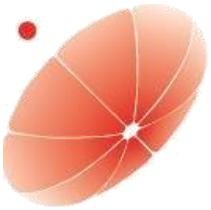
Sun Crest Inc.



Sun Crest Inc.

# Progress Report for the *Stellar Dish: Sun-tracking Solar Cooker*


Project Team: **Phur Tenzin Sherpa**
**Owen Au**
**Imtiaz Charania**

Contact Person: Owen Au
owena@sfu.ca


Submitted To: Dr. Andrew Rawicz – ENSC 440W
Steve Whitmore – ENSC 305W
School of Engineering Science
Simon Fraser University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## Introduction

This report documents schedules, expenditures, and planning for the rest of the term. The sun tracking solar cooker has been designed and is now under the building phase after some initial testing. During this final period, the designed sun tracker will be implemented on a solar dish, constructed using an umbrella covered aluminum foil. Throughout the semester, engineers at SunCrest Inc. have tested the sun tracking mechanism, using LDR's and servomotors. Our group member, Owen is currently working on feeding the tracked sun position information to the servomotor such that it can reposition the solar dish to face the sun for further accuracy. There are several steps required, including programming the Arduino software such that data is communicated between the sun tracker and the solar umbrella. Meanwhile, the other members Tenzin and Imtiaz have been working on designing a suitable support structure for our solar cooker. The following section displays our current progress and how it differs from our original schedule.

## Schedule

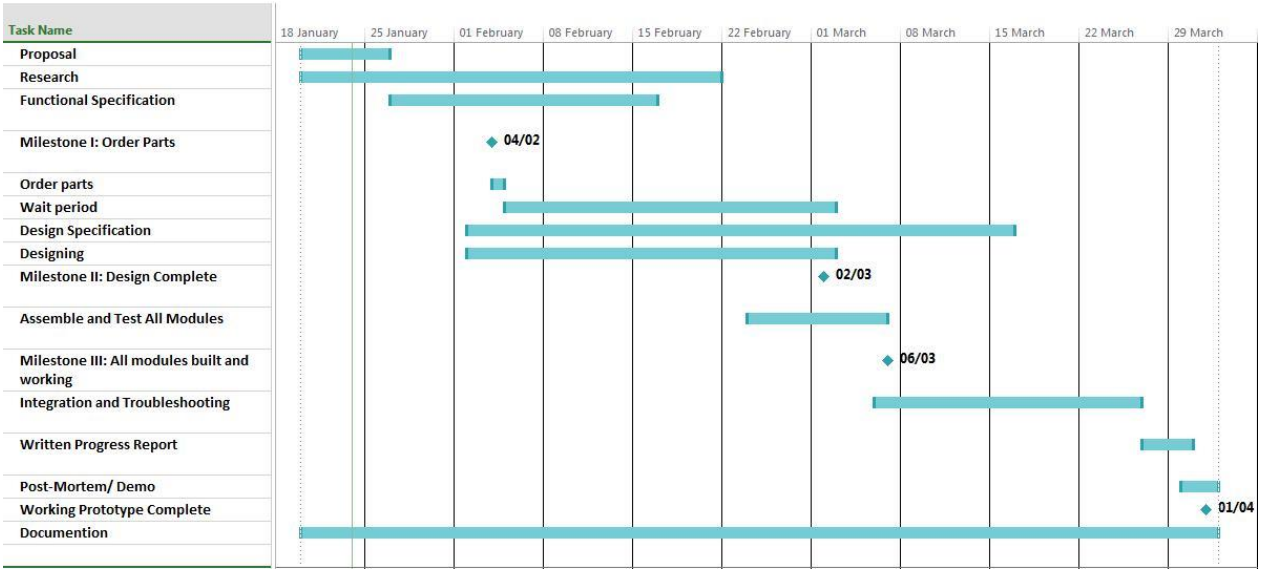


**Figure 1 Displaying the Grant Chart posted in the progress Report**

According to our original schedule, by March 6th the team had all the system components tested, which included programming the main Hitec servomotor to correct its position based on the feedback position of the LDR suntracker and testing the LDR sensitivity outside in the sun. The original motor required to move solar dish, which was ordered online, arrived later than expected pushing us a week behind from the original schedule. For this reason, the team is currently working on integration and troubleshooting sun-tracking accuracy to be within 5 degrees off. Our demo is scheduled for April 13$^{th}$ 2015 leaving us with a few extra days to cope with the time lost due to delivery delay.

# Progress

The current progress of the sun tracking solar cooker is discussed below in detail. The challenging part, which included programming the motor, controlling the RPM and testing if LDR's are responsive enough to track sunlight have been successfully accomplished although sun-tracking accuracy is still a problem. Integrating and troubleshooting the final prototype is underway.

## Dish Design

### Completed Tasks

- The Dish (umbrella) with the required dimensions, mentioned in the design spec has been acquired.
- The dish bas been covered with Aluminum to work as a reflective material and has was tested to generate 400 W on a sunny day.

## Mechanical Design

### Incomplete Tasks

- The connection between the servomotor and the dish has not yet been developed since the sun tracker was under testing phase.
- The support structure for the food has not been built since the sun tracking circuit had not been finalized until recently.

## Hardware

### Completed Tasks

- The sun tracking mechanism is built using four LDR's that reads light intensities from the sun and these intensities are converted into digital values using an Arduino board. The processor then determines the position of the sun, sending a signal to the horizontal and vertical servomotors. This task has been accomplished and is ready to be implemented on the finished product.

## Software

### Completed Tasks

- The software that tracks the sun and then sends the signal to the motors to adjust itself is completed.

### Incomplete Tasks

- The team encountered some problems programming the bigger servo since it has not been receiving enough current to spin. For that reason, the program running the servomotor has not been tweaked to follow the sun accurately.

# Financial

Initially, SunCrest Inc was provided with $500 from the ESSEF for research and building a functional prototype. The chart below displays the breakdown of how this funding was utilized.

**Table 1: Table Displaying Current Expenditures of SunCrest Inc.**

| ITEM | QUANTITY | COST($) / ITEM |
|---|---|---|
| SERVO MOTOR FROM SERVOCITY (HITEC SPG785A) | 1 | 238 |
| SMALL SERVO MOTORS (TOWER PRO SG-5010) | 2 | 30 |
| ARDUINO UNO | 1 | 50 |
| LDRS | 4 | 4.50 |

The total amount spent in building our prototype is $322.5 leaving us with approximately $177.5. Now that we have a functioning sun tracker, an idea about how to program the servo using an Arduino, the remaining amount will be spent on building the structure that integrates all the different

## Remediation

At present, the team at SunCrest Inc. is having troubles powering the servomotor (SPG785A) using the same power supply as the LDR's and the smaller servomotors (S4303R). For that reason, a separate power supply is required to power SPG785A pushing us a couple days behind. During this period, the team has decided to catch-up with the documentation such as preparing for the presentation and the post-mortem report so that we can continue integrating our prototype until the 10th of April. We have decided to spent at least 3 days outside to experiment the solar cooker and deal with problems that may arise during the testing.

## Summary/Conclusion

In conclusion, the development of Sun Tracking Solar Cooker is going according to plan with a little time slippage and our engineers are confident to provide a fully functioning prototype at the demonstration which is scheduled for April 13$^{th}$ 2015. Each respective module has been completed and the financial standing has been assessed leaving the team in a good position financially. The team at SunCrest Inc. is determined to produce a Solar Cooker that is efficient, time saving and will enhance the way of living for various communities.