



Scarlet Hawk II-HASP 2014

January Status Update

1/31/2014

Summary of Progress

The team has been steadily working on the set goals since the submission of the Scarlet Hawk II conceptual design in December. Each subgroup has been supplied with the components and resources needed for their full operability. Most of the electrical components have been ordered or are available to the team. The subgroups are mainly focused on adding more detail to the preliminary design and all the subsystems have started the prototyping phase. The input recently provided by the reviewers has been of great help for the team and are being analyzed. All the orders and spending related to the Microorganism Stratospheric Exposure have been frozen while further evaluation of the reviewers' comments is underway.

Upcoming Deadlines

February 7th:

- Preliminary design of the code for each subsystem

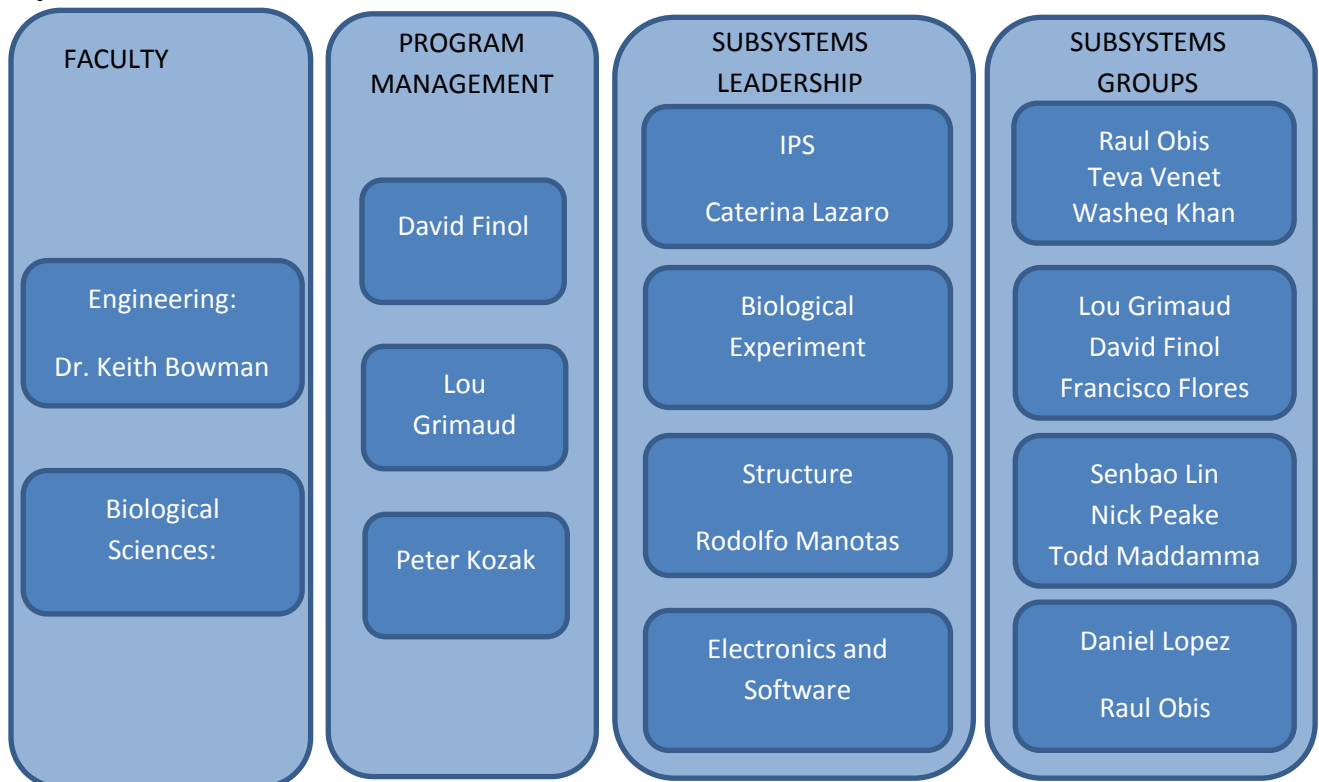
February 21st:

- Maximum Power Point Tracker building
- Main Aluminum Frame building

February 28th:

- Internal Holding mechanism building
- PCB manufacturing for each subsystem

Updated Team Structure



Electronics and Software (ES)

The electronic part or the circuit design part was kick-started by selecting the right software and tools that will be of use. The machinery and the components required for the project were keenly looked upon. We decided to use the software DipTrace for the PCB manufacturing. It not only helps us for easy designing of the PCB layout from the schematics, but it is also easy to export and adapt to various types of CMC machines. We have now gotten acquainted with DipTrace and we are preparing the CMC for the PCB production. The process will be initially tested using a small and simple design (e.g. LED blinking) so as to be sure of its functionality and accuracy. All the preparations are being made to have the setup ready for testing 5 days after the submission of this report.

Apart from the hardware implementation part, we were also keeping track of the components that are to be used in the IPS. The components that were presented in the project proposal are being looked for in the market, carefully taking into account how they perform in the expected space-like conditions. The ES team is perfectly on schedule and the progress of the project also has been steady during the last month.

Independent Power System (IPS)

The team has been mainly working on a prototype for the solar panels. The soldering method for the cells is being tested and is currently under analysis as soft soldering may be a source of problems due to the expected changes in temperature and pressure during the flight. The most efficient way of cutting the cells-considering the available resources for the team-is also being tested as brittleness has demonstrated to be a challenging factor when adjusting the cells to the required size.

It is then possible to confirm that the IPS team is following the schedule stated in the conceptual design of the payload. The team is now focused on getting the experimental performance of the solar panels as close as possible to the maximum theoretical performance. The team will also be starting the building of a prototype of the Maximum Power Point Tracker in the upcoming weeks.

Microorganism Stratospheric Exposure (MSE)

The team has found a possible supplier for the *D. radiodurans* and is working on the details for its acquisition in the upcoming months. On the engineering part of the biology experiment, we have focused on improving the design of the container. The main concerns have been manufacturing and weight reduction. The design will be modular in order to accommodate for possible changes in the configuration of the bacteria test tubes. Each individual module will

contain a row of 7 tubes and will be made out of $\frac{3}{4}$ by $1\frac{1}{4}$ inches aluminum bar, readily available for purchase. The insulating box material has not been chosen yet. It will mainly depend on the available dimensions, and particularly the thickness.

The building of the external structure has been postponed due to delays in the shipping of the aluminum and campus closing because of weather conditions. The team is also trying to minimize weight and the building of the external structure will be back on track this February. Further weight reduction measures will be taken on the heated tube holder. This part is one of the heaviest on our payload and getting it lighter would greatly increase our margins for the rest of the systems. The next step will be finalizing the design and ordering the rest of the materials needed. We will be waiting on the definitive approval of the biology experiment by HASP reviewers before committing to an order.

Structure

During the past few weeks, the structure team has been focused on obtaining the proper materials for the construction of the structure, planning and laying out the construction process. Different construction techniques are being considered; these are being studied closely by visiting the machine shops at the university and discussing the project and its goals with experts in machining. Several members of the group have acquired certification for the use of machine shop tools in the past few days. An optimization process for the aluminum frame is underway with the aim of reducing weight.