

# University of Colorado at Boulder

## Monthly Status Report: April

### Overview Since 3/30/2012:

Since March, the team's primary focus has been a Preliminary Design Review Presentation, an Undergraduate Space Research Symposium, and the commencement of testing and prototyping of components. The PDR was delivered April 12, the Symposium occurred April 21, and prototyping has been an ongoing endeavor throughout the month.

### Current Team Members, Leaders, and Mentors:

#### **Project Coordinator**

Lia Matthews

#### **Project Advisor**

Dr. James Green  
Director of CASA

#### **Project Manager**

Gabrielle Massone (Fr.)

#### **Systems Engineer**

Glenda Alvarenga (So.)

#### **Structure and Thermal**

Lead: Jake Broadway (Fr.)  
Gloria Chen (Fr.)  
Joe Papa (So.)  
*Mentor: Tyler Murphy*

#### **Science**

Lead: Vincent Staverosky (Fr.)  
Nicole Ela (Fr.)  
Corey Wilson (Fr.)  
*Mentor: Kyle Kemble*

#### **ADCS**

Lead: J.J. Busse (Jr.)  
Dalton Smith (Fr.)  
Jannine Vela (Fr.)  
Martin Lee (Grad.)  
Alberto Lopez (Grad.)  
*Mentor: Lee Jasper*

#### **Computing and Electrical**

Lead: Greg McQuie (Fr.)  
Calder Lane (Fr.)  
Zac Collver (Jr.)  
*Mentor: Andrew Thomas*

### Activities of Team Members

The team's focus through the month of April has been on ordering components and prototyping. The Structure and Thermal section has ordered several sheets of aluminum and has machined all plates roughly to size. To machine the trusses, each sized block will be put into a CNC machine. We also recently received our PVC mounting plate, which is being actively compared to our current structure to assure compatibility.

Electrical and Computing has nearly finalized the power board design in the program Altium and has begun assembling a prototype board to test the system before ordering a final PCB. Additionally, they have installed the OS system on our flight computer and are programming serial communications, which will be tested with a 232 terminal package.

ADCS has tested a wide variety of visible spectrum and infrared photodiodes in an attempt to ascertain which would be most reliable and accurate. They have also assembled our stepper motors and drivers and have begun testing the degree of each step under simulated loads compared to the step sizes specified on the data sheets. Additionally, they have continued their weekly meetings with mentor Lee Jasper, who is helping to refine control equations specific to our design.

Finally, the Science team is in the process of obtaining a Rapid Prototype of the current telescope design with which they can perform some preliminary analyses. Additionally, they are examining offramps to the InfraRed Camera; currently the IR system is hindered by lower resolution and higher costs due to available technology. Instead, we are exploring a 393 nm wavelength in the visible spectrum called "Calcium-K."

### **Issues Encountered**

Several problems have been encountered throughout the design, many of which are ongoing. Primary issues include:

1. Learning the nuances of the Altium program to design the PCB.
2. Interfacing computers and monitors with our Pandaboard computer, and trimming the Linux distribution.
3. Designing the interface between the rotating platform and the stationary electronics housing. Also, determining the best way to rotate the platform, taking into account gear ratios, wiring interfaces, etc...
4. Finding time to use the machine shop's CNC machine, which is heavily used by Senior Design Projects and other Space Grant projects.
5. Designing and implementing the control systems, as many of the control equations are relatively arbitrary and must be confirmed by testing
6. Machining the rotary table. We have received several conflicting pieces of advice on the best way to go about machining the table and integrating components.

### **Milestones Reached**

This month, we completed our PDR, Symposium, and began full-fledged prototyping and machining. We have also submitted a very Preliminary Payload Specification and Integration Plan; much more detail will be added to the plan as several design elements become more concrete.

### **Next Objectives**

Our next objectives stem from an overarching goal of having a semi-functional payload during May with which we can begin thermal and vacuum testing at CASA. By early May, we anticipate all major parts of the structure will have been machined, provided no major delays due to scheduling in the machine shop. We will also begin constructing several major ADCS components and programming the attitude determination and control code. With the end of the spring semester rapidly approaching, our team is expecting much more time to focus on construction of the payload, which will hopefully accelerate many of these goals.

### **Questions:**

We were wondering if there were any Preliminary Thermal/Vacuum Integration tests in Palestine planned for May or Early June? If so, what are the dates of those tests?