Wajid Ali

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PROFILE

Mechatronics Engineer with two years of industry experience in robotics, computer vision, and AI, delivering automation solutions for manufacturing, transportation, and infrastructure monitoring. Proficient in Python, PyTorch, Deep Learning, ROS, and edge AI deployment on SoC platforms (NVIDIA Jetson, Raspberry Pi).

EDUCATION

National University of Sciences and Technology — Islamabad, Pakistan

Bachelor of Mechatronics Engineering (accredited by Washington Accord) — Sep 2019 - Jun 2023

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

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

- 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: Demo

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 NERC 22 competition
- 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
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, AWS S3, and Azure IoT Hub with MQTT for scalable cloud-connected manufacturing solutions

Kodifly July 2024 – April 2025
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
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 & Automation: ROS, Python, Nvidia Jetson (Orin, Xavier), Lidar, Docker
Path Planning & CAD/CAM: MATLAB/Simulink, SolidWorks
Computer Vision & Sensor Fusion: PyTorch, OpenCV, Open3D, DeepStream SDK, CVAT, Roboflow
Programming & 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 Jul 2022 - Oct 2022
Career-Prep Fellow

- Led a team of six members for a ”Learn and Fun” project for children of a shelter home.
- Selected from 5,200+ applicants for Stanford University and PepsiCo-funded fellowship, completing 150+ hours of training in business skills

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.