Salman Sadiq

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EDUCATION

National University of Sciences and Technology
Bachelors in Mechatronics Engineering(**CGPA:** 3.32/4.00) Nov 2021 – Oct 2025

Courses: Data Structures & Object-Oriented Programming, Digital Logic Design, Signals and Systems, Electronic Circuit Design, Actuating Systems, Microcontroller and Embedded Systems, Instrumentation & Measurements, Mechatronics System Design, Modelling and Simulation, Linear Control System, Industrial Electronics, Introduction to Robotics, Manufacturing and Automation, Digital Signal Processing.

Fazaia Degree College
HSSC in Pre-Engineering(**%age marks: 94.45%**) Mar 2019 – Aug 2021

Technical Skills

- Programming Languages: C/C++, Python, Vue, Bash, Verilog, Assembly
- Microcontrollers: Arduino, ESP32, Radxa, Raspberry Pi, Orange Pi, Intel
- Tools: Git, GitLab, VS Code, ESP IDF, MATLAB, Simulink, Solidworks
- Additional: AWS, MQTT, WebSocket, CAN, OTA, RTOS, Flask, FAST and REST Api's, VLM's, LLM's, Open CV, Docker, CI/CD

RESEARCH

Z Mahboob, **S Sadiq,** U Shahbaz Khan, A Zeb, M Islam Tiwana, **Multi-Agent Situational Awareness for Visually Impaired.**
International Bhurban Conference on Applied Sciences & Technology 2024

- Designed and implemented a multi-agent workflow for real-time environment perception and scene interpretation, tailored to user queries, enhancing navigation for visually impaired individuals. Developed a wearable customized VR headset for visually impaired persons.
- **DOI:** 10.1109/IBCAST61650.2024.10877205

Z Mahboob, **S Sadiq,** U Shahbaz Khan, A Zeb, M Islam Tiwana, **Towards Inclusive Education: AI-Driven Solutions for Interpreting Complex Educational Content for Visually Impaired Students, Journal *(In Progress)***

- Developing an Adaptive AI-based Solution for Visually Impaired Students, for interpretation and explanation of complex educational content such as Graphs, Tables, and Charts.

UTILITY PATENTS

S Sadiq, Z Mahboob, U Shahbaz Khan, A Zeb, M Islam Tiwana, **- Adaptive AI-enabled Framework for Navigation of Visually Impaired Persons *(Filed)***

- Proposed a Generative AI and generalizable model-based navigation framework for the visually impaired in complex scenarios.

PROJECTS

FYP: Multi-agent Situational Awareness for Visually Impaired Persons (Raspberry Pi, LLM, VLM, ESP32)

- Developed a generative AI and VLMs-based framework for environmental interpretation and perception for visually impaired persons (utility patent applied)
- Developed a wearable customized VR headset for environmental interpretation and perception for visually impaired persons
- Devised a novel multi-agent workflow to reduce cognitive overloading (paper accepted in IBCAST 2024)
- Implementation of cost-effective computational hardware for real-world scenarios is in process
- 1st FYP Position in the Department and awarded with the Rector's Gold Medal.

Optical Fibers Termination Line Robot (Orange Pi, MLOps, Fast API's, Festo Actuators, Docker, Flask, WebSocket) *@Cowlar*

- Designed the Fiber Insertion Logics and control system for the movement of X, Y, and Z axes the Ferrule insertion stage, using Festo Servo Motors, Festo Pneumatics, and Faulhaber Stepper Motors
- Deigned and updated the Firmware of the Machine to Log Data on the Website with images
- Designed a separate Fiber inspection station for validating the Fiber Loading
- Redesigned the Display UI for the Robot to show the Current situation and controls using the Vue Framework with JavaScript

Kitchen Display System for Restaurants *@Cowlar*

- Developed a VGA Display on an ESP32-based Kitchen Display system using LVGL for UI.
- Integrated MQTT for Order Updates.

- Added an electronic Control box for moving selection and order status on the UI using buttons.
- Developed a whole inhouse build box for the deployment of the complete system

Optical Fiber Sorting Machine (Orange Pi, Open CV, Festo Actuators, Dockers, Flask, WebSocket) *@Cowlar*

- Integrated a ML model that detects the Fibers Loading or any other potential Issues with the Fibers placed
- Part of Quality Assurance Team to move the project for Bulk Production on the Line

Smart Power Management and Backup System for Telecom Servers (OTA, UART, CAN, MQTT, HTTP) *@Cowlar*

- Developed the OTA for the Firmware for the control Board
- Established OTA Framework for the Slave Batteries from Master using CAN ISOTP layer
- Performed UL Pre-Testing for the Backup System including Heat Test, BMS overcharge, discharge, Over Voltage, Imbalance charging tests.

Smart wireless intercom (ESP32, I2C, MQTT, WebSocket)

- RnD Smart Intercom System with enhanced audio and camera streaming using MQTT protocols on ESP32.
- Created a Layer for I2C data Packets transfer through MQTT.
- Developed a compete Product considering al the product requirements including Outdoor Environment.

Rock-removing and Tree-planting robot *(Runner Up in Mini National Engineering Robotics Contest,2024)*

- Designed a line-following-based robot to remove rocks from the mentioned positions and plant trees at that point. Coded the logic of path planning using line following for moving on the desired path and completing points.
- Manufactured a steel-based structure with one bar mechanism to pick and place. The critical stage of this project lies in path planning which is achieved by combining the predefined paths for path selection and planning.

