MSU RTC Team
March 30, 2012
MSU – Payload 04

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LSU HASP Program

Re: Monthly Status Report – March 2012

The MSU RTC HASP team focused work in three main areas in March – FPGA circuit design and parts selection, control FPGA architecture, and payload thermal analysis. The FPGAs selected are Xilinx Spartan6 and Virtex6 devices. The control FPGA architecture, which is the primary system component in monitoring the radiation sensors and controlling the payload, was finalized. Thermal analysis focused on conditions during the float at altitude to further our understanding of expected conditions inside the payload. In March, team members performed the following work:

Justin Hogan – Justin continued work on the FPGA CCA and power supply CCA architectures. FPGA part selection for the main and control FPGA was completed. The control FPGA will be a Xilinx Spartan 6, and the main FPGA will be a Xilinx Virtex 6. The circuit design and PCB layout is underway. Justin attended radiation sensor testing at the cyclotron facility.

Raymond Weber – Raymond finalized the control FPGA architecture and is awaiting FPGA CCA completion to begin testing. Ray processed the data acquired during radiation sensor testing and produced the attached visualizations (Figure 2) depicting sensor response in the ~25 MeV ion beam.

Todd Buerkle – Todd performed cyclotron testing of the radiation sensors in mid-March. These tests yielded relevant results including demonstration of sensor performance, and estimates of sensor power draw for low flux rate. Results of both radiation and pulsed-laser tests indicated single-strike current draw for the radiation sensors will be very low (<1mA).

Jennifer Hane – Jennifer continued working on an "agnostic tile" system, which allows reconfigurable FPGA tiles to assume varying functionality based on current system needs. She also attended radiation testing at the cyclotron facility.

Lizi Clem – Lizi finalized materials and parts selection for enclosure construction and mounting, and updated the payload drawings to include more enclosure design and mounting details (figure 1). She continued work on thermal analysis including finalization of thermal calculations during ascent and float, and research of heat pipe solutions to dissipate heat if deemed necessary.

Adrien Lambert – No tasks currently assigned.

Issues encountered during payload design and development

No major issues were encountered during this month of work. The results of thermal analysis indicate a +125 ˚C internal payload temperature during float phase. Design adjustments including enclosure material and insulation thickness may be made to reduce the internal temperature. We don't consider this a serious issue at this point and are confident that design modifications will enable adequate heat dissipation.

Milestones Achieved

- Radiation sensors tested at cyclotron facility, demonstrated functionality, more testing to come in mid-April.
- FPGA selection complete and PCB design underway
- Control FPGA architecture finalized, awaiting PCB for testing
- Power supply PCB design underway

Current team members and leaders

- No change to team members.

Images

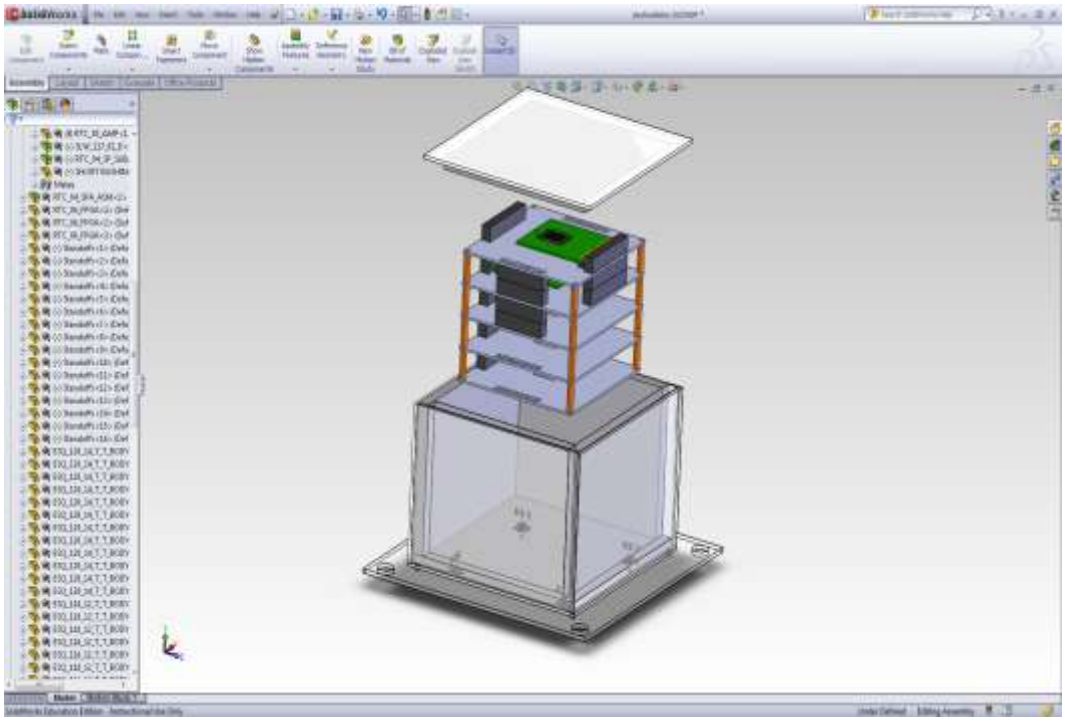

Figure 1: More detailed stack/enclosure drawing.

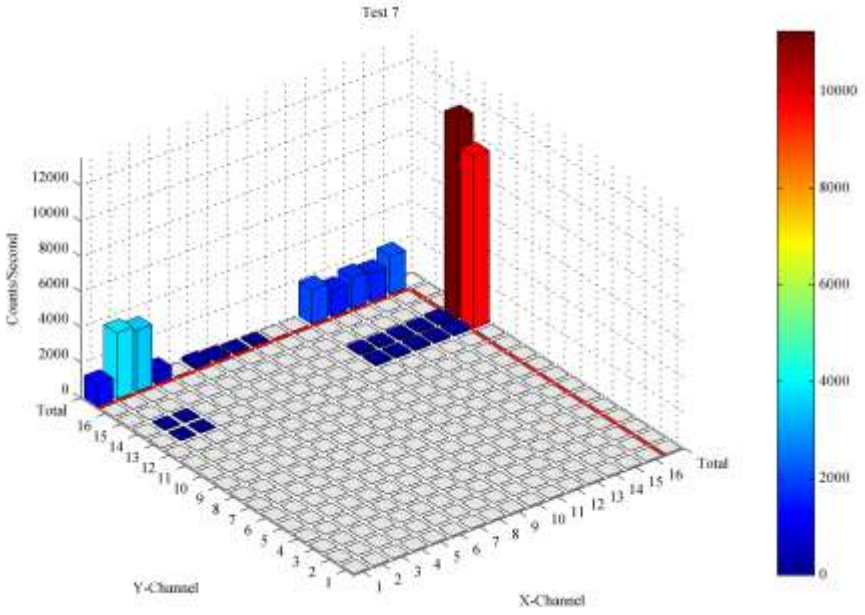

Figure 2: Example radiation sensor data. Beam location in upper left corner. Right-side response is due to charge diffusion in sensor. Diffusion will be eliminated by applying a bias voltage to the sensor and adjusting channel gains.