Study of Cybersecurity Requirements for the Military Robot Operating System (ROS-M) using ROS 2.0 on Unmanned Aerial Networks

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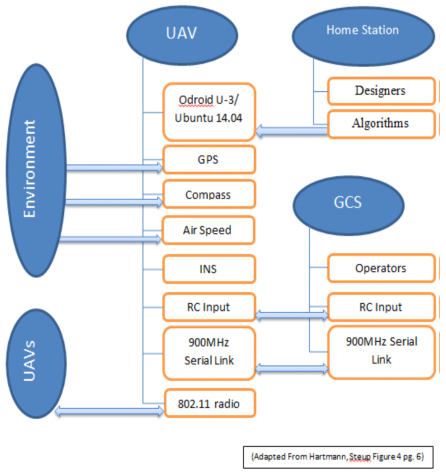

Representation of the UAV architecture and the various vulnerable entry points into the system

How

- 1) Begin with studying ROS-M cybersecurity requirements; Understand ROS-M technical scope, particularly ROS 2.0
- 2) ROS-M Cybersecurity Framework
  - Build PKI on the ROS-M environment using techniques specified by SROS and ROS 2.0
  - Study management of public and private keys for PKI and how to securely disseminate keys among different ROS-M nodes
  - Evaluate the ROS-M PKI via simulations of small UAV networks using the Gazebo simulation platform
  - Evaluate how ROS-M cybersecurity mitigates different threat models

What/Deliverables

- Manage cybersecurity risk such that near term capabilities for systems autonomy can be achieved
- Assessment of the military security standards associated for open source software and determine if such security practices can be implemented for ROS-M using Secure ROS (SROS)/ROS 2.0 as proposed by OSRF
- Study cybersecurity primitives in the ROS-M environment (public key infrastructure (PKI), key management for PKI and securing wireless channel through secure handshake) based on SROS and ROS 2.0
- Analysis of exploitation avenues for ROS-M on small aerial networks
- This is a continuation of work executed in FY17 in which security for the standard ROS 1.0 platform was investigated

Why/Objective

- DoD is seeking to build a military centric ROS
- Implementation of ROS-M and ROS 2.0 is currently in its development phase
- Adoption of one operating framework (ROS-M) would lead to cost savings in program development cycles as well as an increase in reliability and operability
- Ability to securely control ROS-M enabled platforms free from adversarial interference is of the upmost importance.
- The proposed research is operationally relevant and will contribute to relevant thesis study for NPS students
- Cybersecurity is an important research and curricular component at NPS and thus furthers the mission of the school, Navy and DoD.

FY18 Call for Proposals

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