

## **Robert Dahlgren**

NCTS# 25415-17 AGU 2016

- NH11B-1726: FrankenRaven: A New Platform for Remote Sensing

Monday, 12 December 2016

08:00 - 12:20

- Moscone South
- - Poster Hall

Small, modular aircraft are an emerging technology with a goal to maximize flexibility and enable multi-mission support. This reports the progress of an unmanned aerial system (UAS) project conducted at the NASA Ames Research Center (ARC) in 2016. This interdisciplinary effort builds upon the success of the 2014 FrankenEye project to apply rapid prototyping techniques to UAS, to develop a variety of platforms to host remote sensing instruments. In 2016, ARC received AeroVironment RQ-11A and RQ-11B Raven UAS from the US Department of the Interior, Office of Aviation Services. These aircraft have electric propulsion, a wingspan of roughly 1.3m, and have demonstrated reliability in challenging environments. The Raven airframe is an ideal foundation to construct more complex aircraft, and student interns using 3D printing were able to graft multiple Raven wings and fuselages into “FrankenRaven” aircraft. Aeronautical analysis shows that the new configuration has enhanced flight time, payload capacity, and distance compared to the original Raven. The FrankenRaven avionics architecture replaces the mil-spec avionics with COTS technology based upon the 3DR Pixhawk PX4 autopilot with a safety multiplexer for failsafe handoff to 2.4 GHz RC control and 915 MHz telemetry. This project demonstrates how design reuse, rapid prototyping, and modular subcomponents can be leveraged into flexible airborne platforms that can host a variety of remote sensing payloads and even multiple payloads. Modularity advances a new paradigm: mass-customization of aircraft around given payload(s). Multi-fuselage designs are currently under development to host a wide variety of payloads including a zenith-pointing spectrometer, a magnetometer, a multi-spectral camera, and a RGB camera. After airworthiness certification, flight readiness review, and test flights are performed at Crows Landing airfield in central California, field data will be taken at Kilauea volcano in Hawaii and other locations.

### **Authors**

- [Robert P. Dahlgren](#)
  - California State University Monterey Bay
- [Matthew M Fladeland](#)
  - NASA Ames Research Ctr
- [Ethan A Pinsker](#)
  - California State University Monterey Bay
- [John P Jasionowicz](#)

- Temple University
- [Lowell L Jones](#)
  - Tuskegee University
- [Corbin D Mosser](#)
  - University of Kentucky
- [Matthew J Pscheid](#)
  - Michigan Technological University