Underwater Energy Harvesting through Piezoelectric Materials

ELECOMP Capstone Design Project 2022-2023

Sponsoring Company:

Naval Undersea Warfare Center
1176 Howell St Building 990
Newport, RI 02841
(401) 832-7742
https://www.navsea.navy.mil/Home/Warfare-Centers/NUWC-Newport/

Company Overview:

The **Naval Undersea Warfare Center** (**NUWC**) is the United States Navy's full-spectrum research, development, test and evaluation, engineering and fleet support center for submarines, autonomous underwater systems, and offensive and defensive weapons systems associated with undersea warfare. It is one of the corporate laboratories of the Naval Sea Systems Command. NUWC is headquartered in Newport, Rhode Island and has two major subordinate activities: Division Newport and Division Keyport in Keyport, Washington. NUWC also controls the Fox Island facility and Gould Island. It employs more than 4,400 civilian and military personnel, with budgets over $1 billion.

Technical Directors:

TBD. A NUWC staff member will be assigned as a mentor at a later date.

Project Motivation:

The marine community has an interest in recharging the battery systems of underwater vehicles without the use of a surface vessel or underwater power cable. The goal of this project is to investigate using piezoelectric materials to harvest enough energy from underwater sound to recharge UUV batteries and transmit/store data collected by the UUV sensor. The physical method of charging the UUV battery is not within the design scope of this project.

Anticipated Best Outcome:

The goal of this project is to investigate using piezoelectric materials to harvest enough energy from underwater sound to recharge UUV batteries and transmit/store data collected by the UUV sensor.

Project Details:

NUWC has stated that the above-mentioned passage from its originator is sufficient description.

(Task breakdown from original description)

- Determine the required energy to support UUV operation
- Explore how the noise level of the water affects size of the device
- Develop a prototype to prove the feasibility of your design

Composition of Team:

2 Electrical Engineers

Skills Required:

Electrical Engineering Skills Required:

- Knowledge of use of lab equipment, Oscilloscope
- Experience with soldering, and working with DC electronics

Computer Engineering Skills Required:

n/a

Anticipated Best Outcome's Impact on Company's Business, and Economic Impact

NUWC has stated that the before-mentioned passage written by the project originator is sufficient description.

Broader Implications of the Best Outcome on the Company's Industry:

NUWC has stated that the before-mentioned passage written by the project originator is sufficient description.