Inter-American University of Puerto Rico
HASP 2012
March Monthly Status Report

During this month our team has made some change to the sensors selection. During our weekly meeting we determine not to use the ADIS16488 IMU and the Novatel GPS due to cost limitation and inability to get it in time. For that reason we are going to switch to the previous IMU and GPS sensors utilized in the HASP 2011 that are tested and proven to work. The current schematic for the ACS/flight Computer are complete with some minor details that needs to be addressed regarding the adjustable voltage dc to dc converter.

1. Activities of team members

The Electrical team (ELEN) manage to implement and test the dspi33 on a bread board as shown **Figure 1**. The teams test the UART interface and the I/O pins to ensure functionality, during the end of this week we are planning to test the other interface I2C and SPI to verify that all is working properly. In addition the preliminary schematic for the ACS/flight computer board was develop using a configuration with adjustable dc to dc converters but problems arise during the bread board implementation this provoke the replacing of this dc to dc to a fixed counterpart. The other necessary components to the ACS/flight computer were successfully created using eagleCAD and the final version schematic should be completed by the end of this month.

The mechanical team (MECN) modified the payload design using the parameters limits in dimension to the top motor cage with purpose to insulate it. We are tried to apply insulation using the minimal power consumption for the cold case without affecting the hot case. To determine it, we are working in complex simulation in how each area can be affected by temperatures. The next step is to finish the manufacturing of the 1U structure.

The ADCS and software team had developed the MatLab and C code of the attitude determination. The MatLab code is currently tested with the previous HASP data. The result show a pretty good estimation for the data however, with some offset and drift at the output due to the gyroscope sensor. The gyro offset its when there is no rotation and can vary from unit to unit and also may vary with temperature and supply voltage. On the other hand, the drift refer to the integrated effect over time of a slowly varying offset and noise. Thus through the next month is required to fix the error by attaching properly the sensor to the board, soldering this time and to consider the temperature to recalibrate the sensors data.

The C code developed for the dsPIC33 can be tested with an IMU that is in the laboratory. However, the tests for the C code was done using known values from the HASP. Furthermore, is required to test the code in real time and how it can manage the speed of the functions. Right now with fixed values takes approximately 20 ms for the not optimized version of the code. Thus, is require to increase the processor speed and/or optimize the code.

In addition the team tested the encoder of the motor using an external IC HCLT 2032 Quadrature decoder to reduce the microprocessor time of processing and improve performance of the whole

system. The DC motors with encoder need to be interfaced with some circuit or program to know the position of the motor at any time. Using the IC HCTL-2032 had been proven on the Arduino microcontroller first to start getting the data, due to the simplicity. Then it needs to be translated for the dsPIC33. **Figure 2** shows the HCTL-2032 using the Arduino microcontroller.

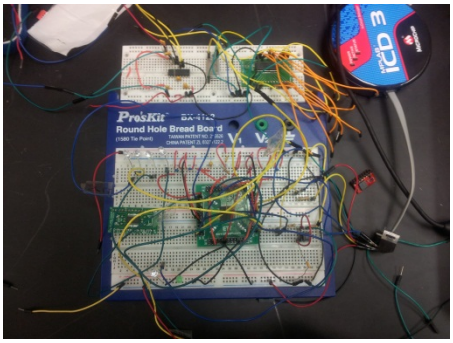

Figure 1: dsPIC33 Bread Board Implementation

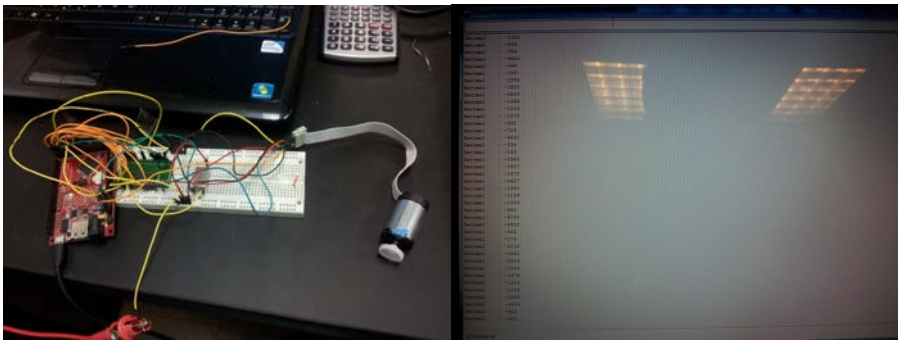

Figure 2: HCTL-2032 Quadrature Decoder with Arduino

2. Current team members

During March no additional changes has been made to the team structure.