

# NSWCPD Internships & Capstones Overview

8/23/2023

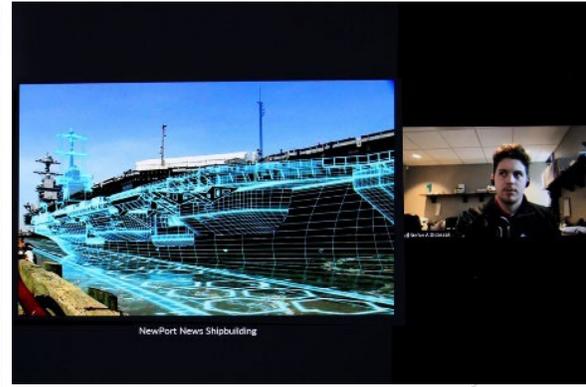
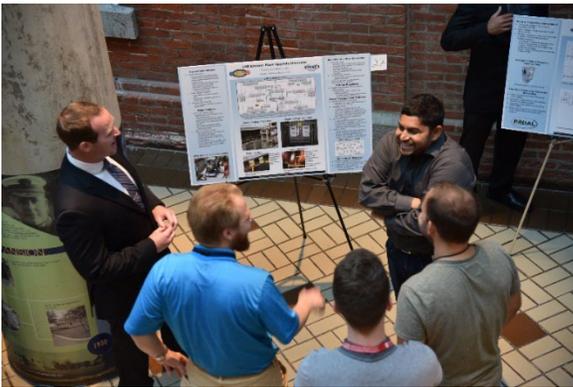
Tristan Wolfe

NSWCPD STEM Outreach Program Manager



# Methods

- ❖ Summer Internships
- ❖ Short-term school year projects
- ❖ Long-term capstone projects
- ❖ Co-ops
- ❖ Scholarships
- ❖ Undergraduate / Graduate research



# Intern Project Examples

- ▶ Modeling & Simulation Support / MBSE
- ▶ Testing & Evaluation Support
- ▶ Work Package Development
- ▶ Test Site Support
- ▶ Computer Programming Support
- ▶ Hardware System Upgrades
- ▶ Research & Development Support
- ▶ Control System Upgrades
- ▶ Cybersecurity, DevSecOps, & Ethical Hacking
- ▶ Engineering System Design
- ▶ Engineering Analysis & Data Analytics
- ▶ and much more...

### Analysis and Prevention of Condenser Corrosion on Littoral Combat Ships (LCS)

Sirawit Shimpalee, 411  
Mentor: Nuri Bracey, 411

**Introduction**

- Air Conditioning and Refrigeration (AC&R) systems are vital for maintaining ideal thermal conditions onboard naval vessels.

**Objectives**

- Research existing and potential methods of cleaning condenser and preventing damage and determine if those methods can be applied to LCS
- Review and compile maintenance data on LCS to determine sources of failure in condenser operation

**Planned Activities**

- For cleaning methods research:
  - Investigate cleaning methods for land based and marine condensers
  - Determine existing preventative

**Problem**

The lack of control power redundancy increases the risk of loss of power to control and machinery equipment in the event of electrical failure.

**Purpose**

- To improve the existing control power design through the addition of a rectifier which enables a cross connection between the two systems.
- To provide redundant sources of control power that are available in a dark ship capable of starting a generator to restore ships power.
- To verify proper operation of the Rectifier and existing UPS when in parallel, to test what diode protection is needed between the units, and see how the devices react as each unit is cycled off and on

**Condenser Corrosion**

**OARS Data for Cleanings**

MIP	5142/034	[Y]
MRC	F4UL	[Y]
Count of MRC	Column Labels	2018 2020 2021
Row Labels		3 4

### Shipboard UPS and Rectifier Parallel Operation Test

Deesha Patel, Code 446  
Mentor: Joseph Everly and Joseph Amato, Code 446

**Test and Results**

- Recorded the output current and voltages from the Rectifier and the UPS.
- Documented the outcomes through the usage of a data logger and multimeters.
- Removed the four diodes.
- Tested with different load bank values.
- Conducted an endurance test.
- Results:**
  - The endurance showed the machinery was able to function individually and maintain a stable temperature for span of two weeks.
  - The parallel test proved that the load bank was always given power through either the UPS or Rectifier.

**Navy Application**

- Tests that different power structures are able to synchronize.
- Single point of failure vs. redundant control power source. (Redundant sources of control power that are available in a dark ship)
- Prevent a dark ship event from occurring in the future.

### Main Reduction Gear (MRG) Dehumidifier

Krishna Mahajan, Code 418  
Brittany McQuaig & Keith Grimes, Code 418

**Abstract**

- The GC-150 Main Reduction Gear (MRG) Dehumidifier Controller was updated to solve the several issues that the old version had:
  - Digitizing the unit control and operation
  - All-in-one controller for unit operation and relative humidity digital display
  - Removes the High Failure rate analog hygrometer
  - Minor change that can be implemented across all ships for commonality
  - Tested on DDG 111 and LSD 52
  - Modernizing a 40 year old design

**What is the MRG Dehumidifier?**

- Device that removes humidity from the main reduction gear while the ship is pier side and the gear is not in use.
- Cycle time can vary depending on how long the ship is docked.
- Dehumidifier turns on if relative humidity is above certain level and unit operates to dry inlet air through a desiccant wheel.

