



Calhoun: The NPS Institutional Archive
DSpace Repository

CRUSER (Consortium for Robotics and Unmanned Systems Education and Research) Faculty and Researchers' Publications

2017

Study of Security Primitives for the Robot Operating System (ROS) of UAV Swarms

Thulasiraman, Preetha

Monterey, California: Naval Postgraduate School

<http://hdl.handle.net/10945/58251>

This publication is a work of the U.S. Government as defined in Title 17, United States Code, Section 101. Copyright protection is not available for this work in the United States.

Downloaded from NPS Archive: Calhoun



<http://www.nps.edu/library>

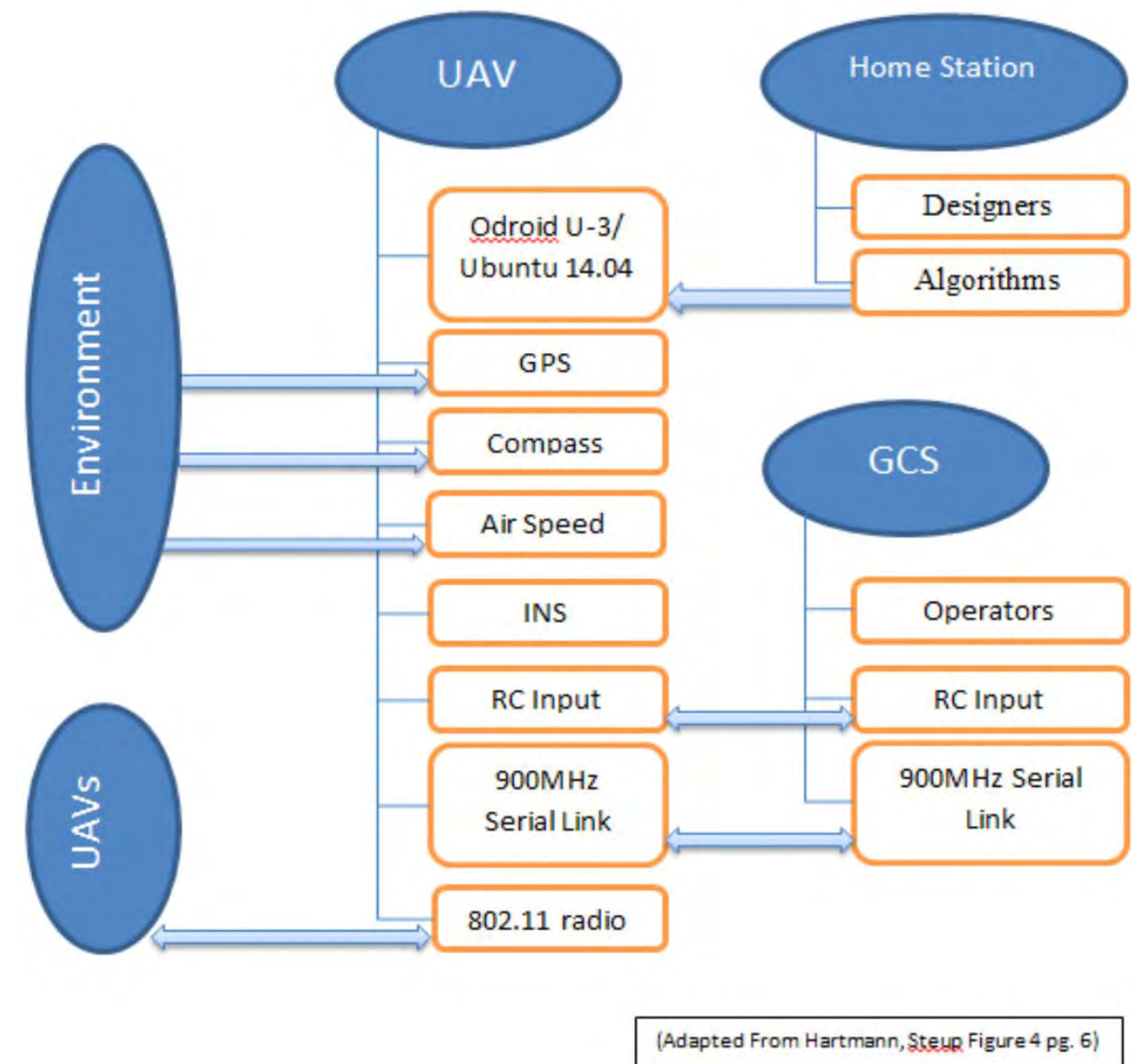
Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

Study of Security Primitives for the Robot Operating System (ROS) of UAV Swarms



Naval
Postgraduate
School



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

- 1) Begin with a comprehensive survey on ROS and its internal dynamics
- 2) Test and experiment with the ROS implementation and management on the Odroid of the UAV
- 3) Implement security primitives in the ROS environment
 - Study the implementation of Message Authentication Codes (MAC) for ROS message authentication
 - Study the implementation of the Advanced Encryption Standard (AES) for dealing with plain text ROS messages
 - Study the impact of security primitives on various threat models, specifically man-in-the-middle (MITM)

- Highlight ROS vulnerabilities and study its use and management in the UAV swarm, including how messages are sent, received, and processed
- Study the implementation of security primitives (authentication, authorization, and encryption) for the ROS used in UAVs
- Quantify the performance change (if any) that these security primitives incur on ROS and the UAV system as a whole
- This is a continuation of work stated in FY16 in which security for the UAV communication link was studied
- We take the baseline security algorithms studied in FY16 and apply them to the other major vulnerability of a UAV-the ROS

- To develop additional security enhancements to the UAV swarm
- To continue to develop a comprehensive security architecture for the UAV swarm
- 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.