Munir Zarea

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Professional Summary

Mechanical engineer specializing in subsea robotics and underwater instrumentation. Designed and deployed robotic systems including pressure-tolerant stereo camera enclosures and bio-inspired manipulators tested in bench and ocean environments. Experienced in CAD-driven prototyping, ROS2 robotic control, and marine sensor integration. **U.S. Citizen eligible for Secret/TS clearance.**

Engineering and Research Experience

Graduate Research Engineer | SAIL Lab, University of Hawai'i at Mānoa | *Aug 2024 – Present*

- Designed and prototyped buoyancy-driven actuation and propulsion mechanisms for a bio-inspired underwater robotic platform, improving maneuverability and depth control during experimental trials
- Led end-to-end system integration of mechanical, electrical, and software subsystems, enabling sensing, actuation, and onboard computation during field deployments
- Engineered a pressure-tolerant underwater electronics enclosure integrating Raspberry Pi computing and a ZED 2i stereo vision camera for subsea imaging and perception experiments, deploying design on commercial ROV in aquaculture and ocean environments to validate hardware and firmware performance
- Integrated stereo cameras, IMUs, and hydrophones with ROS2-based robotic control systems
- Improved system reliability through iterative prototyping and failure analysis of underwater components and sealing interfaces
- Contributed to an IEEE IROS 2026 manuscript describing the design and validation of the robotic system

Mechanical Facilities Engineer | Merrick & Company | Greenwood Village, CO | *June 2023 – June 2024*

- Performed CFD and piping network simulations (AFT Arrow) for safety-critical nuclear containment systems, validating thermal, airflow, and pressure drop performance against design specifications
- Created mechanical drawings and documentation for regulated engineering design reviews

Undergraduate Research Intern | *National Renewable Energy Laboratory (NREL), Golden, CO* | *Aug 2022 – June 2023*

- Contributed to hydrodynamic modeling tools used for marine energy system simulations for the DOE
- Processed and analyzed experimental and simulation data to support engineering design decisions

Education

M.S. Mechanical Engineering - University of Hawai'i at Mānoa, Honolulu, HI | GPA: 3.66 *(Expected Spring 2026)*
B.S. Mechanical Engineering - Oregon State University, Corvallis, OR *(2022)*

Selected Publications

- Zarea, M., et al., *"Stiffness- and Buoyancy-Tunable Underwater Object Manipulation with a Detachable End Effector,"* IEEE IROS, 2026. *(Lead Author - Manuscript in Preparation)*
- Zarea, M., et al., *"Hydrodynamic Modeling of Shark Morphology to Inform Biologging Tag Design,"* ASME IMECE, 2022. *(Lead Author)*

Technical Skills

- **Mechanical Design & CAD:** SolidWorks, Creo, Siemens NX, Onshape, mechanical drawings, GD&T, design documentation
- **Maritime & Subsea Systems:** Underwater enclosures, buoyancy and propulsion mechanisms, subsea sensors
- **Controls & Robotics:** ROS2 node development, robotic actuation (servo, pneumatic systems), sensor fusion (IMU, stereo vision), feedback control systems
- **Prototyping & Testing:** Rapid prototype development & iteration, hardware validation and bench testing, ocean deployment testing, waterproofing & pressure testing
- **Programming & Tools:** Python (data analysis, robotics), C++ (ROS2 nodes), MATLAB (modeling & simulation), data acquisition & analysis
- **System Engineering/Integration:** System integration (mechanical, electrical, software), hardware-in-the-loop (HWIL) testing, requirements-driven design