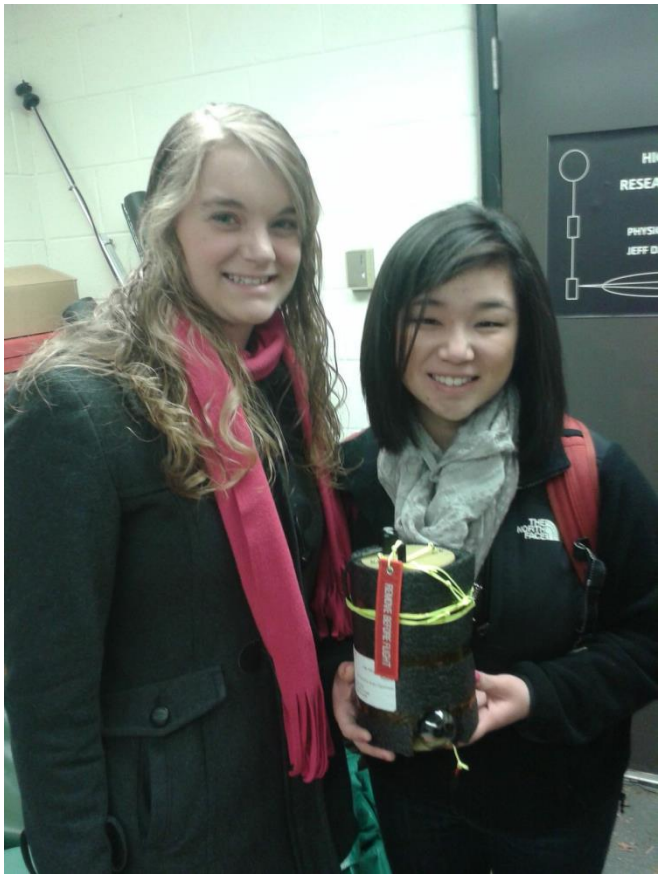
HARP All-Sky Camera

By Raquel Graves

The Team



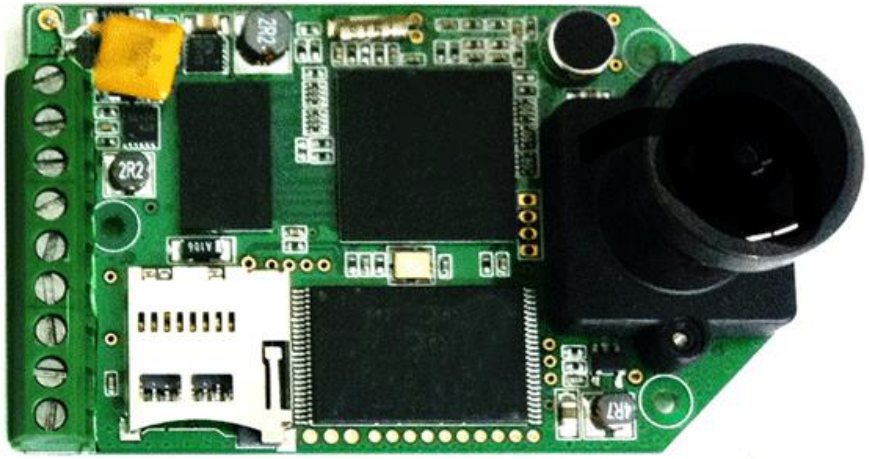
Problem Statement

* The All Sky Camera and then the HackHD is sent into the stratosphere in hopes of obtaining clear, useful, and unique images of stars, the moon, and Earth.

Cameras Used

HackHD Pin Layout

Ground [PIN1]
+3.7v In [PIN2]
Switch / Button [PIN3]
+3.7v Output [PIN4]
Ground [PIN5]
Video Out [PIN6]
L.E.D. Out [PIN7]
Audio In [PIN8]
Ground [PIN9]

