

EMAD BARANDAN

Mechanical Engineer | CAD/CAE | Robotics, XR & Digital Twin | AI-enabled Automation

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Professional Summary

Mechanical Engineer and M.Sc. student in Mechanical Engineering for Sustainability at the University of Bologna, specialized in Sustainable Design and Manufacturing. Experienced in CAD modeling, CAE-driven validation, structural and dynamic simulation, and optimization for manufacturable products and mechatronic systems. Strong interest in Robotics, Digital Twins, XR, and AI-enabled automation, with hands-on work in MATLAB, ANSYS, MSC ADAMS, Unity, and n8n-based workflows. Passionate about combining engineering analysis, digital tools, and data-driven methods to improve product performance, usability, and sustainability.

Experience

Freelance Automation & Process Digitalization Specialist

Jun 2024 – Present

- Develop automation and process digitalization workflows using n8n and AI-based solutions.
- Design practical no-code / low-code pipelines to improve operational efficiency and reduce repetitive tasks.
- Explore AI-assisted automation use cases linking engineering workflows with digital tools.

UX Research – AI-driven Gesture Recognition, DIN – University of Bologna

Jun 2025 – Dec 2025

- Conducted state-of-the-art analysis of AI-based gesture recognition methods for human-centered industrial system design.
- Defined KPIs to evaluate and compare gesture-recognition techniques for ergonomic assessment.
- Replicated lab scenarios to assess context-dependent performance, usability, and robustness.
- Synthesized comparative results into actionable insights for automated ergonomic assessment.

Mechanical Engineering Intern, Farda Automobile Company

Jun 2021 – Dec 2021

- Prepared technical reports on hydraulic and pneumatic systems to improve documentation quality and clarity.
- Developed detailed circuit diagrams in FluidSIM to support troubleshooting and maintenance workflows.
- Assisted senior engineers in preventive and corrective maintenance activities on industrial systems.

Education

M.Sc. in Mechanical Engineering for Sustainability

Sep 2023 – Present

Alma Mater Studiorum – Università di Bologna, Italy
Specialization: Sustainable Design and Manufacturing

B.Sc. in Mechanical Engineering

Sep 2017 – Nov 2022

Semnan University, Iran

Selected Projects

Trajectory Optimization and Dynamic Simulation of a 6-DOF Industrial Robot

Jun 2025 – Nov 2025

Alma Mater Studiorum – Università di Bologna

- Designed and simulated an optimized trajectory for a 6-DOF industrial robot passing through predefined task points while maintaining end-effector orientation.
- Applied forward and inverse kinematics in MATLAB, including workspace, joint-limit, and position optimization analyses.
- Performed dynamic simulation in MSC ADAMS and validated feasibility through joint-rate, torque, and power-consumption analysis.

Extended Reality (XR) for Digital Twin of Mechatronic Systems

Feb 2025 – Jul 2025

Alma Mater Studiorum – Università di Bologna

- Developed an XR-enabled digital twin concept for a telescopic engine mechanism in maritime applications.
- Designed the digital twin HMI for design engineers and maritime trainees.

- Built an AR visualization in Unity to place the mechanism into a real environment, with future extensibility for real-time data overlays.
- Prototyped 3D assets and integrated CAD geometry by converting Creo files to .obj for Unity import.
- Implemented mechanism motion using hinge joints and structured the final hierarchy and assets in Unity.

Design and Optimization of a Boat Transom

Sep 2024 – Feb 2025

Alma Mater Studiorum – Università di Bologna

- Designed an initial CAD model of a boat transom including engine mounting features and deck-side connections.
- Performed structural analysis in ANSYS to evaluate stresses, deformation, and load behavior under marine operating conditions.
- Applied topology optimization to reduce weight while preserving structural integrity and critical mounting points.
- Evaluated additive manufacturing options for aluminum components, comparing machining vs. AM in terms of waste and cost.

Experimental Study of Torsional Vibrations of a Rotating Shaft

May 2022 – Nov 2022

Semnan University

- Designed and executed an experimental setup to investigate torsional vibration behavior in a rotating shaft.
- Built custom test rigs and used calibrated sensors and an oscilloscope to measure torsional stiffness and dynamic response.
- Analyzed results and compared experimental outcomes with theoretical models.

Skills

CAD & Design: SolidWorks, Creo, Mechanical Design, Geometric Dimensioning and Tolerancing (GD&T), Design for Manufacturing (DFM)

CAE & Simulation: ANSYS, MSC ADAMS, Structural Analysis, Dynamic Simulation, Kinematic Analysis, Topology Optimization

Programming & Data: MATLAB, Python, Data-Driven Engineering Workflows

XR / Digital Technologies: Unity, Augmented Reality (AR), Extended Reality (XR) Prototyping, Digital Twin Concepts, Human-Machine Interface (HMI) Design

Automation / AI: n8n, Machine Learning, Computer Vision, AI-Assisted Automation, AI/ML for Engineering Applications

Licenses & Certifications

- **Installing, Running and Testing LLMs on Your Local Computer** – LinkedIn Learning, Jan 2026
- **Build AI Agents with n8n** – LinkedIn Learning, Dec 2025
- **Introduction to Digital Twins** – LinkedIn Learning, Feb 2025
- **Modelling and Analyzing Composite Model in Ansys Software** – Udemy, Jan 2025
- **SolidWorks** – Iran Technical & Vocational Training, Aug 2020
- **Geometric Dimensioning & Tolerancing Professional (GD&T)** – Iranian Society of Engineers, Nov 2018

Languages

Persian – Native

English – Professional Working Proficiency

Italian – Elementary

References

Prof. Margherita Peruzzini

Full Professor, Department of Industrial Engineering

Alma Mater Studiorum – Università di Bologna

Available upon request

Prof. Giangiacomo Minak

Associate Professor, Department of Industrial Engineering

Alma Mater Studiorum – Università di Bologna

Available upon request

Prof. Mohammad Mehdi Khatibi

Associate Professor of Mechanical Engineering

Semnan University

Available upon request