Mahmoud Shanan

Mechatronics and Robotics Engineer

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EDUCATION

Sept 2023 – Sept 2024 | **MSc Robotics, University of Manchester**, *Distinction*
- Focused on autonomous systems, mobile robots, robotic manipulators, computer vision, and machine learning

Sept 2020 – Jun 2023 | **Beng Mechatronic Engineering, University of Manchester**, *First Class Honours*
- Focused on mechatronic design, electrical drives, control systems, microcontrollers, and electronic systems

SKILLS AND LANGUAGES

Software: MS Office, Linux (Ubuntu), Python, C/C++, ROS 2, Gazebo Simulator, MATLAB/Simulink, SolidWorks, Fusion360, Assembly, VHDL, Bash, Git, HTML, CSS, Altium, LabVIEW, Multisim, PLECS, LTspice, Ultimaker

Hardware: STM32, ESP32, Arduino, Raspberry PI, PIC, IMUs, LIDARs, DC/Stepper motors, CAN, I2C, SPI

Languages: English (native), French (native), Arabic (native), Spanish (intermediate B1)

PROJECT EXPERIENCE

Jun 2024 – Sept 2024 | **Path Planning for Drone Autonomous Navigation**
- Developed trajectory planning algorithms for autonomous drones with vision-based obstacle avoidance using Python, OpenCV, Neural Networks, and Kalman filters
- Conducted real-world flight tests using the DJI Tello drone, integrating a positioning system using sensor fusion between Ultra-wideband (UWB) technology and infrared cameras, requiring significant calibration
- Built a drone simulation for transmission line inspection and automated recharging, using ROS 2, PX4 autopilot, and Gazebo, to extend flight duration and facilitate overhead power line cables operations

Sept 2023 – Jun 2024 | **Autonomous Robot Object Retrieval - Leo Rover**
- Led the development of an autonomous mobile robot, capable of navigating unknown environments and retrieving objects using the ROS 2 framework (Ubuntu), Python, and C++
- Built a Gazebo simulation to test autonomous navigation (3D mapping, SLAM, Kalman filter), object detection (OpenCV), and control algorithms for manipulators, and performed system verification and validation tests
- Modified the mechanical design to attach a LiDAR, robotic manipulator, and depth camera using Fusion360 and 3D printing, making our team the only one to retrieve objects from the ground (more details in portfolio)
- Directed project timelines with Gantt charts, conducted risk assessments, produced functional design specifications documents, and facilitated communication between the team and supervisor

March 2024 | **24-hour Robotics-based Hackathon – Extraterrestrial Rover Challenge**
- Led a team of four to build and program a mobile robot equipped with a camera, allowing it to be remotely controlled from a PC without direct line of sight, leveraging remote communication protocols and Arduino
- Achieved 2nd place among 20 teams by designing a remotely-controlled shovel mechanism to collect objects, and a rotating mechanism for 360° camera coverage, within 24 hours (more details in portfolio)

Sept 2022 – Jun 2023 | **2-DOF Drone Control - Quanser Aero 2**
- Evaluated the performance of PID control in UAVs using MATLAB/Simulink and hardware-in-loop simulation
- Designed and tuned cascaded PID controllers to control the helicopter and bi-copter configurations
- Researched a new configuration for the studied platform, and modified the mathematical model of the system, such that it is controlled as a quadcopter (more details in portfolio)

Sept 2021 – Jun 2022 | **Embedded Systems Project - Autonomous Buggy**
- Led a team of five to develop a microcontroller-based autonomous buggy (STM32) capable of following a line on a track using infrared sensors and a PID controller written in C++ (more details in portfolio)
- Designed the chassis using SolidWorks, the sensors' PCB using Altium, and resolved integration challenges

WORK EXPERIENCE

Jul - Aug 2023 | **Production Engineer Intern, El Sewedy Electric Special Cables Plant**

- Implemented and monitored cable production processes to meet the stakeholders and team's operations requirements, ensuring compliance with quality and safety standards
- Analysed data and performance metrics to identify areas for improvement in the production processes, providing process automation recommendations, and maintaining process documentation
- Partnered with engineers to troubleshoot and resolve process-related issues, meeting business requirements

Jul - Aug 2022 | **Mechatronics Engineer Intern, Citroën After Sales Service Centre**

- Executed diagnostics and fault-finding on over 10 automotive engines and gearboxes, using wiring diagrams and specialised software to troubleshoot issues with sensors and actuators
- Coordinated with cross-functional teams to improve diagnostic techniques, documenting findings in technical reports, decreasing overall repair times
- Translated customers' fault description into repair specifications, serving as "front-line" technical support and ensuring a customer-focused after-sales experience

Jul - Aug 2018 | **Sales intern, Hamleys of London**

- Entertained and guided over 100 walk-in customers through their shopping experience in four different isles of the store, and learned how to adapt in a fast-paced atmosphere