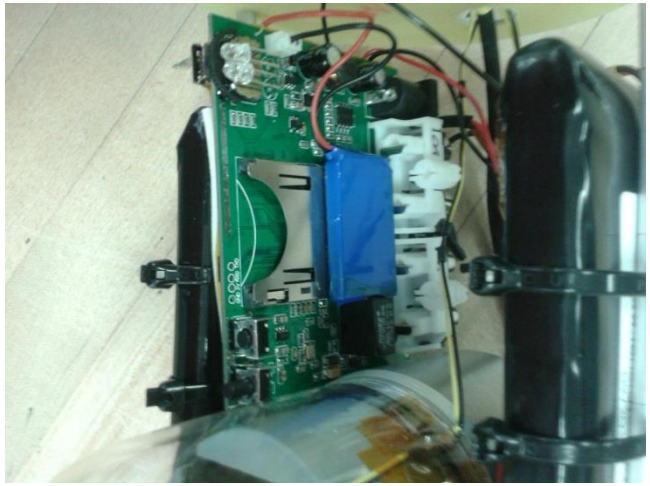


Day Launch

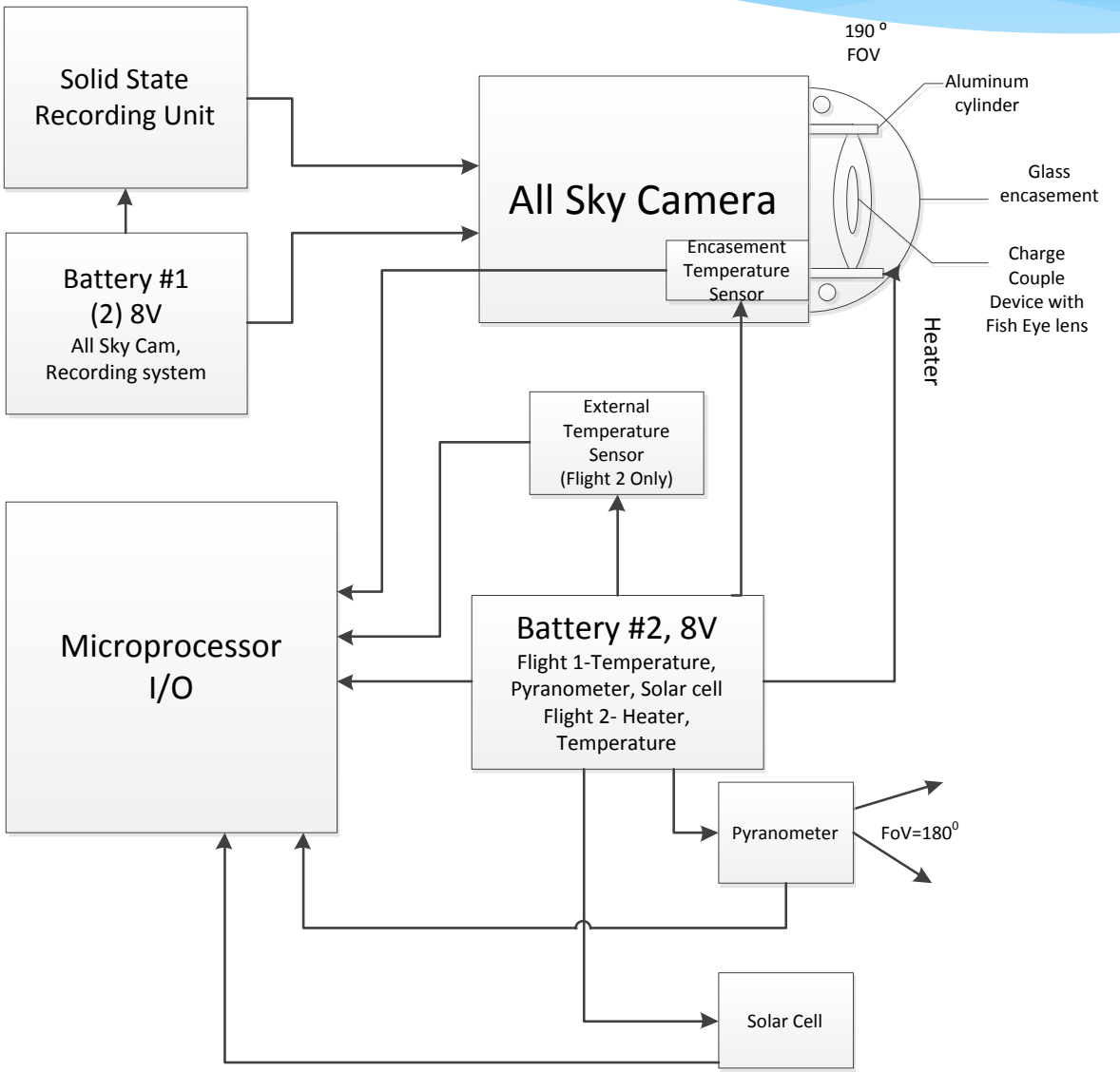
Project Design

* All Sky Camera Specifications:
  * Effective Pixels across Field of View: 546x457
  * Field of View: 190°
  * Exposure time: (1/100,000) – 4 seconds
  * Sensitivity: Min 0.002 Lux

