Mohammed Abdelazim

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LinkedIn: https://linkedin.com/in/mohammed-azab — GitHub: https://github.com/mohammed-azab
Portfolio: https://mohammedazab.com

Education

German International University in Berlin Berlin, Germany
B.Sc. in Mechatronics Engineering — Oct 2023 – Present
GPA: **0.92 (A+)**
Relevant Coursework: Autonomous Systems, Control Systems Engineering, Power Electronics, Embedded Systems, Numerical Analysis, Thermodynamics, Fluid Mechanics, Software Engineering.

The German University in Cairo — New Cairo, Egypt
B.Sc. in General Engineering — Sep 2022 – Aug 2023
GPA: **0.79 (A+)**
Relevant Coursework: Advanced Calculus, Computer Science, Digital Logic Design, Physics III.

Honors & Scholarships

- GUC Scholarship for Outstanding Thanaweya Amma Achievement (2022)
- GUC Scholarship for Study Abroad in Germany (2023)

Research Experience

Multi-Robot Systems (MRS) Research Group — New Cairo, Egypt
Research Intern — Aug 2024 – Oct 2024

- Developed a quadrant drone using Embedded C, focusing on control algorithms and flight stability.
- Designed and implemented a PID controller in MATLAB/Simulink for precise stabilization.
- Reduced drone weight by 23% using SolidWorks, increasing flight time by 15%.

Professional Experience

CARIAD SE – A Volkswagen Group Company — Berlin, Germany
Working Student – Test & Measurement Engineer (ADAS/AD) — May 2025 – Present

- Operate advanced test bench environments to measure and validate sensor data (LiDAR, radar, camera) for Automated Driving Systems.
- Develop, debug, and optimize test and measurement tools using C++ and Python on Ubuntu.
- Work with CI pipelines, CMake, and Conan for scalable build automation and dependency management.
- Author comprehensive technical documentation, ensuring clarity and traceability of test procedures.

Projects

F1TENTH Autonomous Racing Car

- Built a 1/10th scale autonomous race car on the F1TENTH platform, running ROS2 on NVIDIA Jetson.
- Implemented SLAM for real-time mapping and localization.
- Developed a Bezier spline-based path optimizer and hybrid MPC–LQR controller for trajectory planning.
- Implemented a dual Extended Kalman Filter (EKF) to fuse control inputs, IMU, and odometry data for accurate state estimation.
- Achieved 3rd place in the 25th RoboRacer Autonomous Racing Competition, Romania.

TriFlameX: Swarm of Fire-Fighting Robots

- Developed 3 autonomous robots with multi-layer architecture (Laptop–ESP32–STM32) for coordinated detection and suppression of fires.
- Invented the interrupt-driven Azab Protocol for high-speed reliable binary communication in FreeRTOS.

- Designed a custom thermal LiDAR system for real-time fire localization.
- Integrated ROS2, MQTT, and UART for inter-robot and intra-robot communication.

Dice Realms: Quest for the Elemental Crests

- Developed a 2D board game in Java, with object-oriented programming (OOP) architecture.
- Implemented a finite state machine (FSM) to manage structured game flow and modular code architecture.
- Developed AI players using a Monte Carlo method for decision-making, supporting multiple difficulty levels and both human vs AI and AI vs AI gameplay.
- Designed UI in JavaFX and CSS; implemented version control with Git and GitHub.

FPGA Edge Detection

- Designed a real-time edge detection algorithm using VHDL on FPGA using the Prewitt filter method.
- Applied matrix theory for adaptive thresholds, improving detection accuracy.
- Validated performance using Altera tools and custom testbench.

Skills

Technical: System Optimization, Hardware-Software Integration, API Documentation
Programming: Embedded C, C++, Java, Python, VHDL, Assembly, CSS
Operating Systems: Ubuntu, Arch Linux, Windows
Tools: ROS2, Git, MATLAB/Simulink, Quartus, Gazebo, Bash, PowerShell
Hardware Platforms: Raspberry Pi, NVIDIA Jetson, STM32, ESP32, Arduino, FPGA
Languages: English (C1), German (B2), Arabic (Native)
Interpersonal: Public Speaking, Leadership, Communication, Time Management

Certifications & Courses

- Robotics & Automation: ROS 2 Humble
- Machine Learning (DeepLearning.AI): Supervised & Unsupervised Learning, Recommenders, Reinforcement Learning, Advanced Algorithms
- Digitalization in the Aerospace Industry, Technische Universität München
- Mechanical Design: Siemens NX, Fusion 360, SolidWorks, AutoCAD
- Programming & Operation of 5-Axis CNC Machines
- Goethe-Zertifikat B2 (German)

Leadership & Activities

European Solidarity Corps for Youth (ESC4Y) Deuselbach, Germany
Biodiversity and Climate Action Volunteer Sep 2024 – Oct 2024

- Collaborated with IBG and the Foundation for Nature and Environment to support biodiversity (UN SDG 15) and climate action (UN SDG 13).
- Assisted park rangers in restoring peatlands in Hunsrück-Hochwald National Park.

Publications

- **A Modular Framework for Trajectory Optimization and Control in Autonomous 1/10-Scale Racing Vehicle**
  Work in progress.