

Week VI Report

Advisor(s): Gary Tuttle

Client: NASA Marshall Space Flight Center

Members (Roles): **Isaac Johns**-Team Communicator, **Ryan Bissett**-Team Communicator, **Tom Henry**-Webmaster, **Luke Dahlman**-Team Leader, **Anh Ho**-Key Concept Holder, **Dustin Pierce**-Key Concept Holder, **Antjuan Buffett**

Project Title: Remote Deployment Circuit and Mechanism for Lightweight CubeSat Solar Panels

Weekly Summary

This week we started work on designing the physical layout of the boom, started the Verilog design for the circuit and began looking at what materials and parts we'll need to use. We are now moving from the planning phase to using our accrued engineering skills on the project.

Meeting Notes

From our weekly meetings:

- The boom will be a 'scissor lift' design, which can extend and contract while storing itself in a small amount of space.
- The circuitry for the mechanism will be kept inside the relative safety and controlled environment of the satellite itself, with the minimum amount of parts outside as possible.
 - Waiting for John Carr to respond to figure out exactly how much space we have to work with inside.
- We will try to use the smallest number of joints or "soft points" as possible to ensure reliability.
- We will have to make 2 choices for every material- what we will build our prototype out of and what we would recommend NASA use for an actual space-flight ready model.
- In the boom design we most likely want a 'screw drive' that will be perpendicular to the boom itself. One end of the 'scissor lift' design will be mounted to the CubeSat while the other end will not due to function of the 'screw drive'.
- In the case of the 'screw drive' and one fixed point and the other free, torque must be considered as well as deterioration over long period of time. It is planned to design and build this in SolidWorks for simulation this week on either Thursday or Friday.
- Anh and Ryan have decided that all metal in the boom must be of the same material due to expansion and contraction rates of the material. So in ordering parts for the boom we must make sure they are all of the same material.

10/6/2014 Group Meeting to Start Design Work

Duration: 2hr **Members Present:** Isaac Johns, Ryan Bissett, Tom Henry, Luke Dahlman, Anh Ho, Dustin Pierce, Antjuan Buffet

In this meeting we started to flesh out an actual design for the boom. This was necessary since in order to start design on the circuit, the number and types of signals sent to and from the boom needed to be known. We also delegated research topics for everyone in the group.

10/6/2014-10/12/2014 Smaller Group Meetings

Duration: 1hr **Members Present:** Isaac Johns, Ryan Bissett, Tom Henry, Luke Dahlman, Anh Ho, Dustin Pierce, Antjuan Buffet

Purpose and Goals

- These small group meetings were meant to allow us to focus on our individual sections of the project.
- We divided the work into materials, design, logic design and components research so we can be more knowledgeable at our next meeting.

Achievements

Now that we have a direction for the project, the time to start creating some tangible progress is here. According to our timeline, we want to have at least a basic outline of our circuit by the end of this month, so we need to get started on that as soon as possible. The biggest problem we face with that right now is needing to know what the boom itself will look like and how it will function so that we can design the circuit to work with it. It will be much easier to make the circuit work with the design than to find out later on that the boom itself is missing some critical functions we didn't think of when designing the circuit.

A truth table for the circuit to be designed in Verilog has been created, research into materials and components we can use in LEO is underway and the groundwork has been laid for the physical design, which should start this week (10/12/2014-10/19/2014).

Pending Issues

- Making sure John Carr is aware and approves of our decisions for the week since he is currently out of his office according to his email's autoreply.
- We need to know where we can mount on the CubeSat.
- The maximum extension from the side of the CubeSat also needs to be determined.
- The power to area of the solar panels as well as power usage allowed for circuit.

Plans for Next Week

- Luke: Contact Professor Tuttle and John Carr
- Isaac and Ryan: Weekly Group Report
- Anh & Dustin: Keep group on Task
- Tom and Antjuan: Manage Google Docs and Weebly site
- In addition, everyone needs to keep researching their topic in their small groups.
- As a former ME student, Ahn is the only group member who knows how to use a recent version of Solidworks, but we all want to meet up and help him build a digital prototype of the boom so that we can offer our advice on it as it goes.

Individual Contributions This Week

- Luke: Planned next steps for the project. Formed teams and goals for the next phase. Reviewed notes from CPRE 281 for Verilog coding.
- Isaac: Edited weekly report, attended meetings, researched cylindrical solar cells and worked on the Verilog code.
- Ryan: Wrote weekly report, attended meetings, researched materials for use in space and met with Dr. Shrotriya about materials.
- Tom: Updated online media, attended meetings, created truth table for the PLC and started researching how to host our website.
- Dustin: Attended meetings, kept group on task, and researched cryogenic motors and other parts we'll need that are suitable for use in LEO.
- Anh: Attended meetings, kept group on task, and started research on materials.
- Antjuan: Attended first meeting, pitched ideas, and researched cryogenic motors and other parts we'll need that are suitable for use in LEO.

Total Contributions for this Project

1 – 2 hour and 1 - 1 hour meetings

- Luke: 5hrs
- Isaac: 6hrs
- Ryan: 4.5hrs
- Tom: 6.5hrs
- Dustin: 1hrs
- Anh: 5hrs
- Antjuan: 2hrs