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Sounding Rocket Project

Introduction

The “Monarch-One” team from ODU will be taking part of the RockSat-C 2015 Competition at NASA’s Wallops Flight Facility in the upcoming July. The payload that our team has been tasked to design will be launching aboard a two-staged Terrier-Orion rocket, which uses the Mk70 for the first stage and an Orion motor for the second stage. [1] The rocket includes fins and spin motors that induce a steady spin of four revolution per second for improved stability. [2] The rocket also utilizes some on-board stabilizers which help keep the center of gravity and center of pressure aligned.

The goal of our mission is to successfully gather data after the launch, using a multitude of sensors and gyroscopes and transmitting it back to ODU’s Satellite Communications System (SCS) via an on-board transmitter as well as measure the output of our solar cell and compare it to its output on the ground. The sun’s light spectrum at low earth orbit level is drastically different than the spectrum on ground level because the atmospheric absorption considerably changes the distribution of the solar spectrum [3], this mission will allow us to get a full picture of the solar cell’s behavior while exposed to the full spectrum of light from the sun. The main benefit of our payload is its ability to operate at low-power and still perform precise data acquisition and storage and communicate all the data back to our ODU ham radio antenna and ground station.

The payload designed by our team will have to fit in half of the standard RockSat-C payload canister, since we will be sharing our canister space with another team from the Denver Community College. The canister itself is cylindrical, with a diameter of 9.3 inches and a height of 9.5 inches. There are also very strict weight restrictions; the whole RockSat canister along with both payload shall be within 20 lbf with a degree of accuracy of 0.2 lbf. [4] It is crucial that our payload is within that range because all payloads not conforming to the weight constraints will be disqualified and will not be able to take part of the flight. Another important aspect of our design is the center of gravity of our payload, it has to lie within a cubic inch of the geometric center of the RockSat-C payload canister. All these strict design restriction are vital to stability of the flight and hence the success of the mission.

The mission will be a total success if the following goals are met:

* All flight data is successfully transmitted during the flight, without any interference, to the ODU satellite communication system.
* All flight data as well as solar cell output is successfully stored on the SD card on board for complete analysis after the retrieval of the payload.
* SD card stored data perfectly matches the data transmitted during the flight from launch to t = 4 minutes when the transmitter will be switched off.

**References:**

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