



# Contactless Underwater Discharge/Recharge of a Vehicle Battery

ELECOMP Capstone Design Project 2022-2023

## Sponsoring Company:

**Naval Undersea Warfare Center**

1176 Howell St Building 990

Newport, RI 02841

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<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 ability to recharge and discharge battery systems in underwater vehicles is of continued interest to the marine community. The capability to perform this without the need to remove the vehicle from the water body is beneficial. In a submerged environment, this recharge/discharge evolution may be performed through an underwater docking station that utilizes contactless means for the charging, which requires power transfer through a small distance water gap. This would be focused on helping a UUV be able to recharge, discharge, and even be in a layup mode of trickle charge, all while under water.

## **Anticipated Best Outcome:**

The current project shall develop and demonstrate a prototype system that is able to utilize a submerged power supply host platform to recharge a battery on a submerged vehicle in a contactless manner. The prototype shall be able to both charge and discharge the battery on the vehicle and perform this energy transfer through a small water gap. The key focus of the project shall be the command and control of bi-directional charging across a water gap with an objective of 100-200 watts bi-directional transfer.

## **Project Details:**

NUWC has stated that the above-mentioned passage from its originator is sufficient description. However, a capstone project was completed last year that shares similarities. Students wishing for more information on the subject should conduct their own research or possibly review the following ELECOMP project:

<https://web.uri.edu/elecomp-capstone/project-details-by-team/gdeb-dc/>



#### **Hardware/Electrical Tasks:**

- To be determined by the capstone team

#### **Firmware/Software/Computer Tasks:**

n/a

#### **Composition of Team:**

2 Electrical Engineers

#### **Skills Required:**

##### **Electrical Engineering Skills Required:**

- Knowledge of use of lab equipment, Oscilloscope and logic analyzer
- 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.