Osama Ahmad

+1-413 313 8954 oahmad@umass.edu linkedin.com/in/osama-ahmad-b4477513b/ OsamaAhmad369
https://scholar.google.com/citations?user=zbayxloAAAAJ&hl=en

EDUCATION

University of Massachusetts (UMass), Amherst 2026-present
PhD Student in Electrical and Computer Engineering

Lahore University of Management Sciences (LUMS) 2022-2024
Master of Science in Electrical Engineering (GPA: 3.88 / 4.00) (Dean's Honour)

Thesis title: "Dynamic Decoupling of Spatio-temporal Data in Graph Networks for Traffic Forecasting and Beyond" (Supervisor: Zubair Khalid)

University of Engineering and Technology (UET), Lahore 2015-2019
Bachelor of Science in Mechatronics and Control Engineering (GPA: 3.697 / 4.00)

Undergrad Thesis title: "3D Human Limb profile" (Link) (Funded by Human Centered Robotics Lab HCRL)

PUBLICATIONS

- **O. Ahmad**, L. Wesemann, F. Waschkowski, and Z. Khalid, "Robust Spatiotemporal Forecasting Using Adaptive Deep-Unfolded Variational Mode Decomposition," *IEEE Signal Processing Letters (SPL)*. [Review]
- **O. Ahmad**, L. Wesemann, F. Waschkowski, and Z. Khalid, "Variational Mode-Driven Graph Convolutional Network for Spatiotemporal Traffic Forecasting," *ACM Transactions on Intelligent Systems and Technology*. [Review] (Code) (Paper)
- **O. Ahmad** and Z. Khalid, "Robust and Noise-resilient Long-Term Prediction of Spatiotemporal Data Using Variational Mode Graph Neural Networks with 3D Attention," in *Proc. IJCNN*, 2025. (Paper)
- **O. Ahmad**, Z. Khalid, and et al., "Spatiotemporal Air Quality Mapping in Urban Areas Using Sparse Sensor Data, Satellite Imagery, Meteorological Factors, and Spatial Features," in *Proc. 45th IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2025. (Paper)
- **O. Ahmad**, O. A. Jalil, U. Nazir, and M. Taj, "Mending of Spatio-Temporal Dependencies in Block Adjacency Matrix," in *Proc. 31st ICONIP*, 2024. (Code) (Paper)
- **O. Ahmad**, Z. Hussain, and H. Naeem, "Trajectory Planning of Robotic Manipulator in Dynamic Environment Exploiting Deep Reinforcement Learning," in *Proc. IEEE ICIESTR*, 2024. (Paper)
- **O. Ahmad**, et al., "Stiffness Measuring Device for Human Limb," in *Proc. IEEE 7th International Conference on Smart Instrumentation, Measurement and Applications (ICSIMA)*, 2021. (Paper)

TECHNICAL SKILLS

Skills: Image processing, Micro-controller programming and interfacing, IoT, PCB designing, ROS, 3D designing

Languages: Python, C++, Javascript, PHP

Technologies: OpenCV, PyTorch, Flask, Gazebo, Node.js, Tensorflow.js, MATLAB, MPLAB, SolidWorks

Embedded Board: Arduino, PIC, Esp32, Raspberry pi, Mini6410, myRio

EXPERIENCE

UMass Amherst, USA Feb. 2026 – Present
Graduate Research Assistant

- Exploring & developing LLM for healthcare application.

Maincode, Australia Sep. 2025 – Present
Data Engineering Research Assistant – Research Collaboration

- Designed and implemented scalable data crawling, filtering, and deduplication pipelines to curate high-quality datasets for large language model (LLM) training.

Lahore University of Management Sciences (LUMS) Sep. 2025 – Present

Adjunct Faculty – AI on Edge Devices

- Designed and delivered graduate-level lectures and hands-on labs on deploying machine-learning models to resource-constrained edge devices, covering topics such as TinyML, model compression, and on-device inference.

Lahore University of Management Sciences (LUMS) Jan. 2025 – May 2025

Graduate Teaching Assistant – Machine Learning

- Designed practice problems and coding assignments in Python to reinforce theoretical concepts.
- Graded assignments, quizzes, and projects with detailed feedback to improve student understanding.

Lahore University of Management Sciences (LUMS) May 2021 – Present

Research Assistant | Artificial Intelligence, Vision, Embedded systems

I joined the Machine Vision and Artificial Intelligence (MVAI) lab and am currently working at the Center for Urban Informatics, Technology, and Policy (CITY).

- **Smart Vending machine:** I am designing and developing embedded systems for IoT-based smart vending machines and beam break-based IR sensors to detect falling objects. This involves collecting and analyzing sensor data to design filters that remove sensor noise.
- **Surface Defect Detection:** I have developed image processing algorithms to detect surface defects on packaging paper using a camera system. This process includes the acquisition and processing of image data using multi-threading and multiprocessing techniques. (Video)
- **Speed Enforcement System:** I have designed a deep learning-based automatic number plate recognition (ANPR) system to enforce vehicle speed limitations. This system uses radar to determine vehicle speed and I have optimized the OCR pipeline to handle dynamic environments with minimal latency.
- **Average Speed Monitoring:** This research project aims to compute the speed of vehicles between two road junctions for speed enforcement. I developed the pseudo-code to handle all real-time scenarios and supported the team with system integration.
- **Smart Parking System:** I am also working on a smart parking system where vehicles are detected using a DNN, and the empty parking slots are determined by the intersection-over-union method.

Midas International Jan 2020 – Sep 2020

Research and Development Engineer

- **Condition Monitoring Devices:** I designed embedded systems for clean environment equipment such as pass-through boxes, dispensers, and air showers. I also developed and calibrated sensors for condition monitoring of HVAC systems.

Dimen Draw July 2019 – Dec 2019

Project Engineer

- **Safety Airbag Jacket:** I worked on prototyping a safety airbag jacket for motorbikes. I designed a tool for selecting sensors and evaluating their performance based on research methodologies.

RESEARCH PROJECTS

- **Balancing of Beam using BLDC:** Designed and simulated a seesaw balancing system using Model Predictive Control (MPC) in Gazebo, with BLDC motors controlled via ROS. Integrated an IMU for state measurement under Gaussian noise, showcasing advanced control and simulation techniques. (Code)
- **High Dynamic Range Tone Mapping Generative Mechanism:** This project focused on object detection in extreme lighting conditions. The deep-learning-based generative network is employed to translate the High Dynamic Range (HDR) images to low dynamic range (LDR) images. (Code)
- **Developing of Linux Driver for PxMatrix Display:** The main objective of this project is to design the Linux kernel driver that communicates the Linux-based embedded board with an outdoor LED panel.
- **Pneumatic Actuator:** Soft robotics is used for actuation purposes by controlling pneumatic supply.

ACHIEVEMENTS

- Placed on Dean's Honour Roll in Graduate program 2024.
- Received merit scholarship for MS program 2022-2024.
- Designed and organized a Vision Workshop at Lahore University of Management Sciences (LUMS) in 2023.
- Secured 3^{rd} prize for BS final year project in Final Year Exhibition arranged by Mechatronics department.