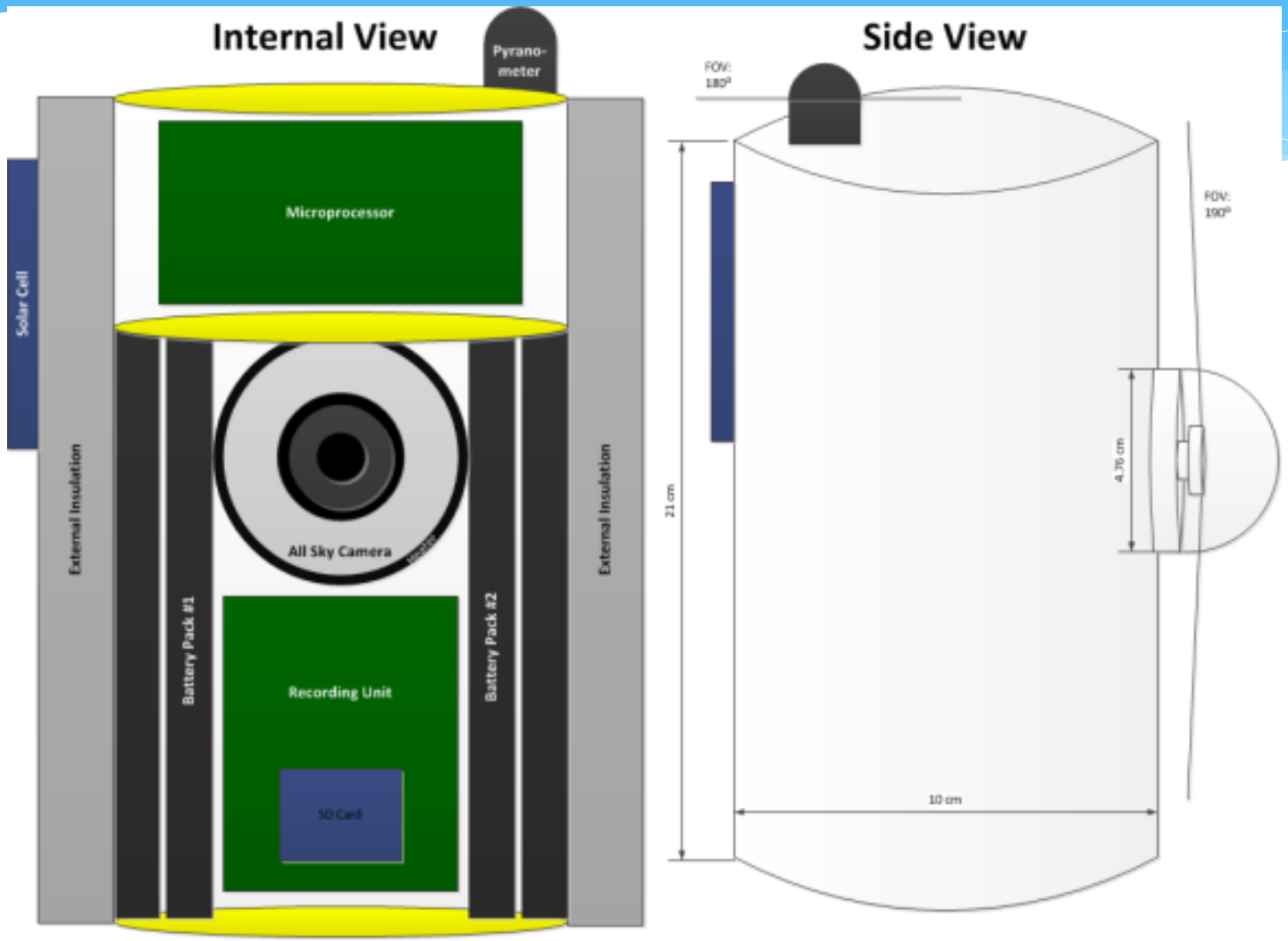
Flight #1 Daytime: Pre-Flight and Design



