DEPARTMENT OF MECHANICAL & MATERIALS ENGINEERING
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: February 8, 2026

PROJECT TITLE: Ultrasonic Charging for Underwater IoT

Physical Requirement :
no physical requirements

Project's Technical Skills Requirement :
Junior or Senior Mechanical Engineering Student, or a related field; Experience or interest in 3D printing, machining, electronics, or mechatronics; Basic knowledge of acoustics, vibrations, or signal processing; Experience with soldering or basic circuit fabrication.

Project's Available Positions : 1

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Metasonics Lab

Project Description

Position Overview
Our Lab specializes in acoustic sensors and systems for the Internet of Things. We combine advanced 3D printing with multiphysics simulations and active materials to design new devices that efficiently generate, guide, and harvest sound waves. These devices allow sensors to operate in extreme environments, such as deep oceans, within the human body, and inside nuclear waste containers. These innovations support applications ranging from infrastructure monitoring and industrial inspection to medical imaging and healthcare.
This position focuses on the research and development of a system for wirelessly charging underwater sensors and autonomous vehicles (AUVs) using ultrasound. You will be trained to build and experimentally evaluate novel ultrasonic transducers using a combination of 3D printing, traditional machining (e.g., milling, lathing), and epoxy resin casting. You will characterize system performance by measuring electrical and acoustic power conversion efficiency using existing laboratory test setups.
This opportunity is well suited for a creative and motivated student who enjoys hands-on work with electromechanical systems, mechatronics, and experimental prototyping. The position involves mechanical design,

fabrication, electronics testing, and experimental data analysis, and provides close mentorship in an active research environment.

Technical Scope & What You'll Learn
Students in this role will gain:
• Experience designing, building, and validating complete electromechanical systems from concept to testing
• Hands-on experience in cutting-edge acoustics, signal processing, and IoT research
• Opportunity to contribute to publications and conference presentations
• Preparation for graduate school or advanced industry R&D careers

Desired Qualifications
• Strong enthusiasm for hands-on building, prototyping, and "making" things work
• Comfortable working hands-on with physical hardware in a laboratory environment
• Major in Mechanical Engineering, Electrical Engineering, Physics, or a related field
• Familiarity with MATLAB and SolidWorks or similar CAD software

Preferred Qualifications
• Junior or Senior Mechanical Engineering Student, or a related field
• Experience or interest in 3D printing, machining, electronics, or mechatronics
• Basic knowledge of acoustics, vibrations, or signal processing.
• Experience with soldering or basic circuit fabrication.