HADES 2013 Status Report
Month: April

1. Activities of the Team Members:
A. Mechanical: Our team made the decision to incorporate technology from another independent payload we have previous designed and built. For this payload we have a thoroughly tested chamber system designed that uses linear actuators to drive chambers opened and closed to sample the air for microbiology. We are currently in the final stages of building more of these chambers, two of which will be used on the HADES payload. Also the slip ring for the electrical connection between the bottom box and rotational system has arrived.

B. Electrical: From the LAMB II test flight, the entire primary electrical system was lost. However, there are some back-up components (microcontroller, actuators, GPS receiver) that have allowed us to continue testing.

C. Software: Correcting the issue with the flight records being recorded to the SD card.

D. Biology: During the past month, the HADES team prepared for a prototype flight. The goal of this flight was (a) to test the functionality of the payload design and (b) to provide additional measurements for the concentration and nature of cells in the atmosphere.

2. Issues Encountered:
A. Mechanical: The slip ring has slightly higher frictional resistance than anticipated but we determined that the motor should still provide more than enough torque to overcome the initial rotational inertia with increased frictional resistance.

B. Electrical: While preparing the payload during the last flight, it was difficult to get the electronics and batteries to fit into the payload box. It was also difficult to plug in all of the headers, confirm the correct orientation of the headers, and ensure that the headers were not unplugged.

C. Software: Not all flight records are properly logging onto the SD card. This problem has been recently discovered so there has not been any headway with its solution. A new logging subroutine has been created and so the problem exists in this part of the software. While less elegant, the previous flight software properly logged the flight record so we can always result back to that method.

D. Biology: Flight preparations went smoothly. However, the failure to recover the prototype payload eliminated the biological analysis of the samples. Survival experiments will proceed without additional isolates.

3. Milestones Achieved:
A. Mechanical: sixteen mechanical components to be used in the HADES sampling system have been fabricated and are ready to assemble.

B. Electrical: The original design for controlling the actuators was based on controlling eight actuators. The new design only requires the use of four actuators. Therefore a new board has been designed to control these actuators and also control eight temperature sensors. The new design adds a temperature sensor to monitor the temperature of the rotating motor for the HADES design. This board will be capable of plugging directly into the Arduino (a shield) and will address the space limitations/problems with fitting the electronics into the payload box. All of the temperature sensors will be consolidated into a 24 pin ribbon header and the headers for the actuators have been consolidated to a common area on the board. This will simplify the process of preparing the payload for flight as the components will be easier to plug in and should be more secure once in the payload box.

C. Software: All prior problems were solved before prior flight and were recorded in previous report.

D. Biology: An important development in the project has been the use of the HYSPLIT model from NOAA. The model allows the team to create back trajectories of the air masses we intend to sample. This creates the opportunity to make changes to sampling altitudes hours before flight to achieve highly accurate tracking information. This can useful for sampling air masses that originate from land versus sea, East versus West, or tracking surface interactions of air masses.

4. Current Team Members and Advisors:

Name	Year	Demo	Role
Noelle Bryan	Graduate Student	Caucasian	Team Lead, Biology
Scott Burke	Soph.	Caucasian	Mechanical
Meggie Alleman	Sr.	Caucasian	Electrical
David Branch	Jr.	Caucasian	Software
B. Christner	n/a	Caucasian	PI