Curriculum Vitae / Resume
Abdullah

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GitHub | LinkedIn | Google Scholar

Education

PhD in Transport Logistics

Faculty of Health, Innovation, Technology and Science   *July. 2025 - Till*
Liverpool John Moores University, Liverpool, United Kingdom.

- **Thesis:** Optimisation and AI for a modal shift to freight rail.

Master's in Electrical Engineering

School of Electrical Engineering and Computer Science,   *Sept. 2021 - Feb. 2024*
National University of Sciences and Technology, Islamabad.
CGPA: 3.20/4.0

- **Thesis:** Optimizing Comfort and Energy Efficiency: Smart HVAC Control with Reinforcement Learning and Time Series Forecasting.
- **Major Courses:** Computer Vision, Artificial Neural Networks, Mobile Robotics, Stochastic Systems.

Bachelor of Electronics Engineering

Department of Electronics Engineering,   *Oct. 2017 - Aug. 2021*
University of Engineering and Technology, Taxila.
CGPA: 3.29/4.0

- **Final Project:** Design & Implementation of FPGA-based Unmanned Ground Vehicle.
- **Major Courses:** Microprocessor & Microcontrollers, FPGA Based System Design, Signal Processing, Linear Algebra.

Experience

AI Engineer

Intelligent Learning Machines, Inc.   *June 2023 – July 2025*

- **Simulation Technology Development (SIMULATER):**
  - Designed and deployed a verification and validation simulation system using digital twin concepts to enhance predictive accuracy and operational efficiency.
  - Developed high-fidelity simulation environments in Unreal Engine, utilizing CARLA for testing autonomous vehicle algorithms in diverse traffic scenarios.
  - Created real-world scenes and scenarios for autonomous driving simulations using MathWorks RoadRunner and custom scenario generation tools to ensure realism and variability.
  - Modeled digital twins of camera and LiDAR sensors in Unreal Engine and a custom-built simulator, enabling realistic sensor behavior and accurate data generation.
  - Implemented fault injection mechanisms within simulation modules to evaluate sensor robustness and assess failure scenarios in safety-critical applications.
- **Safety of the Intended Functionality (SOTIF) Analysis:**
  - Conducted SOTIF analyses specifically for Lane Centering System (LCS) and Lane Keeping Assist (LKA), focusing on identifying and mitigating potential safety risks associated with these functionalities.

Research Assistant

NUST-Coventry Internet of Things Lab, SEECS, NUST   *Nov. 2021 – June. 2025*

- **Sr. Research Assistant** at NUST Funding (Living Lab) funded project (1 million PKR): Air Quality Monitoring Using Industry 4.0:

- Designed PCBs for the main controller board and power board, ensuring compatibility with multiple power sources including 5V DC, 220V AC, and 6V solar panels.
- Developed firmware for data acquisition and transmission to the API for display on the web portal.
- Implemented Over-The-Air (OTA) functionality.
- Trained LSTM and 1DCNN models to predict trends.

- **Embedded System Engineer** at NCAI Pakistan funded project (9.44 million PKR): Agri-DMap: Internet of Things (IoT) and AI enabled system for Crop Disease Monitoring and Prediction:

  - Designed real-time wheat leaf detection and classification device using Raspberry Pi 4.
  - Designed real-time wheat leaf detection and classification device using Jetson Nano.
  - Trained and refined YOLO V7 over indigenous dataset for wheat leaf detection with 96% accuracy.
  - Achieved 97% results for leaf disease classification using Resnet.
  - Designed GUI using python for integrating real-time video feed and edge inference.

- **Embedded System Engineer** at HEC-NRPU funded Project (3.61 million PKR) Crop health monitoring and early warning system using Internet of Things (IoT) enabled precision agriculture:

  - Developed master and slave nodes for monitoring soil moisture and temperature values.
  - Configured slave nodes to transmit collected data to the master node.
  - Implemented functionality for the master node to gather air parameters.
  - Established Wi-Fi connectivity for the master node to transmit all collected data to the web.

