May 29, 2015

To: Dr. T. Gregory Guzik - HASP Project Director
From: Josiah DeLange – Team Lead
RE: HASP Monthly Status Report

1. Activities

Completed board layout of the high-voltage power supply. Sourced mu metal shielding to reduce the effects of a transformer-induced magnetic field on the analog detector front end. A bill of materials is near completed, will be able to order parts and begin assembly in less than a week. For lab tests requiring the detector front-end, a breadboard model is available to bias the avalanche photodiodes.

Completed board layout and design checks for the front-end preprocessor board. Sent off design files for board fabrication and assembly to Advanced Circuits, and hope to get the board back in less than 1 week.

Prototyped ATmega2560 microcontroller with the front-end electronics. The firmware on the ATmega2560 will be implemented onto the front-end preprocessor board, along with similar firmware on an ATmega32u4, which will handle ISA bus-driven interrupts, data buffering, and I/O bus transactions with the single-board computer.

Continued testing and development with the VL-EPM-16 single board computer. Interrupt handling and I/O modules are being developed.

Set up a Github repository (www.github.com/HASP-UMN/2015) for the flight code, EAGLE files for our hardware, and results of any subsystem tests.

2. Issues Encountered

The payload's GNSS receiver, an OEMStar from NovAtel, communicates via UART serial protocol and USB 2.0 protocol. Our PCB layout accounted for only USB 2.0 communication with the payload's single-board computer, which in Linux is not officially supported by NovAtel. To mitigate this, an FTDI-based USB to UART breakout board was purchased and implemented onto the GPS/IMU board. The new setup is currently being tested with the updated flight code.

Shielding the high-voltage bias supply proved to be a challenge due to the amount of components packed onto the board (leaving little room for a magnetic shield). Mu-metal is the best choice, and the best layout is being investigated. The primary sources of electromagnetic oscillations are two 10:1 transformers, located on the same side of the board. Shielding may be able to be done with one piece of mu-metal provided it is properly grounded and attached. This may also be able to cover close-by switching transistors.

3. Milestones Achieved

None.

4. Current Student Team

Name	Gender	Ethnicity	Race	Student Status	Responsibilities
Josiah DeLange	M	Non-hispanic	Caucasian	Undergraduate Senior	Team lead, detector system, flight computer
Aron Lindell	M	Non-hispanic	Caucasian	Undergraduate Senior	Flight software, physics directed research – photon simulations
Charles Denis	M	Non-hispanic	Caucasian	Undergraduate Senior	Flight software, circuit verification
Luke Granlund	M	Non-hispanic	Caucasian	Undergraduate Junior	Flight software, hardware interfacing
Zicheng Li	M	Non-hispanic	Caucasian	Undergraduate Junior	Flight software and optical prep