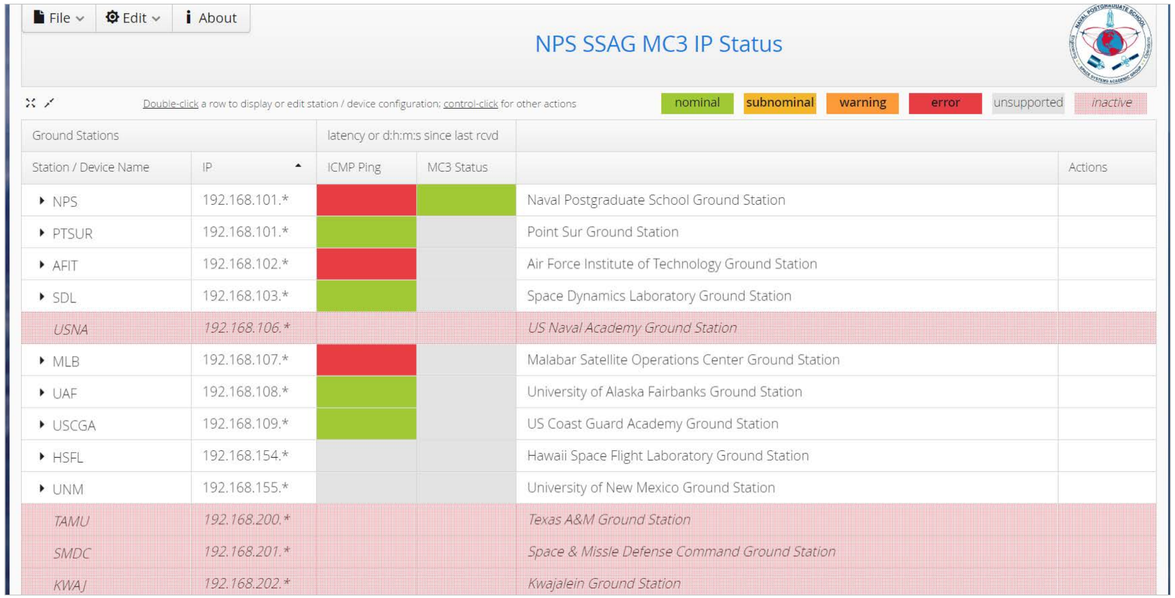
Development of Autonomous Capabilities for MC3 Satellites and Groundstations

CRUSER
Consortium for Robotics and Unmanned Systems Education and Research



Ground Station Network Autonomous Health and Security Monitoring Product (Security beta)

How

- Develop autonomous, optimized satellite commanding and data exfiltration capability and incorporate into baseline pass scheduling for implementation at each ground station.
- Develop a specification of standardized commands and data formats to simplify new satellite automation for generic satellite tasking.
- Identify and procure hardware components for single station testing that can be autonomously controlled, develop drivers for these components, and test for possible future network-wide implementation.
- Collect, organize, and subject to analysis ground station data that contributes to ground station health and security monitoring. Investigate using machine learning algorithms such as NASA's Inductive Monitoring System for applicability.

What / Deliverables

- Programs using scripting language structures for automated, "lights-out" satellite command and control.
- Satellite Python objects capturing the commands and telemetry feedback for PropCube Satellites as a model for standardized satellite command and control.
- Computer and mobile device applications permitting human-in-the-loop monitoring of the autonomous systems from any location;
- Autonomous health and security monitoring programs and applicability for machine learning; and
- Thesis work, Directed Study reports, and other documentation.

Why / Objective

- The number of very small satellites is rapidly proliferating and the ground stations that control them need to be treated as autonomous entities.
- Develop data gathering capabilities for the Mobile CubeSat Command and Control (MC3) ground station and satellite system.
- Look at ground stations as autonomous, remote entities that can be better understood and managed by collecting health and security information. Subject this to Autonomous Health and Security Monitoring using machine learning such as NASA's Inductive Monitoring System (IMS).

NPS PRAESTANTIA PER SCIENTIAM

FY20 Call for Proposals

Jim Newman, Chair and Professor
Space Systems Academic Group
jhnewman@nps.edu

Gio Minelli, Faculty Associate - Research
Space Systems Academic Group
gminelli@nps.edu