

Background

The National Renewable Energy Laboratory (NREL) Cybersecurity Center (CRC) research seeks to address today's most critical energy security challenges—like the exponential increase in grid-connected devices, split incentives for robust cyber defense, and control of the technology supply chains that directly impact grid services.

Whether the research involves cyber threat emulation, novel security technology for complex energy systems, site risk analysis, or the development of new cyber-inclusive standards for renewables, NREL researchers are working at the leading edge of cybersecurity for clean energy technologies and highly distributed energy systems.

Project Description

This project aims to extend NREL's Next Generation Cyber Range capabilities by building an easily deployable industrial control system model, complete with hardware in the loop (HIL). This concept of easily deployable models is referred to as a '[Sceptre on a platter](#)' (SOAP) topology because the topology is handed to the user ready to use. Once created, these SOAP topologies are used to test a myriad of different hypotheses like examining cyberattacks on electric systems. This specific project will focus on building a SOAP topology that includes all of the following components:

- Emulation of supervisory control and data acquisition (SCADA) system.
- HIL Siemens Programmable Logic Controllers (PLCs) running S7 Comm *provided by NREL*
- A power system model

The result of this project will be a fully functioning topology that can be deployed quickly and allow NREL or other organizations to model threats and risks to the energy system.

Desired Skillset

A background in any of the following topics would be helpful but is not required: virtualization / containerization, networking, hardware, or industrial control systems.

Team Size

Teams of 2-5 students can be accommodated, with the size of the effort scaled to meet the size of the team.

Internship

Internships are available at the conclusion of the project if students and NREL are both interested in continued collaboration.



Work Location

Most work will be remote. Students will need to come to NREL (located in Golden) to pick up and return provided hardware. Students will meet with NREL researchers via teleconferencing software like Microsoft Teams. An optional visit to the NREL lab is available but not required.

NDA

N/A

Intellectual Property:

The results will be released under GPLv3.0. Hardware used will be returned to NREL.

Contact

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