

**ARIES-GPS Payload**  
**Inter-American University of Puerto Rico Bayamon Campus**  
**March 2012 monthly report**

I. Activities of the team members

We will describe the activities that the members of the ARIES-GPS Payload are working at this point of the project.

**Electronic system**

- In the last month we were working to build from scratch the DC/DC converter. Sadly the time is upon us and we decided to buy the converter from a company. Several tests were made to see the efficiency of the converters (because more than one was purchased). The best result was a 90.9% of efficiency, which fulfill the efficiency constraint that we had. Right now our focus is to finish the layout for the board that will contain the components of the power conversions. We're hoping to finish the layout design and fabrication for the next week, having April 13 (the second week of the month) as the deadline for the layout. In addition in order to make the Novatel OEMV-1DF GPS receiver meet the CubeSat specification an adapter board with the PC/104 expansion bus was selected to mount it. The adapter board is the MBS-GPS-OEMV1-104, this adapter board is developed by Microbee- System specifically for the Novatel GPS receivers OEMV family.

**Software**

- During the last month we developed different softwares for the ARIES GPS Payload. The software for the GPS receiver that will determine the payload localization and timing was completed. In addition the software for the SD card to store the data acquired by the payload during the flight also was created. Moreover the software for the payload's temperature sensors also was developed. By other way some changes were done to the flight computer, previously in our design we had a microcontroller DSpic 33 as flight computer. In order that our payload meet the CubeSat standard PC104 we decide change our flight computer to the board TS-7260. The TS-7260 is a compact full-featured single board computer (SBC) based upon the Cirrus EP9302 ARM9 CPU. The EP9302 features an advanced 200MHz ARM920T processor design with a memory management unit (MMU) that allows support for high level operating system such as Linux, Windows CE, and other. As general propose processor, it provides a standard set of peripherals on board and full set of Technologic System feature peripherals via the standard PC/104 format.

**Mechanical**

- In the month of March we made some changes to the board arrangements in the payload. We replaced two boards in the structure, the flight computer and the GPS adapter board. We are working on the computer-aided design (CAD) for these new boards. In addition

we are going to start the manufacturing process very soon. We already order the materials so we can make a simple mock-up for testing purpose.

## **System Engineer**

- This month we start to review the documents for the upcoming deadline (PSIP) April 20. Also we work with the CASES GPS receiver provider to reduce its power consumption. The selected computer is SBC-FITPC2i with the Intel Atom Z550 2.0 GHz CPU and 2GB of DDR2 RAM. The fit-PC2i has a high speed 300GB solid state drive for storing the raw data from the balloon flight. The unnecessary functionality on this board were disable to reduce its power consumption to fit the HASP power budget. Then the system was tested for over 24 hours the end-to-end system to ensure continuous gap-free data acquisition from the RF front end board for the duration of the flight.

## II. Issues Encountered During Payload Design

- Using the single board computer ( SBC) with a low power consumption imply to properly setup the real time application interface ( RTAI) into the stock Linux kernel, since a full Linux operating system will consume too much power.

## III. Milestones Achieved

At the time of the projects this are the milestone that we have achieved.

- Final payload board layout.
- GPS positioning and timing operation.
- Digital temperature sensors (DS18B20) implementation.
- Created the register and store system for the payload generated data.

## IV. Current Team Members and Leaders

