Monthly Status Report - January
ASTRO Payload
Friday, 25 January 2013

Current Team Members and Leaders:

- Jessica Sandoval (Sophomore, Biological Engineering Major, Team Leader)
- Steven Gordon (Junior, AeroAstro Major)
- Devon Sklair (Sophomore, AeroAstro Major)
- Jeremy Kaplan (Sophomore, Computer Science Major)
- Christopher Carr (Research Scientist, Facilitating Mentor)

Currently, the team is on break until Monday, January 28. On Monday, we will be regrouping for one of our biweekly meetings during which assignments will be allocated to the respective individuals.

Funding Update:

Since ASTRO is in its first year, we are currently in the process of soliciting for funding in order to help pay for prototype construction, materials acquisition, and travel. We are in the process of finishing a draft of our financial budget for our projected expenses for the pre and post flight periods. Additionally, we are finishing our presentation in preparation for our multiple MIT academic department solicitations upon the completion of our financial budget.

Design/Build Updates:

We are modifying our Solid Works design in order to incorporate the HASP interface integration (ie by constructing the student platform within SWX). This design is complete with fasteners and all given values from the HASP webpage. Additionally, we have been working towards finishing our electrostatic precipitator's SolidWorks design by adding in such items as connectors (microfluidic tubing, fasteners) and creating accurate solenoid valves. The goal of this SolidWorks design is to have a concise sketch off of which it is will be easy to obtain values for machining and prototyping purposes. We have input most of the known part materials and will therefore be able to run thermal and stress analysis before moving onto prototyping. These tests will serve as a conceptual checking step. Also, we have received and reviewed the ASTRO Proposal Status Report and are also making modifications to our Solid Works schematic accordingly. Our objective is to have the SolidWorks updated within the next few days, in order to move forward with prototyping.

In regards to prototyping, one of the tasks of the mechanical build team (composed of Steven Gordon, Devon Sklair, and Jessica Sandoval) is to test various partial pressures exerted on the microfluidic tubes. To generate various pressures we will use a highly accurate syringe pump to generate a known air volume displacement. Pressure measurements at several large volume displacements will be used to determine the system volume, then this system volume can be used to determine small volume displacements to provide low (mbar) pressures. These

small volume displacements will still be large in comparison to the dead volume of the system so that "sample collection" will not substantially impact the applied pressure. Within the coming two weeks, we aim to also research and perform tests given various electrode types in order to measure conductivity, resistance, etc.

In regards to the computer programming aspect of the project, Jeremy Kaplan is currently creating a break down of the various functions and commands he will need to code in order to perform the following functions associated with spore collection: opening and closing of a panel to allow air flow through the collection funnel, precise, controlled release of ethanol using microdispenser from LeeCo, controlled opening of the two way Micro Inert Valves (MIV), the use of a pressure sensor in order regulate sampling over an integral amount of time, and the controlled use of a plunger in order to help drive our droplet from the collection well to the microfluidic chip. Due to the rather large list of action items, we are looking for one more student programmer to collaborate and work with Jeremy.

Currently, our primary challenge is creating/designing a high quality power circuit schematic due to the loss of our electrical engineer. Therefore, we are holding an informational meeting on Friday, January 25, in hopes of gaining one to two more members for the team, a student with a strong electrical engineering background and potentially a student with a strong computer science background.

Summary:

Our next steps are to address the comments of the HASP Payload Summary, finalize our SolidWorks design, perform fluid and thermal analysis of our product, mechanically test out various concepts (such as the creation of partial pressures within the system, electrode efficiency and copper plate conductivity), finish the computer programming breakdown of various functions, finalize the budget, fundraise, and recruit one to two more individuals for the team. Even though the to-do list is long, the individuals on the team are dedicated and will give this project much attention and effort in order to ensure timely completion.