Mahmoud Ismail

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Summary

I am an aspiring engineering undergrad with hands-on experience in ROS, navigation, SLAM, and control. I have successfully led the development of autonomous vehicle systems from simulation to hardware integration. I am continuously seeking challenging opportunities within the autonomous robotics field where I can further enhance my skills and contribute to innovative projects

Education

Cairo University *Giza, Egypt*
Bachelor of Mechanical Design and Production Engineering *2020 – 2025*

Experience

Shell Eco Racing Team (CUERT) *Cairo University, Egypt*
Director of Autonomous Teams *Jan 2025 – July 2025*

A student-led racing team focused on the development of eco friendly racing vehicles.

- Led 35 engineering students across Development and Embedded teams, fostering teamwork and clear communication.
- Migrated CARLA system to a Docker-based setup, resolving Ubuntu dependencies issues and enabled seamless team transitions.
- Developed Bash/Python tools to automate integration and simplify development workflows.
- Drove completion of 3+ development projects managing testing and documentation, built ROS perception base for AI model deployment.
- Conducted energy consumption calculations for vehicle model supporting energy-efficient velocity profiling project.
- Repaired corrupted Jetson Xavier device, restoring hardware and software functionality to enable autonomous system deployment.
- Developed CAN communication system between the Xavier and STM32 microcontroller for autonomous vehicle control.
- Initiated vehicle modeling project overseeing MATLAB/SolidWorks models with URDF conversion for ROS integration.
- Achieved 3rd place globally in the Shell Eco-marathon Autonomous Programming Competition 2025.

Leader of Autonomous Development Team *July 2024 – Jan 2025*

- Hired and led 23 engineers across multiple disciplines for a Level 3+ autonomous car competition.
- Mentored with sprint-based learning roadmaps and reviews, cutting onboarding time 80% versus prior season.
- Initiated three cross-functional projects: system optimization, energy-cost velocity profiling, and embedded team integration.
- Shifted from waterfall to agile methodology, accomplishing more with fewer resources across multiple projects.

Member of Autonomous Development Control Team *Sept 2022 – July 2024*

- Established the software base structure to allow building and assessing control algorithms using ROS 1 packages.
- Implemented a PID controller for longitudinal movements and the Stanley algorithm for lateral movements, boosting energy efficiency by 300%.
- Utilized the engine performance map to automate the calculation of driving parameters for efficient driving cycles.

SLB Company (Schlumberger) *6th of October, Egypt*
Production Systems Intern *July 2024 – Aug 2024*

Leading global provider of technology for reservoir characterization, drilling, production, and processing

- Coordinated with cross cultural teams to learn about casing strings and hydraulic liner hangers, ensuring wellbore integrity.
- Developed knowledge of TRSCSSVs, Bridge plugs and production packers for well completion.
- Conducted phase-to-phase and DC tests on ESP induction motors and centrifugal pumps, presenting results to senior engineers.
- Supported subsea casing head, spool & Christmas tree assembly to optimize hydrocarbon flow.

Egyptian Atomic Energy Authority *Nasr City, Egypt*
Mechanical Engineering Intern *Apr 2023 – May 2023*

National authority responsible for the development of nuclear energy applications

- Studied four nuclear reactor types, their core components, design consideration, cooling loops and heat-transfer systems.
- Collaborated in hands-on training and expert discussions to refine technical communication.
- Presented the four nuclear reactor types, highlighting operational principles, benefits and trade-offs.

Projects

Autonomous Tow Tractor - Graduation Project *Nov 2024 – July 2025*
https://github.com/GP-Autonomous-Tow-Tractor/tow_tractor_ws
A graduation project focused on designing an autonomous tow tractor

- Designed ROS2-based autonomous tow tractor system, integrating simulation (Gazebo), real-time hardware control, and navigation.
- Developed custom URDF/Xacro robot models implementing rear-wheel steering and differential drive control algorithms.
- Built a ROS2 package for sensor data intake and actuator commands using my hardware Python library's serial drivers.
- Integrated navigation/mapping with Nav2 & SLAM Toolbox for autonomous operation.
- Integrated MPU6050 IMU, RaspberryPi camera, wheel encoders, and LiDAR with a Kalman filter for accurate odometry data.