**Dehumidifier Air Flow Diagram**

**Technical Manual Update**

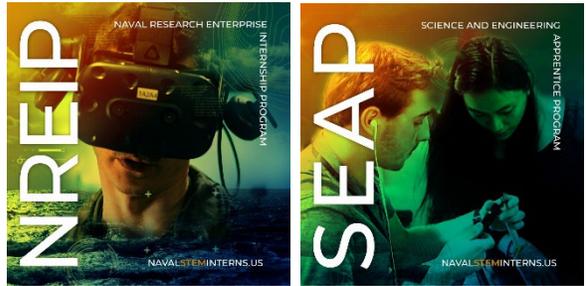
- Logistic updates are required to reflect changes to new dehumidifier controller
- Reviewed existing tech manual and provided redlines for necessary changes
- Updated parts list for APL development and inclusion in tech manual
- Ensured that all figures and diagrams reflected the updated digital controller.



# Links

## ▶ Internships

- ▶ [Naval Research Enterprise Internship Program \(NREIP\)](#)
- ▶ [Science and Engineering Apprenticeship Program \(SEAP\)](#)
- ▶ [Veterans to Energy Careers \(VTEC\)](#)
- ▶ [National Security Innovation Network \(NSIN\) X-Force](#)
- ▶ [DoD College Acquisition Internship Program \(DCAIP\)](#)
- ▶ [DoD Cyber Scholarship Program \(DoD CySP\) - DoD Cyber Exchange](#)
- ▶ [Pathways](#)



Closes Nov 1

Closes Feb 10



Closes Oct 11

Closes Dec 1

## ▶ Scholarships / Fellowships

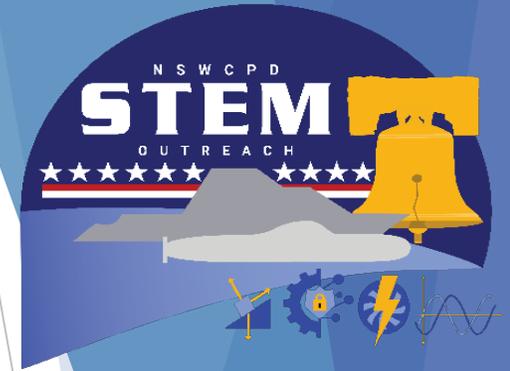
- ▶ [Science, Mathematics, and Research for Transformation \(SMART\)](#)
- ▶ [National Defense Science and Engineering Graduate Fellowship Program \(NDSEG\)](#)



## ▶ Capstones / Research / Projects

- ▶ [National Security Innovation Network \(NSIN\) Capstone](#)
- ▶ [Naval Engineering Education Consortium \(NEEC\)](#)
- ▶ Capstones, co-ops, and other summer hire opportunities: Please contact us directly!

Closes Oct 31



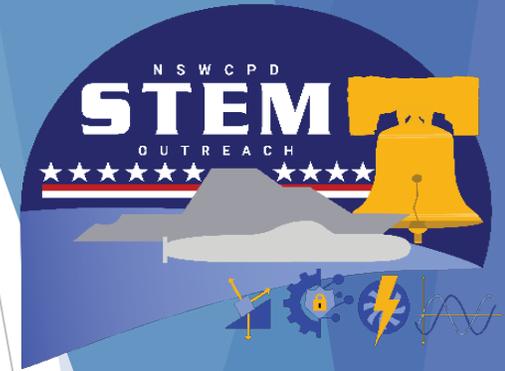
# QUESTIONS

Tristan Wolfe

[tristan.m.wolfe2.civ@us.navy.mil](mailto:tristan.m.wolfe2.civ@us.navy.mil)



# Sample Summer Intern Projects



**HFC 134a high global warming potential replacement refrigerant:** Intern assists with the identification of low global warming potential refrigerants including testing AC chiller components with drop-in replacements, AC plant test site installation, and start-up testing.

**Propulsion shafting alignment training and requirements development:** Intern assists the propulsion shafting team in supporting the research and testing of advanced bearing materials to develop Stribeck curves for different paired materials. Stribeck curves help predict bearing wear and service life. The intern also assists in developing shafting alignment standards and products to support the in-service engineering agents in updating the training class materials and Fleet standards.

**Salinity monitoring system testing:** Intern assists in aspects of mechanical, electrical, and control systems testing related to control panels and other equipment supporting salinity monitoring. Activities include computer programming and cybersecurity as well as hands-on testing & evaluation.

**Research & development in superconductivity:** Intern assists in testing & evaluation activities related to studying the magnetic effects on pneumatic motor operations as well as studying current state of high-temperature superconducting wire performance and cost.

**Machinery plant control and monitoring systems:** Intern assists in new software design and development for shipboard machinery plant control and monitoring systems. Intern uses a combination of virtual machine, java script, visual basic, Arduino, and C programming languages and develops a better understanding of requirements testing.