Embedded Systems Engineer

Thermalog   *Sep 2022 – May 2023*
- TESEN:
  - Contributed to the development of TESEN, an advanced temperature sensor designed for high-accuracy readings in diverse environments.
  - Engaged in hardware and firmware optimizations to improve sensor performance and reliability.
- WISEN:
  - Developed the WISEN probe from scratch, focusing on enhancing its wireless signal processing capabilities and environmental adaptability.
  - Designed firmware to extend the LiPo battery life to a week.
  - Implemented Over-The-Air (OTA) updates and calibration procedures that improved measurement precision and operational durability.
- TASMOTA Bridge Integration:
  - Led the integration of the TASMOTA bridge system, facilitating robust connectivity between IoT devices and network applications.
  - Developed firmware and software solutions to ensure seamless communication and data transfer across platforms.

Publications

- Khan, Muhammad Umar, Sumair Aziz, Adil Usman, and Talha Jalil. "Soft computing approach for classification of complex power quality events." In 2021 International Conference on Artificial Intelligence (ICAI), pp. 223-228. IEEE, 2021.
- Khan, Muhammad Umar, Waqas Ali, Muhammad Faisal Shahzad, and Sumair Aziz. "A signal analysis approach towards detection and classification of power quality disturbances." In 2020 First International Conference of Smart Systems and Emerging Technologies (SMARTTECH), pp. 71-76. IEEE, 2020.
- Aziz, Sumair, Muhammad Umar Khan, Adil Usman, and Areeba Mobeen. "Pattern analysis for classification of power quality disturbances." In 2020 international conference on emerging trends in smart technologies (ICETST), pp. 1-5. IEEE, 2020.
- Wicha, S., Duangban, N., Abdullah, Mumtaz, R., & Sureephong, P. (2024, July). Designing of

Beef Cattle Recognition and Detection System to Improve Walk-over-Weighing System (WoW) for Beef Cattle in the Lancang-Mekong Region. In *IFIP International Conference on Product Lifecycle Management* (pp. 365-380). Cham: Springer Nature Switzerland.

Projects

Computer Vision Based Projects:
- Vehicle Behavior Extraction and Simulation: Analyzing Traffic Dynamics from Video Data
- Depth Estimation of Neighboring Vehicles Using Dashcam Video with MonoDepth and ZoeDepth
- Ego-Vehicle Speed and Steering Angle Estimation from Dashcam Video Using Optical Flow Techniques
- Estimating Neighbor Vehicle Speeds from Dashcam Video Using Depth and Ego Vehicle Motion
- 3D Pose Estimation Using Computer Vision
- Detection and Classification of Forged Images
- Integration of Minos Simulator with ORB SLAM2

Machine Learning Based Projects:
- Real-Time Critical Event Detection in Industrial Environments Using Advanced Computer Vision Techniques
- Predicting Air Quality Levels Using Deep Learning Techniques on Data Collected from Indigenous Sensor Nodes
- Audio Signals Classification for Vessel Identification using Spectrogram based Transformer Models
- Celebrity Recognition using k-Nearest Neighbors (k-NN) Algorithm
- Adversarial Attacks on Text Classifier
- Stock Price Movement Prediction using Logistic Regression
- Classification of Power Quality Disturbances

Analog & Digital Electronics Based Projects:
- Design of 2-Layer PCB of ECG Sensor
- Design & Implementation of low-cost ECG Sensor
- Parking Sensor Using IR Sensor
- DC to AC Inverter
- AC Voltage Controller
- Smart Agri Controller using Digital Logic

Micro Controllers & Processors Based Projects:
- Design of Indoor Air Quality Monitoring Nodes
- Indoor Air Purifier
- Crop Health Monitoring System.
- Design & Prototyping of IoT Based Indoor Air Quality Monitor.
- Design of Temperature and Humidity IOT Sensor.
- Design of Raspberry Pi based Lie Detection System using Electroencephalography.
- Field Spying Robot with Wireless Night Vision Camera for Combat.
- Graphical User Interfaces for multiple Embedded Systems
- Accelerometer Based Hand Gesture Control Vehicle.
- Designing of PID Controller for Ball and Beam System.
- Hazardous Gas Monitoring System Using Programmable Logic Controller

Robotics:

- Camera calibration using python and ROS.
- Path planning using A^* and Dijkstra Algorithms
- Robot perception using SLAM

Languages

- Urdu – Native
- English - *IELTS (7.5 Bands)*