HADES 2013 Status Report
Month: May 2013

1. Activities of the Team Members:
A. Mechanical:
-Built and assembled Top Hades Box (based on prototype payload design: LAMB)
-Mounted the top box to the swivel (Lazy Susan)
-Made an excel file of all possible crankshaft couplings
-Designed a motor mount in Solidworks
-Created Solidworks models of the motor, slip ring, lazy Susan, top hades box, and
motor mounts and placed these models on the Solidworks model of the HASP plate
-Sketched a bottom box design and listed important considerations
-Worked on a timeline for the HADES project

B. Electrical:
-Designed and populated a shield board for the Arduino that controls the linear
actuators and also has temperature sensors for inflight temperature readings.
-Made flight battery packs. One 12V AAA battery pack for powering the
microcontroller and one 12V AA battery pack for powering the linear actuators.

C. Software:
-Tested software changes. Reworked how flight events are logged so that they are
easily readable for post-flight analysis.

D. Biology:
        During the month of May, we successfully launch and recovered a small
balloon payload. This payload is a prototype for the HADES payload. The purpose
of these flights is to test the functionality of the payload, the ability to maintain an
uncompromised biological sample, and lay the groundwork for data analysis in Fort
Sumner, NM.

2. Issues Encountered:
A. Mechanical:
        The majority of issues encountered were related to design considerations.
Also a hole was drilled approximately one hundredth of an inch off when making
parts for the top HADES box. The drill bit caught the side of the center punch hole,
however this proved to be unnoticeable both by the naked eye and during assembly.

B. Electrical:
        The shield used to control the LAMB actuators and get temperature readings
will have to be slightly modified to integrate with the new GPS/logging shield
created by Brad Ellison. The same components will be used, but they will have to be
reconfigured on the board.
        It is possible that the linear actuator did not produce the same amount of
force in a cold environment as it does at room temperature. This issue will have to
be explored further.

C. Software:

During LAMB III flight, all software functions performed as expected. However, the GPS receiver is still receiving VTG (used for determining heading) and the software is not written to parse this information, so it brings back an error. Will have to configure the new GPS to only receive GGA (used for altitude readings) strings.

The North chamber doors did not open during the LAMB III flight due to mechanical design. The log file from the flight shows multiple attempts at opening these chambers. Software needs to be written so that LAMB attempts to open the doors for longer events.

D. Biology:

During the flight, one of the sampling chambers failed to open properly. This prevents the calculation of cells m^{-3}, as we cannot determine the volume of air sampled by this chamber. Fortunately, the second chamber opened and closed as planned. We can now calculate the volume of air sampled by the second chamber. This will enable us to determine the concentration of microorganisms collected from the flight.

3. Milestones Achieved:
A. Mechanical:
-Assembled the HADES top box
-Mounted the HADES top box to the lazy Susan

B. Electrical:
The new LAMB shield worked great during the LAMB III flight. Will continue to use this shield after small modifications are made.

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

D. Biology:

We have the first successful sample collection at a target altitude using the HADES prototype payload. Analysis is currently underway to determine the total number of bacterial cells collected. We are also attempting to recover viable organisms in the lab. Any isolated cultures will be identified using 16S sequence analysis.

4. Current Team Members and Advisors:

Name	Year	Demo	Role
Noelle Bryan	Graduate Student	Caucasian	Team Lead, Biology

Scott Burke	Junior	Caucasian	Mechanical
David Branch	Junior	Caucasian	Software
B. Christner			PI