TigreSAT 2010 &2011
February Monthly Report

2010-2011 TigreSAT Monthly Progress Report

EQUIS ADS 2010 PAYLOAD

No changes to the payload since it had passed all the test, requirements and integration necessary for LSU HASP platform has been performed. Calibration is needed for the Accelerometer and Gyroscope and we have been working on an instrument that will be able to calibrate magnetometer, accelerometer and gyroscope. The expectation on February was to accomplish the calibration for the accelerometer sensor by the end of March. Nevertheless, due to a very busy schedule of the students due to classes, assignments, and projects we have not finish yet the calibration process. We developed the documentation required for the implementation of the design of the accelerometer sensor and made a part list to obtain the components of the improved version of the ADS calibration instrument. It is important to explain that we are just obtaining the equations for the payload; no changes will be done to the payload's software, structure and electronics. The calibration equations obtain will be used for post flight analysis; consequently the ADS payload is ready for flight.

TigreSAT 2011 PAYLOAD

During the month of March the TigreSAT project has had some significant changes and has better defined the project by applying system engineering concepts such as breaking the tasks in smaller and simpler one. The project is divided in three parts which are Maximum, Intermediate and Minimum success criteria.

Minimum Success Criteria (MSC):

Develop and implement the Attitude Determination System done in the summer of 2010 by EQUIS team in a PC104 standard board with improvements and additional components such as a GPS, Sun Sensor capable circuitry, RS232 for Telemetry, Heater and Camera capable circuitry. This board will be implemented in two versions one with an Atmega168 20UA and another with a dsPIC33 which will allow us to learn and develop the code for the microcontroller used in actual space flights. This board will be placed in a 1U (10x10x10)cm CubeSAT structure, with proper insulation to maintain an internal temperature in a range of 0 to 10 degrees Celsius. Also as a success this criteria the payload must pass all tests and obtain and downlink data throughout the whole flight.

Intermediate Success Criteria (ISC):

For this success criteria we will use the board of the CubeSAT structure, heater, RS232 and the ADS of the MSC and add to the CubeSAT on the exterior five Solar Panel (already implemented and tested by one of our student at UC Berkeley). These solar panel will be connected to board that will allow characterization of the panels and save the data in an SD card, this board will be completely isolated from HASP platform, a connection from the characterization board will be send to the ADS microcontroller through the Sun Sensor circuitry to obtain the orientation of the

payload with respect to the Sun. The code for both the Atmel and dsPIC33 will do the same in their respective languages. Also as a success this criteria the payload must pass all tests and obtain and downlink data throughout the whole flight.

Maximum success criteria

For this success criteria, the complete CubeSAT from the Intermediate Success Criteria (ISC) will be placed in the Pitch and Yaw rotating platform. Since the ADS board was made with Camera capable circuitry we will connect a camera to observe the external environment and perform the appropriate controls taking into account the requirements needed for this operation. A code will be developed and uploaded to the ADS board to received data from the ADS sensor and perform the calculations to perform the controls with the actuators, thus making the ADS board into an Attitude Determination and Control System (ADCS). Also dry powder is being considered as a lubricant for the servo motors to meet with the temperature requirements which is to develop a structure that will work in an environment of -80C to 60C. Also as a success this criteria the payload must pass all tests and obtain and downlink data throughout the whole flight.

The TigreSAT team will work its way up from the minimum success criteria to the maximum success criteria to ensure at least a success criteria to be completed. Having developed the previous criterias, improving the requirements and descoping the Electrical Power System (EPS), mentioned in previous documents. The team as accomplished the following:

From the Software Development Team:

Arduino Version Team Codes:

Magnetometer - Completed	Temp Sensor - Completed
Gyroscope - Completed	Heater - Completed
Accelerometer - Completed	Real Time Clock – Completed
SD card - Completed	Sun Sensor – In progress
GPS – In progress	Camera – In progress

dsPIC33 Version Development Team:

Magnetometer – In progress	Accelerometer – In progress
Gyroscope – Almost Completed	SD card - Completed

GPS – In progress

Real Time Clock – In progress

Temp Sensor – In progress

Sun Sensor – In progress

Heater – In progress

Camera – In progress

From the Electrical Development Team:

Arduino Version

Completed Task

- Eagle Cad SCH complete and PCB almost complete (90%)

To be Accomplished

- Solder components

dsPIC33 Version

- Eagle Cad SCH and PCB complete

To be Accomplished

- Solder components

From the Mechanical Development Team:

Completed Task

Solidworks Cad Structure Cad Design

- CubeSAT – complete
- Rotating structure - complete

To be Accomplished

- Physical Implementation of Cube – In progress
- Physical Implementation of Pitch and Yaw Platform
- Thermal Analysis – In Progress

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ARIES Students and Tasks	
Students	**Task**
Javier Espinosa	ADS, ACC
Jose Molina	SDT
Victoria Gonzalez	Thermal Analysis
Abdiany Rivera	Structure
Ana Espinal	Electrical
Jose Almonte	Sun Sensor
Nestro Vargas	Solar Panel Characterization
Jose Fermin	Solar Panel
Rose Navarro	Motor Research
Erika Portilla	SDT
Jose G. Almonte	SDT
Juan Colón	SDT, Telemetry
Mairim Nieves	SDT, ACS
Jorge Quinones	SDT, SD Card
Abel Torres	SDT, Gyroscope
Hugo Pastrana	SDT, Accelerometer
Rauly Torres Cruz	SDT
Juan G. Rosado	SDT, GPS
Brian melendez	SDT
Alexavier Roman	SDT
Damian Miralles	SDT
Luis J. Diaz	ACS
Alexander Santiago	Mechanical

Table 1 Student Member fot TigreSAT