Autonomous Vehicle Traffic-Aware Control System - Shell Eco Racing Team *May 2025*
https://www.youtube.com/watch?v=0uErVfB_nWY
A project focusing on traffic-aware control systems for autonomous vehicles

- Designed advanced traffic handling logic for an autonomous vehicle in ROS, integrating real-time path planning and collision avoidance.
- Enhanced control module with traffic-aware longitudinal and lateral controllers for dynamic autonomous response.

Hardware Python Library - Graduation Project, Shell Eco Racing Team *Apr 2025*
https://github.com/m7moud-mostafa/hardware

- Designed an OOP Python library with Serial, SPI & CAN drivers using inheritance and mixins for modular, reusable code.
- Developed robust low-level drivers (buffer management, message framing, error handling) and high-level abstractions for sensors (IMU, encoders) and for sending actuators commands.
- Designed extensible, testable interfaces for adding new hardware drivers, with centralized logging, connection management, and automated message handling for reliable robotics integration.

Bash Shell Interpreter - ALX *Mar 2024*
https://github.com/m7moud-mostafa/simple_shell

- Developed a practical UNIX command line interpreter using C programming to mimic basic shell functions.
- Integrated system calls for managing processes, configuring environmental variables , executing programs in a shell setting.
- Implemented essential built-in functions, achieved argument parsing, and allowed the execution of PATH commands in Interactive or Non-interactive mode, which achieved 120% score for this project.

Autonomous Vehicle Control ROS Package - Shell Eco Racing Team *Feb 2024*

- Developed a PID controller and Stanley algorithm within the ROS Control package, optimizing the energy efficiency for autonomous driving.
- Utilized Linux, Python, and the CARLA Simulator to develop and test the control system.
- Optimized the energy efficiency of the control system, which increased the efficiency 3 times the previous system.

Energy Performance Evaluation ROS Package - Shell Eco Racing Team *Jan 2024*

- Developed a comprehensive ROS package to assess energy efficiency and distance metrics of autonomous vehicles, utilizing Python and interfacing with the CARLA simulator.
- Proposed data collection for further Matlab analysis, real-time monitoring, and visualization for the car performance.

Energy Performance Evaluation ROS Package - Shell Eco Racing Team *Apr 2023*

https://drive.google.com/drive/folders/1-v-dgZtKch2yg0wYo3KupjW7MLcKM4Bl

- Resolved team's calculations into a CAD design using SOLIDWORKS, including building and assembling the parts.
- Conducted a motion study, created the exploded view and working drawings, and ensured the design's safety with finite element analysis.

Skills

Programming: Python, C/C++„ Git, Bash Scripting, Supervised ML, Pandas, NumPy, URDF, XACRO, SQL

Software Tools: ROS 1, ROS 2, Gazebo, CARLA, Nav2, Microsoft Planner, Microsoft Office, SolidWorks, MATLAB, Linux OS

Embedded Tools: Jetson Xavier, Raspberry Pi, Arduino, Serial, CAN

Concepts: Autonomous Navigation, Control Systems, Data Analysis, OOP, Data Structures, Sensor Fusion, SLAM, State Estimation

Soft Skills: Leadership, Team Collaboration, Adaptability, Problem-Solving, Presentation, Communication, Attention to Details, Agile, Fast Learner

Languages: English, Arabic

Certifications

- State Estimation and Localization for Self-Driving Cars - University of Toronto, Coursera
- Introduction to Self-Driving Cars - University of Toronto, Coursera
- Supervised Machine Learning - Stanford Online, Coursera
- Data Analysis Professional Nanodegree - FWD, Udacity
- Software Engineering Program - ALX
- Git and GitHub - Google, Coursera
- Machine Design - Georgia Institute of Technology, Coursera

Extracurricular Activities

Ministry of Youth and Sports, Egypt *Egypt*

COP27 Organizer *Sept 2022 – Nov 2022*

- Volunteered as part of the youth team organizing the UN COP27 Climate Summit in Egypt.
- Supported event logistics and served as an on-ground organizer during the conference.

Technical Center for Career Development (TCCD) *Cairo University, Egypt*

Graphic Designer *Sept 2021 – July 2022*

- Created tens of posters and designs using Photoshop and Illustrator to elevate social media advertising efforts.
- Coordinated 5 technical events such as Math Day and Job Fair events.