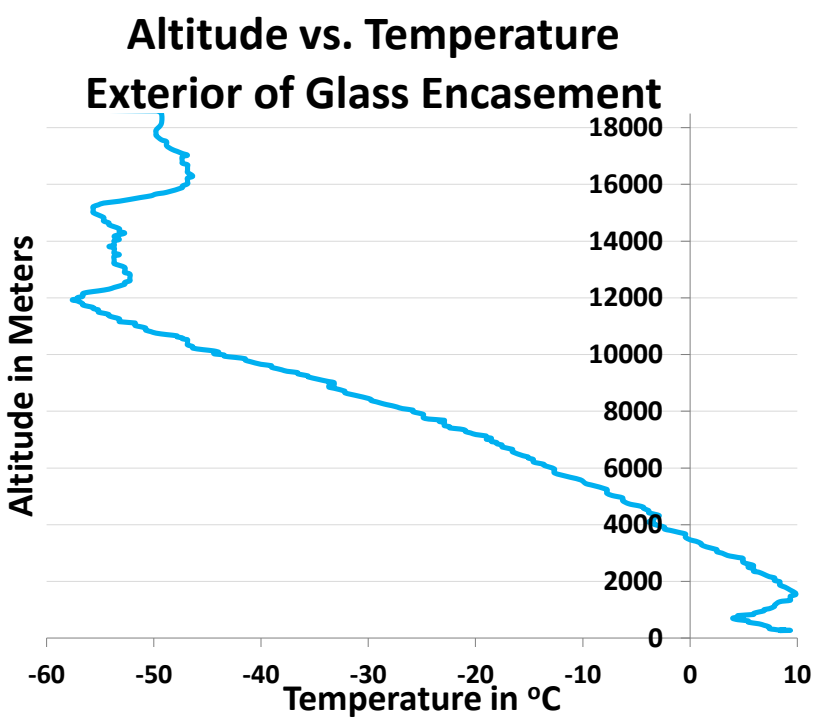
Block Diagram: Combination of Flight #1 and #2