Brain-computer interference (BCI) using MindRove arc for body movements

- Captured and decoded EEG data for precise detection of hand/arm movements, such as hand grip and walking, using cutting-edge tools like MATLAB, Python, and the MindRove app.
- Focused on analyzing brain signal changes corresponding to motor actions for real-time data interpretation and movement tracking.

IoT-enabled device for monitoring glucose, cholesterol, and uric acid

- Designed a vital signs detection system using a MAX301 optical sensor and ESP 32. The data from the sensor is published to the AWS Server for the use of the doctor or caretaker.
- Reimplemented a benchmark Research paper.

Load Forecasting using the LSTM Model

- Predicted next week load consumption utilizing the past four years of data with 63.2% accuracy using the LSTM algorithm within the Tensorflow Framework.

Traffic Monitoring System

- Implemented YOLOv8 model for Vehicle detection. Utilized 'ByteTrack' and 'Supervision' for precise tracking and counting.
- Counted Vehicles and created an algorithm to manage the traffic effectively avoiding traffic congestions.

Urine Bag Replacement Alert System

- Designed a fully automated Urine Bag replacement alert system using ATMEL 89C51(8051) and a water sensor fabricated in the urine bag.
- Programmed ATMEL 89C51 in assembly language for in-depth control of architecture.

Wall Climbing Robot

- Deployed a Wall climbing robot using BLDC and HC-06 for a wireless controller. Computed analysis using mathematical formulas to find the thrust and forces on the Wall climber during motion.

Modeling and Simulation of Glock 17 9x19 mm

- Mathematically modeled a Pistol into different mass-spring systems as per the systems found in the Glock. The equations are used for modeling the system on Simulink or Simscape for analysis.
- CAD file of Glock 17 is simulated in motion study for demonstration of working of the Glock.

Smart Environment Monitoring for Your Space

- Deployed environment monitoring system in space for automated controlling Temperature and Humidity. Harnessed DHT-11 sensor using Arduino IoT platform and ESP32.

PROFESSIONAL EXPERIENCE

Cowlar Inc., USA(YC-W17) Islamabad, PK

Design Engineer(Intern) July 2024 - Aug 2024

- Engineered embedded systems, focusing on IoT, OTA updates, and advanced features using ESP32, contributing to robust, scalable solutions.

Automation Engineer Sep 2024 – June 2025

- Contributing to robust and scalable solutions, especially retail solutions.
- Worked with the North American Clients for the Industrial Automation Product/Project
- Worked on Project Management that includes coordination with the Clients, Project enhancements related to Competitive Edge and Limitations for Future Work.

RADWI Electronics Islamabad, PK

Embedded Systems Intern Aug 2023 – Sep 2023

- Prototyped Smart Intercom System with enhanced audio and camera streaming using MQTT protocols on ESP32.
- Demonstrated proficiency in IoT and Embedded systems using Microcontroller programming on Arduino IDE and PlatformIO.

Pakistan Aeronautical Comple Kamra, PK

Mechatronics Intern Aug 2023

- Discovered PMI (Plant Maintenance & Installation) Department, with insights into the three levels of maintenance.
- Studied and surveyed the operations of water purification plant, boiler, compressor, and treatment of three types of waste treatment at the effluent treatment plant.
- Attained knowledge of heavy-duty 3-axis and 5-axis CNC machining centers, equipped with advanced Siemens controllers from Germany, showcasing cutting-edge manufacturing technologies.

EXTRACURRICULAR ACTIVITIES

General Secretary – Society for Promotion of Community Services & Media (SPCS&M), NUST CEME May 2024 – Present

Served as General Secretary, collaborating with the Dean and leading six dynamic student clubs. Organized initiatives to empower students in exploring their interests, nurturing their talents, and driving positive social impact.

Autonomous Vehicles (AV) Team Lead – NUST Automotive Group, NUST CEME Oct 2023 – Sep 2024

Led a team of 50 members, specializing in Autonomous Systems, to compete in national or international AV competitions. Coordinated technical training and strategic planning to achieve competitive success. Mentoring the Autonomous Systems work and system design Approach to build an Autonomous Vehicle

Club Mentor – Robotics and Automation Club, NUST CEME Oct 2023 – Sep 2024

Mentored the Students in Mechatronic Projects. Mentored more than 30 unprivileged students in building Line Followers and Competing in the National Engineering Robotics Contest.

ADDITIONAL

Certifications & Training: Python for Data Science, AI & Development (Coursera); Fundamentals of Digital marketing (Google)

Soft Skills: Leadership, Persuasion, Resilience, Cognitive Flexibility, Decision-Making

Recognitions:

- Rector's Gold Medal, National University of Sciences & Technology for Best Final Year Project.
- College Medal of Excellence for GS SPCS&M
- 1st FYP Position in Department of Mechatronics
- Runner Up Mini National Engineering Robotics Contest, Indigenous Category
- 2nd Runner up in IoT & Digital Systems, COMPPEC
- 2nd Runner Up Mini National Engineering Robotics Contest, Lego Category
- Millennium Fellowship 2023
- Certificate of Appreciation, Humanity Alliance Organization (Campus Ambassador)
- Certificate of Appreciation, 'Robotics for Everyone,' U.S. Department of State

Research Interests: Assistive Technologies, Robotics & AI, VLMs, LLMs, Computer Vision, Advanced Sensor Integration and Monitoring, IoT Networks, and Wireless communication.