SCARLET HAWK I – HASP 2013

January Status Update
01/25/13

INTRODUCTION

Summary of progress

Following the acceptance of the SCARLET HAWK I payload proposal, the IIT HASP team has moved from the conceptual design stage to more detailed preliminary design. For most of the last two weeks of January, the team has been busy working on prototyping and testing each subsystem. Most of the electrical components and sensors are now available for use and the remainder have been ordered and shipped. The HASP Payload Summary provided some incredibly useful insights into potential problems and deficiencies in the conceptual payload design which the team has used to design payload subsystems.

Upcoming deadlines

- February 7: All sensor subsystems should be prototyped so that work may begin on subsystem integration and detailed design of the complete payload.
- February 15: Response will be delivered that addresses payload design issues and deficiencies listed in the HASP Payload Summary.

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, Jesus Garcia

Image Processing

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

Structure

Miguel Javier (Subgroup Leader), Manpreet Singh, Josh German

GPS AND COMMUNICATION

The Copernicus II GPS receiver was tested and code was written to collect and store data using an Arduino Mega. Two codes were developed to retrieve sensor data and GPS measurements simultaneously or separately with desired sampling rates then stored or fed directly into algorithm to compute the Tropospheric error. The two alternative codes will allow GPS data to be sent as it is received by the Arduino or allow the string to be coupled with sensor data outputs before being uplinked. Later, a determination will be made as to which data handling procedure is most efficient.

SENSING AND GENERAL ELECTRONICS

The SHT21 digital humidity and temperature sensor as well as two Omega pressure transducers were tested using an Arduino Mega and shown to be accurate within the documented limits. A testing schedule is in development to find accurate correlation curves for all sensors at temperatures below -40C. A Figaro TGS 2600 gas sensor was chosen to measure methane and carbon dioxide concentrations due to its well document use in high altitude applications. A literature search was begun to investigate which high efficiency DC/DC converters would be optimal for the mission.

IMAGE CAPTURE AND PROCESSING

A LinkSprite JPEG color camera was chosen for image capturing and command protocol was developed for taking a picture and storing the file on an SD card. The command protocol that was developed will allow the team to change the baud rate, image size and compression ratio using parameterized values in order to minimize uplink time to within acceptable limits. After some investigation, it was determined that files may be transmitted in binary or hexidecimal format. A preliminary procedure for repairing files with missing information was designed, using multiple transmissions of a file to ensure that information that is lost in one file is likely to be contained in another.

STRUCTURE

Detailed design of the payload structure, including integration mechanisms, began this month. A mock payloads were built to demonstrate different methods of securing electronics using shelving units. A preliminary weight analysis was begun so that an estimate of the total payload weight can be provided with confidence in time for the February 15 deadline.

QUESTIONS FOR HASP COORDINATORS

- Can holes be cut into the base-plate?

- How will (on/off) commands be sent from our team?

- How should we format the Payload Summary response due on February 15? Should we simply add to the previous HASP payload proposal or should each issue be addressed directly?