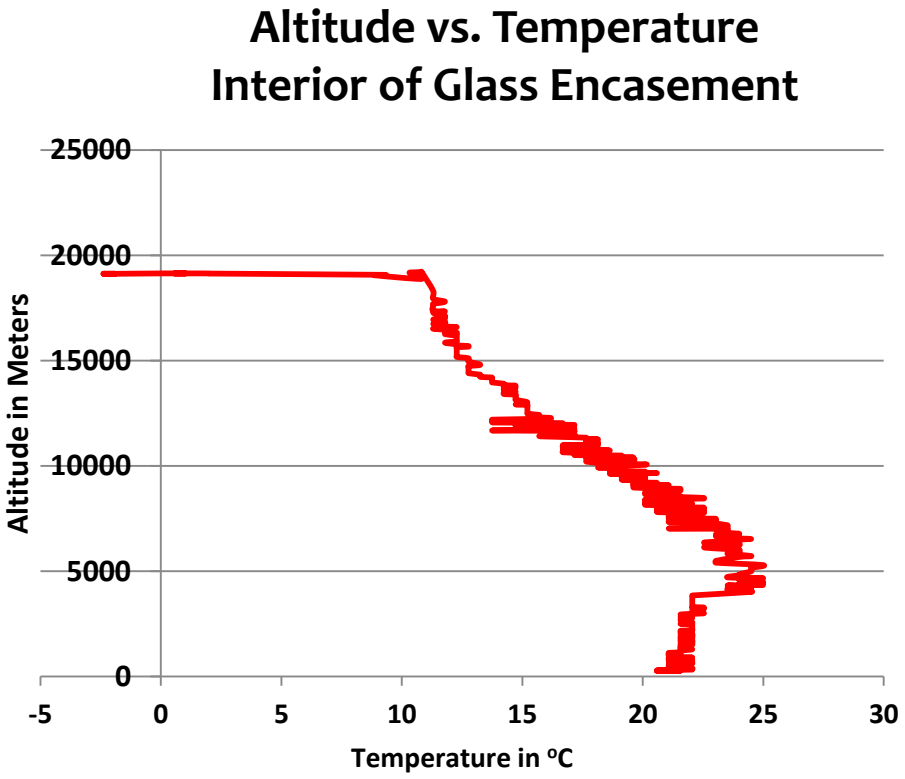


Mechanical Design: Combination of Flight #1 and #2

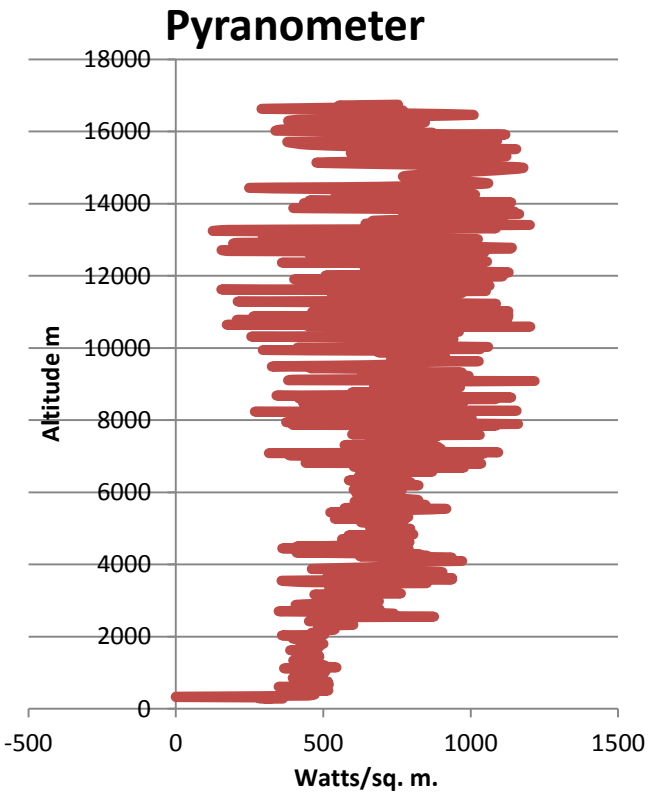


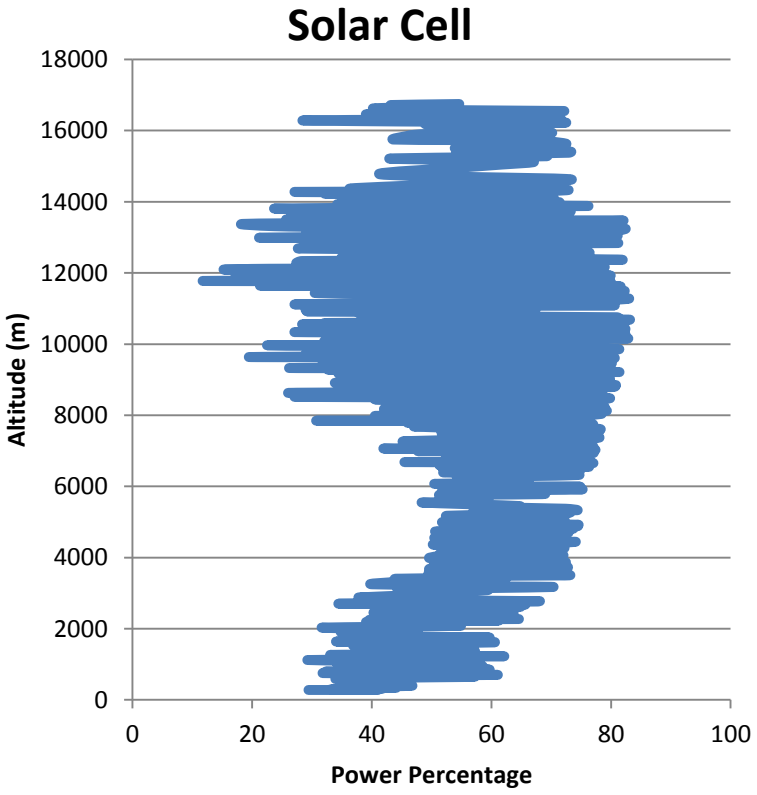
Flight # 1 Daytime: Results



