Muhammad Anss

Mechatronics & Control Engineer
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PROFESSIONAL SUMMARY

Dedicated Mechatronics Engineering student (Rank 1st, 3.84 CGPA) who loves building real-world robotic systems from scratch. I enjoy combining mechanical design, electronics, and coding to solve practical problems. With hands-on experience in autonomous navigation, PLC automation, and AI, I actively share my technical skills through community workshops and love learning from global engineering environments.

EDUCATION

University of Engineering and Technology (UET) Lahore, Pakistan
BS Mechatronics and Control Engineering *Dec 2022 – Present*
CGPA: 3.84/4.00 (Rank: 1st in Department/Batch) | *Medium of Instruction: English*

HONORS & GLOBAL EXPOSURE

- **DAAD Sponsored Exchange (2024):** Fully-funded Robotics Week at THWS, Germany. Won the **Conceptual Excellence Award** in the Maze Navigation Challenge.
- **Global & Industrial Tours:** Toured the Deutsches Museum, SACHS Ausstellung (Exhibition), and Schaeffler's bearing manufacturing plant in Germany. Networked with BMW alumni and TUM PhD students. In Pakistan, gained large-scale industrial insights by visiting the SNGPL Plant and Haval Car Manufacturing Plant.
- **Scholarships:** UET Merit Scholarship (2022–2024), Honhaar Scholarship (2025–2026), STEP High Achiever (2022–2026).

TECHNICAL SKILLS

- **Robotics & Kinematics:** ROS 2 (Humble), ROS 1, Nav2, SLAM, TF2, Gazebo, 6-DOF Robot Kinematics/Dynamics.
- **Control & PLC Automation:** PID, LQR, State-Space, Industrial Pneumatics, PLC Programming (All 5 Languages, Ladder Logic).
- **Embedded & Hardware:** Jetson Orin Nano Super, STM32 (HAL), TIVA C (Bare Metal), Raspberry Pi, Arduino.
- **Programming & AI:** C++, Python, MATLAB, PyTorch (CNN-RNN), OpenCV, Machine Learning, Digital Signal Processing.
- **CAD & Manufacturing:** SolidWorks (Stress/Motion Analysis), AutoCAD, CNC Machining, PCB Design (Proteus).

EXPERIENCE

IHYA LAB, UET Lahore | *Research Intern* *Summer 2024*
- Extracted and analyzed vital health data from smart bands, optimizing signal processing workflows for wearable sensors.

DAWN Foods (Muridke Plant) | *Intern Engineer* *Summer 2023*
- Analyzed automated production lines and debugged real-time PLC/Machine faults to reduce manufacturing downtime.

Mechatronics Club & IET On Campus | *Technical & Outreach Director / Head Outreach* *2022 – Present*
- Spearheaded 3 major outreach programs (2 at GCU, 1 at Deaf Foundation) to promote STEM education.
- Showcased engineering projects at the Lahore Science Mela (Al Khawarizmi Society) and led hands-on technical workshops covering soldering, Arduino programming, and PCB design for junior students and attendees.

CORE ENGINEERING PROJECTS

GRACE: Geriatric Robotic Assistance for Care and Engagement *Final Year Project*
- **Autonomy & Vision:** Implemented Nav2 SLAM on a **Jetson Orin Nano**. Deployed **PyTorch CNN-RNN** pipelines for video-based activity recognition and MediaPipe for advanced human posture detection using Intel RealSense.
- **Embedded Control:** Bridged AI with physical actuators using **STM32/ESP32** via micro-ROS. Designed custom closed-loop velocity control for repurposed BLDC hoverboard motors.
- **Mechanical Design:** Designed a 19-part custom chassis in SolidWorks optimized for DFA/DFM principles.

Robotics, Control & Path Planning *Algorithms & Kinematics*
- Engineered and fabricated a **2-Axis CNC Pen Plotter** entirely from scratch.
- Computed forward/inverse kinematics to control the movement of a **6-DOF Robotic Arm**.
- Derived state-space models and implemented an **LQR** controller in ROS 2, validating 30kg chassis stability via Gazebo.
- Simulated SCARA Manipulators; developed Robot Motion Control in MATLAB using **PRM** and A* algorithms.

Industrial Automation & Embedded Systems *Hardware & Software*
- Implemented a PLC **Ladder Diagram** to control an automated punching system utilizing industrial pneumatic cylinders.
- Built a **Voice Recognition App** with a custom GUI in MATLAB utilizing Mel-Frequency Cepstral Coefficients (**MFCCs**).
- Programmed a **TIVA C Series** in **Bare-Metal C** to drive a BLDC motor; built an Arduino Fan Vibration Analyzer.
- Solved the Knight Dominant Problem using Genetic Algorithms (C) and built a Face Security System (Jetson Nano).