UCI Rocket Project

Project Advisors: Professors Kenneth Mease & Mark Walter

Project Goal

Design and build a cost effective means of reaching space using a Rockoon system, with the ultimate goal of carrying a Cube Satellite to orbit.

This Years Goals

Avionics:

1. **Precision landing System (04/16 -03/16)**
2. **Avionics for Rocket (01/15-06/17)**
3. **Avionics for Rockoon (01/16-01/17)**

Structures:

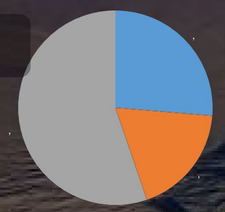
1. **Finish Prototype 2 and Launch (10/15-1/16)**
2. **Rocket Airframe (11/16-5/17)**
3. **Large Rockoon, Prototype 3 (03/17-05/18)**

Propulsion:

1. **Develop Hybrid Engine (01/16-05/17)**
2. **Successful Engine Test (06/17)**
3. **Mass Production and Flight Ready Engine (06/17- 08/17)**

Background

Traditional CubeSat launch costs to space for a sounding rocket cost $40,000/Cube to $2,000,000/Cube. Currently there is a push from both Academia and Industry to develop these small satellites because of their low cost and proportional functionality compared to a large (full scale) satellite.



Project Lead: Isaiah Navarro
Structures
Team lead: Linh Ly
Members: Aleeza Roque, Norberto Abadias, Kevin Chen, Stephen Moes, Phong Huynh, Leo Salgadro, Aroosa Ansari

Avionics
Team lead: Jesse Inoyue
Members: Auzzsa Eaton, Tarik Snyder, Joshua Yang, Zhiyang Feng, Roger Yao, Samuel Ts, Brian Vu, Adrian Velasco

Propulsion
Team lead: Tai Wei Chen
Members: Oziel Ortiz, Luis Gallegos, Omar Medina, Grant Wu, Justin Block, Anchit Roy,

Rocket

Sea Launch: ~23.5km; 77,000 ft
Rockoon launch: ~76 km; 250,000ft
Weight: ~47 kg (17kg of propellant)

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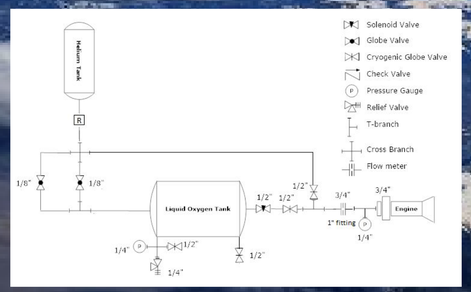
Hybrid Chemical Rocket Engine

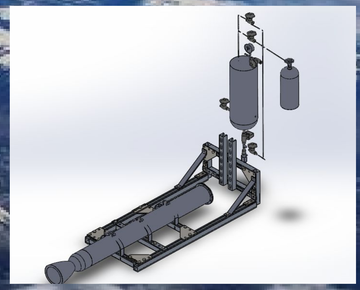
- Thrust: 1000 lbf .
- Propellants: Liquid Oxygen (oxidizer) + Paraffin (fuel)
- Cooled Ablatively using carbon ceramics similar to that used on the Space Shuttle
- Engine Made from Carbon Fiber Composite to drastically reduce weight

Fuel Grain Mold

Plumbing System



Test Stand

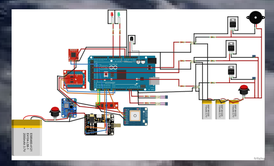


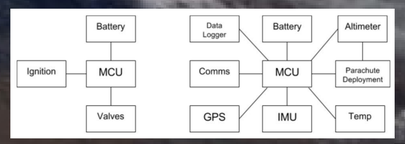
Nozzle Mold

Avionics

Capable of launching rocket, deploying parachute, and communicating with both Rocket and Rockoon. Must survive very cold environment and run on limited battery power to reduce weight.

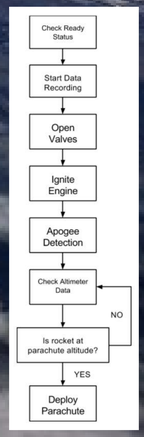
Circuit Diagram

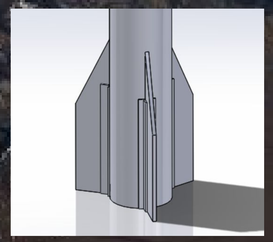




Avionics Parts List

- Arduino MCU
- IMU (GY-85)
- GPS
- Temp sensors
- Altimeter
- Data logger
- Electric matches
- Valve actuators
- Batteries
- Transceiver





Rocket Airframe:

- **Low drag (Cd nose cone=0.012)**
- **Nose cone maintain low temperature**
- **Strong skeletal structure of 5700lbs (Safety factor of 17)**
- **8in diameter, ~15ft in length**
- **CO2 charge parachute ejection (831.7lbs with Safety factor of 3)**