

MOUSTAFA SHARAF

Product Development Engineer | Mechanical R&D Engineer | M.Sc. Mechanical Engineering

Mechanical Design | DFM/DFA | Mechatronics Integration | Prototype-to-Production | Validation

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ENGINEERING PORTFOLIO: moustafasharaf.com | 12 engineering case studies with photos, videos, CAD, and test results

PROFESSIONAL SUMMARY

Hands-on product development engineer with 7+ years in engineering, including 5+ years leading delivery of 50+ client-funded electromechanical prototypes and custom systems from requirements through fabrication, integration, validation, and repeat production. Strongest in mechanical design, DFM/DFA, mechatronics integration, supplier coordination, and hardware validation. At MARS-Z, leads 3 engineers and 4 full-time technicians while remaining directly involved in design reviews, build troubleshooting, acceptance testing, and delivery.

CORE CAPABILITIES

- Product Development & Industrialization: requirements, concept selection, system architecture, CAD, design reviews, Design for Manufacturability and Assembly (DFM/DFA), prototyping, verification, technical handover, and transfer to production.
- Mechanical Design & Manufacturing: SolidWorks, Fusion 360, mechanisms, enclosures, assemblies, Geometric Dimensioning and Tolerancing (GD&T), tolerance analysis, sheet metal, CNC, 3D printing, fabrication, fixtures, and BOMs.
- Mechatronics Integration & Validation: sensors, actuators, motion systems, embedded-hardware integration, instrumentation, acceptance testing, root-cause analysis, and multidisciplinary debugging.
- Engineering Analysis & Digital Tools: ANSYS Mechanical FEA, ANSYS Fluent CFD, and MATLAB; working knowledge of C++, Python, Git, APIs, and AI-assisted workflows, with primary strength in engineering integration and physical verification.

PROFESSIONAL EXPERIENCE

Lead R&D and Product Development Engineer | MARS-Z

Dec 2020 - Present

Alexandria, Egypt | Custom electromechanical product development and manufacturing company | marsz.tech

- Lead delivery across 50+ client-funded electromechanical prototypes and custom systems, converting incomplete or evolving requirements into testable hardware and clear acceptance criteria.
- Own the end-to-end development cycle: stakeholder requirements, concept trade-offs, system architecture, CAD and drawings, DFM/DFA, supplier coordination, fabrication, assembly, embedded integration, validation, and technical handover.
- Coordinate a permanent team of 3 engineers and 4 full-time technicians through design reviews, build sequencing, workshop troubleshooting, quality checks, and delivery deadlines while remaining hands-on in the work.
- Productized a visual-sensory learning line that reached around 300 cumulative units for one client, with units exported by the client to Gulf and European markets.
- Delivered operational systems for Si-Ware / Pulsar, EBank, and regional research clients, including three identical arc-discharge systems delivered to a university client in Oman.

Academic Project Mentor (Part-time) | Faculty of Engineering, Alexandria University

Sep 2022 - Jul 2024

Alexandria, Egypt

- Mentored senior mechanical engineering teams from problem definition and concept selection through analysis, prototyping, testing, and technical presentation, turning broad briefs into defensible engineering decisions and build plans.

Mechanical Design and Drafting Engineer | Freelance

Sep 2018 - Dec 2020

Alexandria, Egypt

- Delivered 10+ SolidWorks projects covering mechanisms, enclosures, assemblies, manufacturing drawings, GD&T, tolerances, and supplier-ready documentation; coordinated revisions to improve manufacturability and resolve build issues before fabrication.

Team Lead and Mechanical Engineer | Torpedo ROV University Student Team

Jul 2016 - Sep 2018

Alexandria, Egypt

- Led mechanical design, fabrication, integration, and field testing of a lightweight stainless-steel underwater ROV across structure, thrusters, manipulators, sealing, buoyancy, and ballast.
- Won 1st place nationally in MATE ROV and qualified for presentation at NASA's Neutral Buoyancy Laboratory.

SELECTED PROJECTS

Visual Sensory Learning Product Line | Product Development, DFM/DFA, Repeat Production

- Converted a client concept into a serviceable product architecture designed for repeat fabrication rather than a one-off prototype.
- Led product architecture, mechanical/electrical integration, fabrication workflow, assembly refinement, supplier coordination, and batch-level quality checks.
- Delivered around 300 cumulative units for one client; standardized subassemblies and acceptance checks enabled repeat production, and the client exports units to Gulf and European markets.

High-Precision Inertial Rate Table | Motion Control and Sensor Test Equipment

- Developed a cost-conscious single-axis platform for controlled inertial-sensor test profiles and client evaluation workflows.
- Led drivetrain development, encoder-feedback integration, safety hardware, live monitoring, and iterative mitigation of low-speed smoothness, rotating inertia, and backlash.
- Client-side analysis measured 0.00328% of full-scale encoder-to-command nonlinearity (32.8 ppmFS) over a +/-300 deg/s sweep; final tests achieved 15 Hz sinusoidal motion at 400 deg/s peak.

Chewing Simulator | Long-Cycle Dental Research Equipment

- Translated a dental test protocol into an automated system for controlled loading and thermomechanical aging over extended cycles.
- Developed the multi-axis motion architecture, loading fixtures, thermal cycling, embedded controls, operator interface, cycle logging, and serviceable separation of water from motion hardware.
- Supported a peer-reviewed study running 250,000 mechanical cycles with 1,000 thermal cycles; the machine operated for about two years and later prompted a repeat-build inquiry.

Automated Insulin Delivery Research Prototype | M.Sc. Thesis and IEEE Publication

- Built a low-cost M.Sc. research platform using locally available components, with dose verification and fault detection treated as core design requirements.
- Integrated geared actuation, power-screw transmission, encoder and linear-position cross-checking, motor-current occlusion monitoring, embedded control, continuous glucose monitor connectivity, and a mobile interface.
- Three independent verification signals supported bench testing below 1% dosing error at roughly 90% lower cost than commercial pumps; this is a research prototype, not a clinically deployed or approved medical device.

EDUCATION

M.Sc. in Mechanical Engineering | Alexandria University

Awarded Feb 2026

- Thesis: Low-Cost Automated Insulin Delivery System. Selected coursework: CFD, turbulent flow, heat and mass transfer, modelling and simulation, and composite materials.

B.Sc. in Mechanical Engineering | Alexandria University

2019

- Graduation project: Power-to-Gas sustainable energy system. Best Graduation Project, Energy Track, Egyptian Engineering Day.

PUBLICATIONS AND RESEARCH CONTRIBUTIONS

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

AWARDS AND LANGUAGES

Awards: 1st Place, MATE ROV National Competition (Team Lead); Best Graduation Project, Energy Track, Egyptian Engineering Day.

Languages: Arabic - Native | English - Fluent