WAJID ALI

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Education

National University of Sciences and Technology — NUST September 2019 - June 2023
Bachelor of Mechatronics Engineering (accredited by Washington Accord).

- Rector Gold Medalist for best final-year project in the department of Mechatronics Engineering.
- Project report/thesis: /link
- Blog: /link

Publications

- Usama Jahangir, Fahad Aamir, Wajid Ali, Mohsin Tiwana, Hamid Jabbar. *Assistive Feeding System: Design and Evaluation*. International Conference on Robotics and Automation in Industry (ICRAI), 2024.

Projects

Assistive Feeding System (Final Year Project) May 2022 - June 2023
A 6 DOF robotic manipulator to feed patients with limited movement.

- Designed and built a 6-DOF robotic manipulator for feeding patients with limited mobility
- Integrated face detection and 3D localization of facial landmarks using MediaPipe and OpenCV.
- Performed camera calibration and monocular depth estimation for accurate object interaction.
- Deployed solutions on a Raspberry Pi 3B controller.
- Project Demo: /link

AI-Based Defect Detection and Adaptive Manufacturing Correction System

- Developed a real-time computer vision system using YOLOv8 to detect manufacturing defects (e.g., scratches, tool wear, misalignment) from images, video, and live camera feeds.
- Designed and implemented an adaptive decision module that simulates process correction or pausing based on defect confidence and sensor fusion with simulated IMU/encoder data.
- Built an interactive Streamlit dashboard for live visualization, system status monitoring, and user-driven simulation of smart manufacturing scenarios.

Data recording of Railway Track and SLAM

- Data collected from railway tracks using a calibrated camera, LiDAR, and IMU.
- Performed camera calibration using a checkerboard and camera-to-LiDAR calibration for sensor fusion.
- Developed a real-time data synchronization framework using an STM microcontroller, ensuring accurate alignment of LiDAR and camera recordings at 10 Hz.
- SLAM generated from sensor data recorded, enabling an accurate reconstruction of the 3D railway environment.

Path Planning of Drone

- Implemented the RRT* algorithm with deep learning-based sampling for obstacle avoidance.
- Simulated in MATLAB and Simulink for autonomous UAV navigation.

PID Controller for Robot based on ESP32

- Designed and implemented PID control for the robot based on ESP32 with the following design parameters:
- Zero Steady state error, Settling time < 0.25 seconds, Overshoot $< 5\%$.

Agri Bot

- Designed and manufactured an autonomous fruit plucking bot for competition in the national engineering and robotics competition — NERC 22.

- Designed a 3D model and fabricated a fruit plucking mechanism.

Workshop

Attended a workshop at the 6th International Conference on Robotics and Automation in Industry (ICRAI) tutorial on Structure from Motion and Open Multi-View Stereo Reconstruction using openMVG and openMVS libraries.

Experience

Thingtrax May 2025 – Present
Role - AI Engineer

- Developing end-to-end computer vision systems for label validation, product counting, and defect detection in the food and beverage industry.
- Integrating AI-driven inspection results with PLC actions for real-time manufacturing automation.
- Using FastAPI to develop REST APIs, AWS S3 for data storage and retrieval, and Azure IoT Hub with MQTT for device communication to design, deploy and maintain scalable cloud-connected manufacturing solutions.

Kodifly July 2024 – April 2025
Role - Computer Vision Engineer

- Developed sensor fusion-based solutions using Lidar and machine vision cameras for intrusion detection and tracking.
- Leveraged ROS, Python, Nvidia Jetson, and DeepStream SDK platforms for automation in transportation infrastructure and real-time safety monitoring.
- Deployed deep learning models on NVIDIA Jetson devices using Docker for production environments.
- Converted PyTorch models to TensorRT, achieving improved FPS for real-time inference.

STRADA IMAGING Aug. 2023 - May. 2024
Role - Computer Vision and Machine Learning Engineer

- Designed machine learning pipelines for lane line detection and road defect classification
- Utilized CVAT for data annotation and training models for a 15-class road network dataset
- Implemented algorithms to measure rutting depth from stitched images of 200m sections

Technical Skills

- **Robotics and Automation:** ROS, Python, Nvidia Jetson (Orin, Xavier), Lidar, Docker
- **Path Planning and CAD/CAM:** MATLAB/Simulink, SolidWorks
- **Computer Vision and Sensor Fusion:** PyTorch, OpenCV, Open3D, DeepStream SDK, CVAT, Roboflow
- **Programming and Tools:** C/C++, LabVIEW, Git/GitHub, Jupyter Notebook, Google Colab

Achievements

- Awarded the **Rector Gold Medal** for the best Bachelor of Mechatronic Engineering project in session 2023.
- Received **IGNITE** funding for my senior year design project.
- Winner, **COMPPEC 2023** for *Assistive Feeding System* in Electromechanical Systems category.
- Featured on national television (ARY, Samaa, Express) for innovative FYP solutions.

Fellowship

AMAL ACADEMY — Career-Prep Fellow July 2022 - October 2022

- Led a team of six members for a "Learn and Fun" project for children of a shelter home.
- Selected from more than 5,200 applicants for a 3-month Stanford University and PepsiCo-funded fellowship, completing 150+ hours of training in business skills, including leadership, communication, and problem solving.

Certifications

- **Deep Learning with PyTorch: Image Segmentation** (Coursera)
- **MS Excel: Data Analysis and Dashboards** (Udemy)

Extra-Curriculars / Volunteer

- Director, **Registration Process** for ICRAI 2021; Volunteer for project exhibitions at ICRAI 2019.
- Vice President, **Nawaye Sarosh** – Poetry society (2022–2023)

- Active member, **Kare-e-Kamal** – Community service and relief organization.
- Team Lead, **UMANG**, for a seminar on volunteer work for shelter homes.