UCI Rocket Project

SAMUELI SCHOOL OF ENGINEERING
UNIVERSITY of CALIFORNIA · IRVINE

Advisors: Professor Kenneth Mease, Dave McCue, & Colin Sledge
General Manager: Brandon Hernaez

Structures Budget $1300

Objectives

Design & Fabricate Helium Balloon Rockoon
Small-scaled model for structure testing (low altitude)

Large-scaled model for recovery system testing (high altitude 65,000 ft.)

Solar Hot Air Balloon Rockoon
One small-scale model

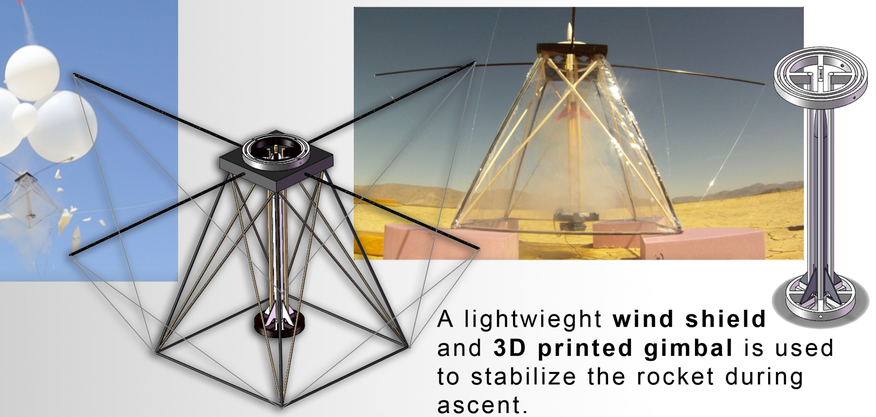
Parachute precision landing system
Solution of drift problem

Structures Lead: Yuan Zhang
Team Members:
Nathan Cox, Isaiah Navarro, Robert Chung

Solar Balloon Version

Helium Balloon Version

Two versions will be used to demonstrate different cost effectiveness and possibilites.



A lightwieght **wind shield** and **3D printed gimbal** is used to stabilize the rocket during ascent.

Project Goal

Design an alternate method for CubeSAT Launches.

How?

Using a **balloon** to hoist and launch an **actively stabilized** rocket with a highly efficient **liquid engine**.

Why?

The current method is expensive and can take several years to do.

Avionics Budget $1100

Objectives

Derive Roll Control Laws

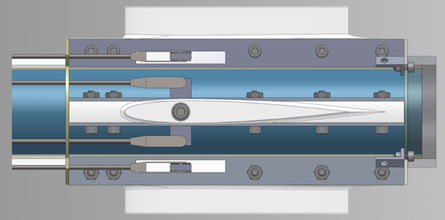
CAD Airframe and Size Internal Design

Fabricate Small Scale Rocket

Fabricate Electronics System & Develop control algorithm

Perform Multiple Test Launches

Avionics Lead: Michael Rappuhn
Team Members:
Rachel Bola, Michael Morey, Abdullaah Tarif, Tai Chen



Avionics Test Rocket

Fin Tips will control the attitude of the rocket to ensure **stable flight.**

Fin section will be **competely modular** to allow for different fin configurations.

Propulsion Budget $1300

Objectives

CAD Models of Liquid Engine

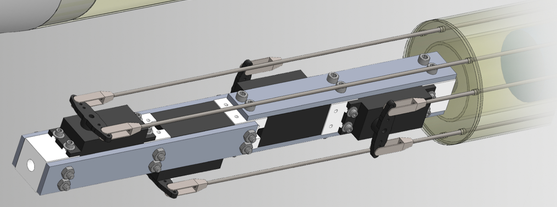
Cold Flow Test

Machining Chamber & Injector plate

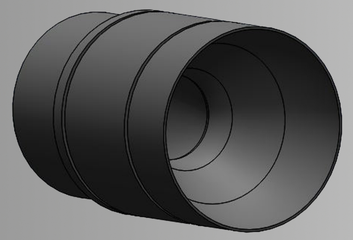
Purchase Liquid Oxygen (LOX) and JP4 (Kerosene) for Static Fire

Test Stand Fitting for Static Fire

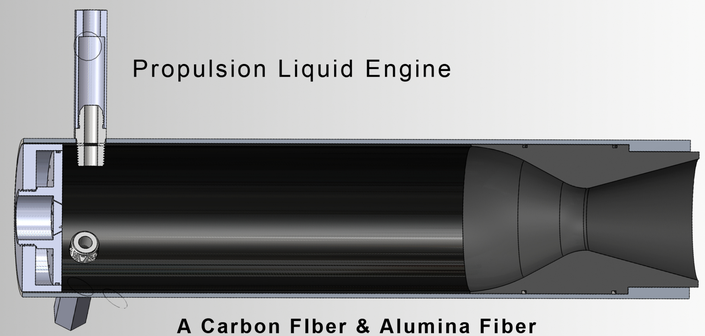
Propulsion Lead: Jesse Sidhu
Team Members:
Nick Cordero, David Lee, Taylor Jones, Grant Wu



The 3D Printed Fin Tips are actuated by servos motors that are made to fit within the air frame.

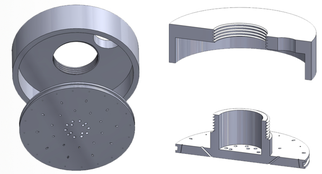


The **Graphite Nozzle** designed to 1000 lbs of thrust and withstand temperatures near 3100K.

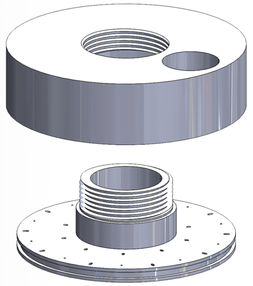


Propulsion Liquid Engine

A Carbon FIber & Alumina Fiber weave will line the chamber walls for ablative cooling.

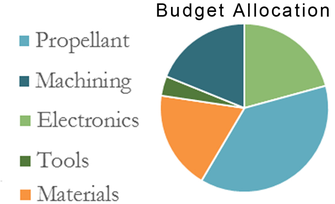


The **Injector Plate** will channel the correct ratio of LOX and Kerosene into the chamber.



PROJECT PHASE	STARTING	ENDING
RESEARCH/UROP PROPOSAL	9.20.2014	11.10.2014
DESIGN	11.10.2014	12.1.2014
PURCHASE	12.1.2014	1.10.2015
FABRICATE	1.11.2015	3.7.2015
TEST/ANALYZE	3.28.2015	4.30.2015
REPORT/ REDESIGN	5.1.2015	6.1.2015
FINAL DESIGN REVIEW	5.1.2015	End of Spring Quarter

Budget Allocation



Blue is Finished, Yellow in Progress, Black not started

2014-2015 Spring Design Review