SCARLET HAWK I – HASP 2013

September Status Update
09/27/13

INTRODUCTION

Summary of progress

The 2013 HASP launch took place on September 2nd, taking SCARLET HAWK I to 133,000 feet in altitude to complete its mission. Following the mission, IIT's payload was returned two weeks after the launch and recovery. The IIT team was able to open up the payload and extract additional data. The remainder of this month has been spent doing preliminary data analysis and investigating failure points.

This month, AIAA-IIT will continue to analyze our data and prepare a rough draft for the science / flight report that is due in December. Additionally, AIAA-IIT will be taking advantage of the beginning of the school year to recruit new members to the high altitude ballooning team and begin conceptual design for a 2014 HASP payload.

Upcoming deadlines

- November 1: Completion of Science Report Rough Draft
- December 13: Science Report Due

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

Preliminary Flight Report

During ascent, SCARLET HAWK I operated in sensor mode, collecting temperature, humidity, pressure, and gas sensor data then uplinking the data to be read on the HASP website. For the majority of ascent, all sensors behaved normally with the exception of the temperature/humidity sensor, which required that the payload be restarted after the first hour of the flight. As a result, AIAA-IIT should have a clear data set for a wide range of altitudes which will be necessary in order to complete our investigations into GPS tropospheric error an hydrocarbon-water interactions in the atmosphere.

Once the payload reached float altitude, the camera mission began and a problem was detected immediately. The cameras seemed to be taking pictures and saving the images, but the Arduino Due in charge of image handling was unable to transmit the images to the main flight computer. As soon as a problem was identified, the team followed the failure checklist included in the FLOP, rebooting the payload, switching back to camera mode, and commanding the payload to take and transmit images manually. The team was able to show that the main hardware components were functioning by monitoring the current draw and verifying that the levels were normal. Currently, the team believes that this issue was caused by the failure of a level-converter that is required to transmit information between the Arduino Due (which relies on 3V for serial communication) and the main flight computer (which relies on 5V). More diagnostics will be required to confirm this, but the team is already working on mitigating this potential risk in the future by ensuring that one voltage level is used for all major serial communications in the future. Furthermore, additional tests will need to be done on the ground to validate the Reed-Solomon algorithm for use on future HASP flights, since this could not be done during the flight.

Fortunately, the team was correct in their conclusion that all major components required for the image capture mission were functioning normally throughout the flight. Even though images could not be transmitted and uploaded to the HASP website during flight, the images were instead recovered from the SD memory once SCARLET HAWK I had been returned to IIT. At float, SCARLET HAWK I was able to take some spectacular pictures of the horizon and terrain below. There are also images taken at dusk that show a bright object above the western horizon, which AIAA-IIT believes to be Venus. Below are a couple photgraphs taken by SCARLET HAWK I during the flight: