

MOUSTAFA SHARAF

Mechanical & Robotics R&D Engineer | M.Sc. Mechanical Engineering

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Robotics & Mechatronics | Underwater & Mobile Robots | Sensor Integration & Embedded Control

Mechanical and robotics R&D engineer with an M.Sc. in Mechanical Engineering and hands-on experience building robotic and electromechanical systems end to end. Strong in mechanical design, sensor and actuator integration, embedded control, and precision motion, with a track record of taking robots from concept and CAD to working, field-tested hardware. Experience spans underwater robotics, mobile robots with real-time perception, and custom research platforms. Comfortable integrating sensing systems onto moving platforms and debugging complex multidisciplinary systems.

TECHNICAL SKILLS

- **Robotics & Mechatronics:** Robotic System Integration, Underwater & Mobile Robots, Sensor & Actuator Integration, Sensor Fusion, Real-Time Perception, Precision Motion Control
- **Sensing & Embedded:** IMU, mmWave Radar, Encoders, Load Cells, ESP32/STM32, PCB Design, UART/I²C/SPI, System Debugging, Test & Validation
- **Mechanical Design & Analysis:** SolidWorks, Fusion 360, Mechanism & Enclosure Design, GD&T, DFM/DFA, Material Selection, FEA (ANSYS Mechanical), CFD (ANSYS Fluent), Rapid Prototyping, 3D Printing, CNC
- **Programming & Tools:** C++, Python, MATLAB, Arduino/PlatformIO, Git (familiar with ROS concepts)

EXPERIENCE

Mechanical & Robotics R&D Engineer — MARS-Z, Alexandria

Dec 2020 – Present

- Led mechanical design and development of **25+ electromechanical systems** and prototypes for universities and industrial clients across Egypt, Saudi Arabia, UAE, Oman, and the UK.
- Designed and integrated robotic and electromechanical systems combining mechanics, sensors, actuators, and embedded control into reliable working platforms.
- Owned the full mechanical development cycle: requirements definition, concept generation, CAD design, detailed drawings, tolerance/GD&T, fabrication follow-up, assembly, and testing.
- Integrated design changes based on test feedback and performance data, ensuring final designs performed reliably under real-world conditions.
- Drove transfer-to-manufacturing using DFM/DFA, rapid prototyping, 3D printing, and CNC machining to improve manufacturability and development speed.
- Prepared technical reports, design documentation, and validation records supporting reviews, debugging, and research paper/conference submissions.
- Delivered diverse robotic platforms including mobile robots, motion systems, and sensor-integrated devices, from concept through field testing.

Academic Project Mentor | Faculty of Engineering, Alexandria University

Sep 2022 – Jul 2024

- Mentored senior mechanical engineering students through project scoping, concept development, design reviews, and engineering analysis.
- Strengthened students' technical problem-solving, engineering analysis, and presentation quality for final project readiness.

Mechanical Design & Drafting Engineer | Freelance

Sep 2018 – Dec 2020

- Delivered **10+ SolidWorks design projects** covering mechanisms, enclosures, assemblies, and production drawings with GD&T.
- Managed design iterations, rapid prototyping, and supplier coordination to improve manufacturability and turnaround time.

Team Lead & Mechanical Engineer — Torpedo ROV Team

Jul 2016 – Sep 2018

- Led mechanical design and fabrication of a lightweight stainless-steel ROV that won 1st place nationally in the MATE-ROV competition.
- Coordinated mechanical, electrical, and controls sub-teams; planned testing and refinement that qualified the team to present at **NASA's Neutral Buoyancy Laboratory**.

SELECTED PROJECTS

4WD Radar Perception Robot — Mobile Robotics & Sensing

- Built a 4-wheel mobile robot using a 24GHz mmWave radar for real-time obstacle detection, computing distance from X/Y radar coordinates with Doppler-aware speed control and predictive lookahead.
- Integrated and synchronized the sensing system with embedded motion control on a moving platform, the core skill behind mounting and fusing imaging sensors on robots.

Underwater ROV — Marine Robotics

- Integrated thrusters, manipulators, sealing, and buoyancy/ballast into a reliable stainless-steel underwater platform tested in real conditions.
- National 1st place (MATE-ROV) and qualified to present at **NASA's** Neutral Buoyancy Laboratory.

Inertial Rate Table — Precision Motion Platform

- Designed and built a single-axis precision rate table for inertial-sensor testing, including mechanical structure, drivetrain selection, and system integration.
- Achieved 30 ppmFS encoder accuracy and stable sinusoidal motion to 15 Hz; **client reported it exceeded their existing commercial Aeromith rate table in dynamic accuracy.**

Automated Insulin Delivery System — M.Sc. Thesis

- Developed a closed-loop electromechanical system with real-time sensor feedback and embedded control; defined the actuation and control architecture and validated accuracy and repeatability.

EDUCATION

M.Sc. in Mechanical Engineering — Alexandria University

Awarded Feb 2026

- **Relevant graduate coursework:** Computational Fluid Dynamics, Turbulent Flow, Advanced Fluid Mechanics, Heat & Mass Transfer, Modelling & Simulation, Selected Topics in Fluid Mechanics, Pipe Systems, Composite Materials.
- **Thesis:** Low-Cost Automated Insulin Delivery (AID) System aligned with IEC 60601/62304 principles, covering mechanical design, embedded control, and safety validation.

B.Sc. in Mechanical Engineering — Alexandria University

2019

- Graduation Project: Power-to-Gas Sustainable Energy System (electrolysis-based hydrogen storage). Best Graduation Project (Energy Track), Egyptian Engineering Day.

PUBLICATIONS

- **A Developed Design of Low-Cost Insulin Pump for Automated Insulin Delivery (AID) System.** ITC Egypt, 2025 — [DOI](#)
- **Surface roughness, wear, and abrasiveness of printed and milled occlusal veneers after thermomechanical aging** — The Journal of Prosthetic Dentistry, 2024. Acknowledged contributor (chewing simulator) — [DOI](#)
- **Potent biological activity of newly fabricated silver nanoparticles coated by a carbon shell synthesized by electrical arc.** Scientific Reports, 2024. Device contribution (arc-discharge setup) — [DOI](#)

AWARDS

- **Best Graduation Project (Energy Track)** — Egyptian Engineering Day
- **1st Place, MATE-ROV National Competition** — Team Lead; qualified to present at **NASA's** Neutral Buoyancy Laboratory

LANGUAGES

- **Arabic:** Native
- **English:** Fluent