Contract No:

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Disclaimer:

Collaboration with United States Army Cyber School (USACyS) for Signals Manipulation

U.S. Army Cyber School wants to develop methods and capabilities for bit-level manipulation of electronic and electromagnetic communications. SRNL has expertise in communications and signal processing and would like to expand capabilities to include the unique systems of the US Army. This project will develop SRNL's relationship with Fort Gordon's US Army Cyber School and develop key abilities in cybersecurity. This relationship and skills will advance our ability to meet DOE's demand for enhanced consideration in cybersecurity with respect to our role in evaluating and developing future technologies relevant to energy and energy infrastructure.

Awards and Recognition

Memorandum of Agreement with Fort Gordon US Army Cyber School

Intellectual Property Review

This report has been reviewed by SRNL Legal Counsel for intellectual property considerations and is approved to be publically published in its current form.

SRNL Legal Signature

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Signature **Date**

Collaboration with United States Army Cyber School (USACyS) for Signals Manipulation

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Subcontractor: N/A

Thrust Area: NS

Project Start Date: October 1, 2018
Project End Date: September 30, 20202

Savannah River National Laboratory has been investing into its cybersecurity capabilities over the last few years. Cybersecurity has been a rapidly growing area for the CSRA in general and has included the consolidation of Cyber and Electronic Warfare units at Fort Gordon. This consolidation has been driven by the convergence of cyberwarfare and electronic warfare as the technologies behind both fields unify. This convergence, investment by SRNL into cybersecurity for critical infrastructure, and the desire for collaboration between the Army and SRNL has resulted in an opportunity for SRNL to develop R&D capabilities in electronic warfare that will complement SRNL's cybersecurity efforts. Discussions between SRNL and the U.S. Army Cyber School (USACyS) has identified a general gap in electronic warfare capability in which both entities could contribute to solves.

FY2019 Objectives

- Meet with USACyS and determine methods of collaboration
- Sign a Memorandum of Understanding between SRNL and USACyS
- Procure necessary tools/equipment
- Bench test methods of signal manipulation

Introduction

The CSRA has seen a significant increase in investment into Cybersecurity over the last few years. Fort Gordon has been designated as the location that the Army will be co-locating its Army Cyber School, Operations group, and Electronic Warfare groups. SRNL is in the process of investing into developing capabilities and personnel who can tackle high level R&D projects in cybersecurity. The lab's focus has been industrial control system (ICS) security, which more broadly is part of critical infrastructure. This area is of interest to the Army, as critical infrastructure is important for national defense, but also because electronic warfare techniques are becoming increasingly applicable to cyber-attacks on ICS as these systems become more dependent on advanced electronics and communication systems. The proximity of SRNL and Fort Gordon, and mutual interests in national security, inevitably resulted in dialogue between the two entities.

In FY19 a Memorandum of Understanding was signed between USACyS and SRNL that will pave the way for personnel exchange that will be necessary for future collaborative work. The SRNL team also built up capabilities with software defined radios, refining the skills needed for bit-level manipulation.

Approach

The technical approach for this project began with a series of planning meeting with USACyS to determine personnel appropriate for this project. This transitioned into meetings and tours to discuss the technologies in use and the current gaps in capabilities. An MOU was signed and an internship request was issued to USACyS. Bench-test equipment has been procured with guidance from USACyS. Lab space was also established where testing and evaluation of the hardware can occur.

Simulated industrial control systems developed by SRNL R&DE will be used as a signal generation test bed. Personnel from USACyS will work with the lab team to identify signals of interest and develop a tool for bit-level manipulation of that signal. That tool will then be tested on the simulated systems.

Results/Discussion

The project has contributed heavily toward the signing of an MOU between USACyS and SRNL. The team has been training on the new software defined radios in preparation for the intern from Fort Gordon. This project will be taking advantage of the new ICS simulation capabilities being developed by the R&DE department.

FY2019 Accomplishments

- An MOU has been signed between USACyS and SRNL
    - This LDRD contributed heavily to this accomplishment.
    - The MOU has provisions specifically for collaborative opportunities.
    - USACyS is processing paperwork to have a student or instructor placed at SRNL for the purpose of collaborating on this LDRD.
    - As a result of the MOU signing, SRNL has been invited to exercises and collaborative events supporting Cyber Initiatives.
- Software Defined Radios and Target Equipment have been purchased
- Lab space has been established

Figure 1. A new and fruitful relationship between SRNL and USACyS.

Future Directions

- Development of this initial prototype will open avenues for continued development of the technology and its capabilities. Further funding would be based on DoD interest in developing and supporting this technology.
- Collaboration with USACyS in exercises to demonstrate capability and evaluate equipment.
- Training exchanges.
- Long term research positions from Fort Gordon Cyber Officers.

FY 2019 Publications/Presentations

Several presentations have been given to the Fort Gordon USACyS team and faculty as well as tours of SRNL facilities in the process of developing the MOU and working towards future collaborative opportunities. It was also briefed to the other commands present at Fort Gordon (Futures, Intelligence, Training, and Cyber) as well as in briefs to DHS, NNSA, and other DoD agencies.

References

None

Acronyms

MOU	Memorandum of Agreement
R&DE	Research and Development Engineering
SDR	Software Defined Radio
SOI	Signal of Interest
USACyS	United States Army Cyber School

Intellectual Property

None.

Total Number of Post-Doctoral Researchers

None.

Total Number of Student Researchers

At least one student researcher from the US Army Cyber School expected in FY20.