

HADES 2013 Status Report
Month: March 2013

1. Activities of the Team Members:

A. Mechanical

DC motor has arrived and was bench tested. An experimentally estimated value of 0.035 lbf*in was determined for the startup torque required for the motor. (This value is really small and the motor will have no problem with it) The motor will be cold/vacuum tested tomorrow.

B. Electrical

- Took UV measurements outside at local noon.
- Used Graphical Analysis and Excel to find equations for the UV viewing angle graphs.
- Calculated the angular sensitivity throughout flight using the relative azimuth and relative elevation.
- Attempted to correct the UV data using the angular sensitivity.
- Recorded shadow times from a 30 minute segment of the flight video.

The temperature sensors were meant to be pre-calibrated from the factory, however when we got them in, each sensor produced a different temperature when tested. Temperature sensors were calibrated and now work fine, however calibration will need to occur for each sensor.

C. Software:

While investigating the system reboot. became aware that the software was not reading back the proper checksum value from the GSP. We know that the values from the serial fed GPS strings are correct so there was some sort of calculation error in the software. Without the system correctly confirming the information it is receiving, system failure will occur. This problem is now fixed and all previous problems seem to be solved.

D. Biology:

Preparations are being made to start the survival trials to simulate stratospheric environmental conditions. Lab strains and other atmospheric have been selected for these experiments. We are currently attempting to recover DNA from the rods.

2. Issues Encountered:

A. Mechanical:

None besides some motor retailers being slow to respond or unhelpful about their gear box product information. Also the slip ring is ordered but has a 10 day lead time.

B. Electrical

Corrected UV data does not look corrected.

C. Software:

D. Biology:

Previous years attempts to recover culturable organisms have been unsuccessful. We may need to expand our culturing conditions (media, temperature, oxygen concentration). Due to the low cell concentrations on each rod, the DNA was not PCR amplifiable. There may be a way to combine samples to achieve a signal.

3. Milestones Achieved:

A. Mechanical:

Motor functions with correct angular velocity on the bench. Estimated startup torque required was determined.

B. Electrical:

Built a new board to interface H-bridge board and temperature sensors with the Arduino microcontroller.

Built two (2) new battery packs. Will need more battery packs for flight.

Seven (7) temperature sensors have been added to the payload design. These sensors will be located as follows:

One (1) temperature sensor on each of the linear actuator's motor casing. This accounts for four (4) sensors. This will allow us to monitor any increase in temperature due to motor loads.

One (1) temperature sensor between Arduino microcontroller and the GPS shield. Used to monitor any heat created by processing load.

One (1) temperature sensor in the interior of the payload. Used to monitor overall temperature of electrical components during flight.

One (1) temperature sensor located on the exterior of the payload to monitor exterior temperature during flight.

C. Software:

System reboot has been solved. The problem occurred due to the microcontroller not accessing the buffer at the beginning of the string. Addressed the problem by being more explicit about where the buffer is accessed.

The system now properly calculates the checksum received from the GPS. This problem was discovered thanks to the GPS simulator. Addressed problem by being more explicit with how the software reads the GPS string and how the information is saved and calculated.

Temperature sensors are now integrated with software. Reads all sensors when GPS receives "x" number of good strings or when the actuators are being used.

D. Biology: DNA extraction techniques are going to be applied to the next sampling mission.

4. Current Team Members and Advisors:

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