1.5 million USD** grant.
- Scrapped social media data regarding social issues that include smog and women's mobility, and collected roughly half a million tweets. Data was then utilized as a primary input to the topic modeling and sentiment analysis pipeline, based on BERT NLP model, to extract actionable insights and public perception.
- An interactive GUI application was developed to present findings to stakeholders.

Undergraduate Research Assistant at Smart Data Systems & Applications Lab LUMS

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES | PROF. M. TAHIR — *Jan 2021 - May 2022*

- Worked on wireless environment sensing using USRP Software Defined Radios and RFID tags.
- Soil moisture sensing using WiFi band RSSI measurements from USRP and ADLAM-PLUTO SDR transceivers.
- Demonstrated the ability to estimate human respiration rate (b_r) using WiFi band CSI measurements and extended the problem of b_r estimation for a mobile individual using data collected from RFID backscatter tags.

Extracurricular Activity

LUMS Squash Team — *Lahore, Pakistan*

VICE CAPTAIN — *Aug 2021 - May 2022*

- Represented LUMS Squash team in sports competitions such as Higher Education Commission national championship

LUMS Society of Chemical Sciences and Engineering — *Lahore, Pakistan*

GENERAL SECRETARY — *May 2020 - May 2021*

- Member of the design and host committee of LSCSE's flagship event, CARBON, attended by 60+ national delegates and industrial executives
- Responsible for overlooking External Relations, Human Resources, and Publications Department

Interests

Strength Training, Squash, Bicycling, Traveling, Hiking, Gardening, Reading