ARIES-GPS Payload
Inter-American University of Puerto Rico Bayamon Campus
June 2013 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.

- **Electrical system**
  - During the month we run several test to the electrical boards to see systems performance and power consumption. The electrical boards currently developed are being constantly checked to avoid any electrical peak current over the limits imposed by the HASP.
  - In addition we build the back-up boards for the mission. In case of failure it is indispensable to count with a systems of back-up boards to guarantee a success mission performance in Palestine. The prototypes boards are being also tested under the same conditions that those selected for flight operations, constantly watch out for undesired electrical peaks currents.
- **Mechanical system**
  - During the month of June 2013, the design of the outer case had to be partially re-designed. Some simulations were ran as required to ensure the structure could withstand 10g's vertically, 5g's horizontally and the equivalent of 5g's in shear (torque). Since exact weight of the total payload was not determined yet (not all the parts have been received) we ran the simulations under critical mass conditions (3kg). All of the results were positive and way under the yield strength of the material. The total outer structure including the base has a mass of 1.7 kg. This leaves a good margin for insulation and inside payload.
  - The new ports installed to ensure rapid integration process were finished and rapidly assembled into the system. This new features ensures a better interface and debugging capabilities for the HASP GPS payload.
  - The outer case of the payload was completely built, and assembled, with its brackets, walls and all hardware. It was also attached to the PVC base provided. The structure is completely assembly and under the weight margins required.
- **Software System**
  - During the present month several new capabilities were added to the main flight software of the payload. Among those that we improved we can list the interface of the GPS board over the USB port, which leads to higher rates in processing the information and a more secure and stable interface. In addition the data processing for the GPS receiver software was reduced in execution time by almost 50 %.
  - In addition the team added a Watch-Dog timer each 8 seconds before a full reset to eliminate any software malfunction. As the new capability was added some changes were done on the command and telemetry interface to include remote control on those capabilities.
  - We've been able to retrieve data from each sensor the IMU posses. Using the Linux terminal we have acquire, through some strong research, the commands and data we need from the IMU. We are currently working with an implementation to extract the data using a C file in order to implement it in the project file. We have modified some

code to be able to retrieve the necessary data and have total control of the hardware as desired.

- **System Engineering**
  - During the month we worked mainly in the documentation for the final PSIP. After some issues were addressed we manage to fix those. For this team is indispensable that our documents meet the HASP requirements.
  - Also after some experiment an IMU was added to the payload in order to complement the data from the radio-occultation experiment, the new instrument does not represented major issues in the system power consumption.

II. Issues Encountered During Payload Design
  - The new mechanical changes on the structure increased the payload weight, still it is under the required weight margins.

III. Milestones Achieved
At the time of the projects this are the milestone that we have achieved.
- **Objectives**
  - Power and communications backup board for the payload were completed.
  - The ARIES GPS payload preliminary assembly was started with new modifications.
  - Payload external structure was finished and it is under HASP regulations.
  - Software improvements in the auto-running programs for the Linux environment.

IV. Current Team Members and Leaders