MUHAMMAD ABDULLAH

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Electrical & Robotics Engineer | Data Scientist
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EDUCATION

Bachelor of Science, Electrical Engineering, Habib University — Expected May 2025
GCE Advanced Level, Karachi Grammar School – *3 A's (Physics, Math, Chemistry), SAT: 1480* — 2019 - 2021
GCE Ordinary Level, St. Paul's English High School – *8 A*s & 2 As* — 2014 - 2019

SKILLS

Languages	Python, C++, SQL, Verilog
Frameworks & Tools	ROS2, Gazebo, PX4, MATLAB, Simulink, Autoware, CARLA, AWSIM, Git
Libraries & Databases	Pandas, NumPy, Scikit-learn, TensorFlow, PostgreSQL, MongoDB
Expertise	Robotics, Control Systems (PID, L1-Adaptive, Impedance), Machine Learning (ML), Autonomous Driving, Data Science, Power Systems, Embedded Systems

EXPERIENCE

Algorithm Developer — June 2024 - Present
Stealth AI/ML Startup based in Europe — *Karachi, Pakistan*
- Architecting control and path-planning algorithms for an embedded AI/ML autonomous driving stack, focusing on optimal control methods and validation in CARLA/AWSIM simulators.

Research Intern — June 2024 - August 2024
Habib University — *Karachi, Pakistan*
- Engineered an aerial robotics system for industrial inspection; developed ROS2 simulations and hardware prototypes to automate drone workflows, aiming to reduce manual setup for EPCL.

Summer Intern — June 2023 - July 2023
Pakistan Petroleum Limited — *Sui, Balochistan*
- Analyzed power system SLDs and contributed to preventive maintenance schedules for critical generation, electrical, and control systems, enhancing operational reliability.

PROJECTS

- **Quadcopter Control for Contact-Based Industrial Inspection (Capstone Project)**
  - Engineered a novel control architecture (Cascaded PID, L1-Adaptive, Impedance Control) for a DJI F450 to perform contact-based tasks, addressing the 85% setup time cost of manual scaffolding.
  - Validated the system in a ROS2/PX4/Gazebo SITL environment, achieving sustained surface contact ($>$ 60s) while a rotating end-effector operated at speeds up to 35 rad/s.
- **Quadcopter Control for Aggressive Maneuvers**: Implemented a hybrid geometric/quaternion-based controller in MATLAB/Simulink, enabling a UAV to execute complex maneuvers like 360-degree flips and helical trajectories.
- **Electricity Theft Detection System**: Built an ML-based system using Isolation Forest and K-Means clustering to analyze LV distribution network data and accurately identify consumption anomalies indicating theft.
- **ROS2 Security Analysis**: Authored a research paper analyzing ROS2 vulnerabilities, evaluating cryptographic protocols, and proposing robust post-quantum security solutions to harden robotic systems.
- **Inertial Platform Stabilizer**: Constructed an ESP32-based single-axis stabilizer using PID control, integrating an MPU6050 IMU and a custom gearmotor with real-time tuning via Bluetooth.

LEADERSHIP & EXTRACURRICULARS

- **Treasurer, Student Government**: Directed student body finances, led a full revision of the official code of conduct, and launched new community-building and safe-space initiatives.
- **President, Natural Science Club**: Founded and directed the university's inaugural science olympiad ("Spectra") and organized numerous astronomy-focused events for the student body.
- **General Secretary, Mathematics Club**: Co-founded and managed the university's first Mathematics Olympiad ("Mathema") and led advanced study groups.