



SCARLET HAWK I – HASP 2013

**March Status Update
03/29/13**

INTRODUCTION

Summary of progress

During the past month the IIT HASP team has completed the detailed design of the payload electronics and structure. Overall, the coding for the microcomputers is approximately 80% complete. The previous months revised deadlines were met and the additional time was used to streamline the printed circuit board (PCB) designs. Some delays were caused by last minute changes to the integrated payload subsystems electronics and the addition of minor electronics components. Early April will be spent completing the construction of the SCARLET HAWK I payload and the remainder of the month will be spent conducting testing and completion of the Preliminary Specification and Integration Plan (PSIP).

Upcoming deadlines

- April 2: Integrated Payload Software Ready for Testing
- April 9: Payload Construction Complete
- April 16: Complete In-House Environmental Testing and Calibration
- April 19: Preliminary Specification and Integration Plan (PSIP) Due
- April 25: Integrated Payload Software

Updated Team Structure

Project Manager: Peter Kozak

Faculty Adviser: Keith Bowman

GPS & Comm.

Aniruddha Katre (Subgroup Leader), Raisa Vitto, Lou Grimaud, Collin Rutenbar

Electronics and Sensing

Shalmik Borate (Subgroup Leader), Peter Kozak, Raisa Vitto

Image Processing

David Finol (Subgroup Leader), Rodolfo Manotas, Corey Page, Collin Rutenbar, Abdulrhman Arnaout

Structure

Miguel Javier (Subgroup Leader), Manpreet Singh

GPS AND COMMUNICATION

In order to complete the PCB design, a comprehensive system was developed to allow the main payload onboard computer to autonomously turn on/off each payload subsystem. A combination of high efficiency DC/DC converters and MOSFET transistors will be used to switch between Sensor and Camera Modes, ensuring that the peak current draw for the whole payload is kept below 500mA. A communications hierarchy was developed in so that the main Arduino microcomputer can receive serial commands from HASP, transmit sensor and GPS data, and receive image data from the second Arduino computer then transmit the data to HASP.

SENSING AND GENERAL ELECTRONICS

Most of March was devoted to designing and redesigning the PCB designs. At this point, the boards have been ordered and a complete electronics package is expected to be built by the end of this week, ready for environmental and operational testing. For the first time during this project, the IIT HAB team encountered some serious delays with the PCB design due to last minute changes to the payload subsystem integration plan as well as the addition of some minor components. These delays were mitigated by the aggressive schedule the team adopted, which likely allow the team to keep on schedule in the future. As a result of this delay, the group has concluded that future projects include a electronics design freeze date, with the development of PCB design set earlier in the project schedule.

IMAGE CAPTURE AND PROCESSING

SCARLET HAWK I will use an Arduino Due instead of a Mega for control of the cameras and handling of the image data due to the Due's larger internal memory. Since the Due and the Mega use 3.3V and 5V signals for digital commands, respectively, level converters were included in the subsystem integration system in order to prevent burnout of one of the onboard computers. The Reed-Soloman algorithm has been implemented on the camera Arduino and is currently being improved using telemetry data provided by the HASP communication team. We now expect that occasional serial commands (expected to be <1/hr) will be sent to SCARLET HAWK I which will adjust the Reed-Soloman parameters in the event that there is unexpected corruption of the image data.

STRUCTURE

The structure components are currently being machined by the IIT HAB structure team using the IIT Idea Shop. We expect to have a completed structure in two weeks.

QUESTIONS FOR HASP COORDINATORS

- In the event that a given serial/EDAC connection will not be connected to the payload, what is the standard practice for how should these connections be handled? At this point, we plan to solder them onto isolated leads on our PCB. Is that acceptable?
- We have noticed that there are multiple 30V and ground connections on the EDAC. Are these connected to one another? If so, is it alright to have multiple 30V connections sharing a common node?