1. Task Overview and Objectives
This is a follow-on IRAD within the Science SmallSat Technology line of business (LOB) to perform integration and testing of the Goddard Modular SmallSat Architecture (GMSA) avionics system. The goals are to complete development of the Command and Data Handling (C&DH), implement Core Flight Executive (cFE) /Core Flight System (cFS) on the C&DH, and integrate the C&DH with the Power Systems Electronics (PSE) in a flatsat configuration. We will also propose the option to complete environmental testing on the PSE and the C&DH boards.

2. Accomplishments
Include the key accomplishments and their impact. List out any significant changes that may have been made to this task since the beginning of the fiscal year. Describe any issues or problems that were encountered.

Key Accomplishments
- Completed the design and assembly of all GMSA hardware
- Completed the SmallSat Common Electronics Board (SCEB) FPGA design such that all of the electrical interfaces that are part of the SCEB and the Adapter Board can be tested.
- Implemented embedded LEON3FT processor core as part of the SCEB FPGA design
- Developed and implemented SCEB diagnostic software needed to test all of the board interfaces.
- Developed a set of cFS apps that have been run on the SCEB as part of flight software implementation.
- Completed orbit simulation test to aid with PSE development
- Completed PSE and battery pack partial EMI test
- Designed and fabricated all harnesses needed for testing the GMSA hardware
- Developed a set of GSE test racks for testing the GMSA hardware
- Implemented ITOS ground support software for testing the GMSA hardware

Significant Changes Made Since The Beginning of FY17
- There was a delay with the completion of board layout and board assembly for both C&DH boards that flowed in the first quarter of FY17. Therefore, additional procurement dollars were needed to complete board layout and board assembly.
- An additional board design was needed to ease the process of testing the C&DH boards. It is called the Breakout Board. Both additional manpower and procurement dollars were required to complete the Breakout Board design, layout, bare board fabrication, board assembly, and part procurement.
- Due to additional time needed to develop the SCEB FPGA design code, diagnostics software, and cFE/cFS the integration of the C&DH and PSE hardware, along with the optional environmental testing will be deferred to the first quarter of FY18.

Issues or Problems Encountered
- Additional manpower and procurement dollar resources had to be requested in the middle of FY17 to complete some of the key C&DH accomplishments

3. Recognition and Papers
Hanson and I submitted a paper to the IEEE Conference in 2018 about our GMSA work. It has been accepted and we will be completing a presentation at that conference.