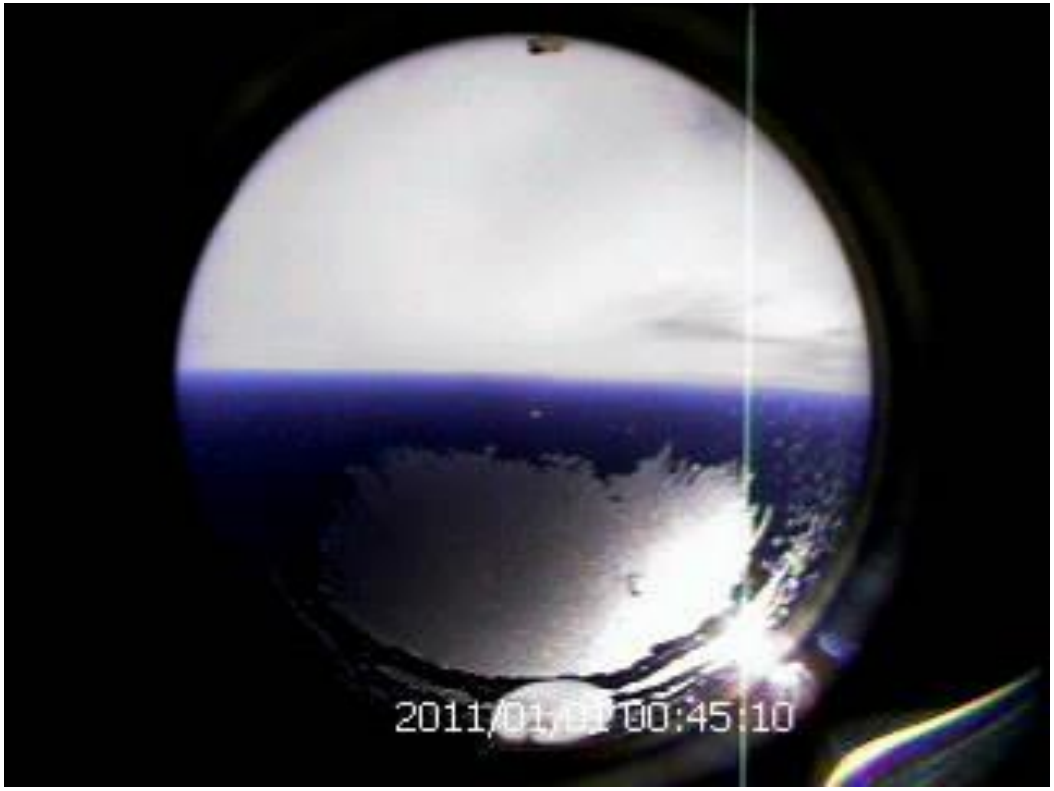


Flight #1 Daytime: Results



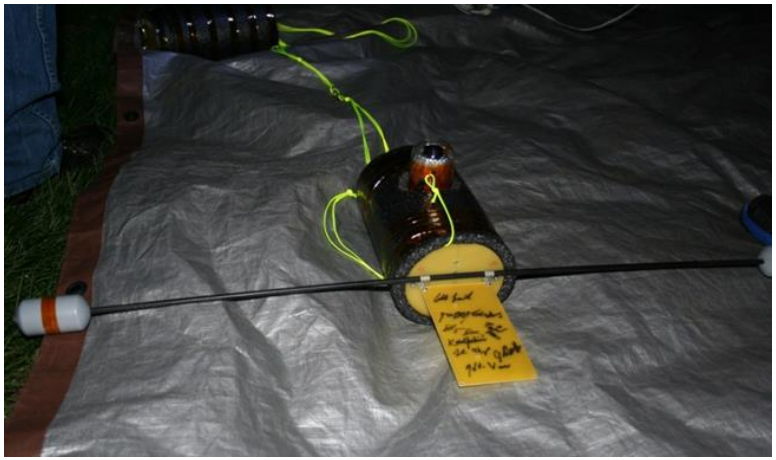


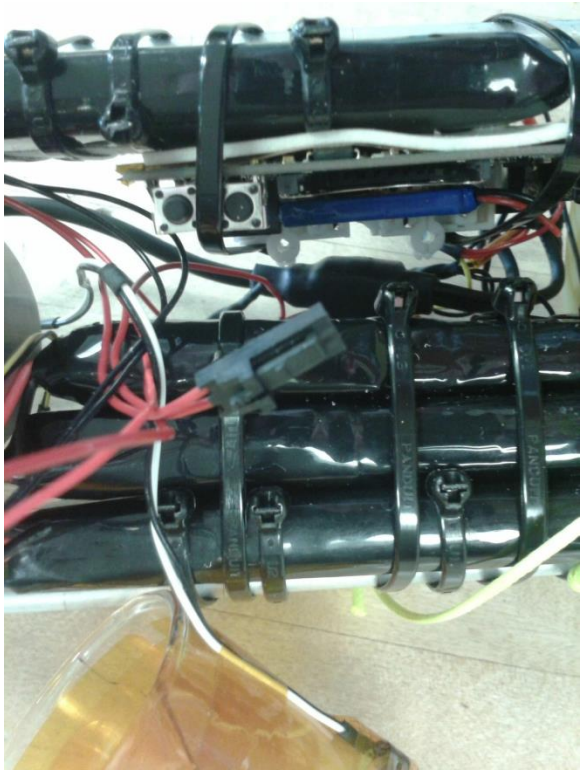
Flight #1 Daytime: Failure Analysis

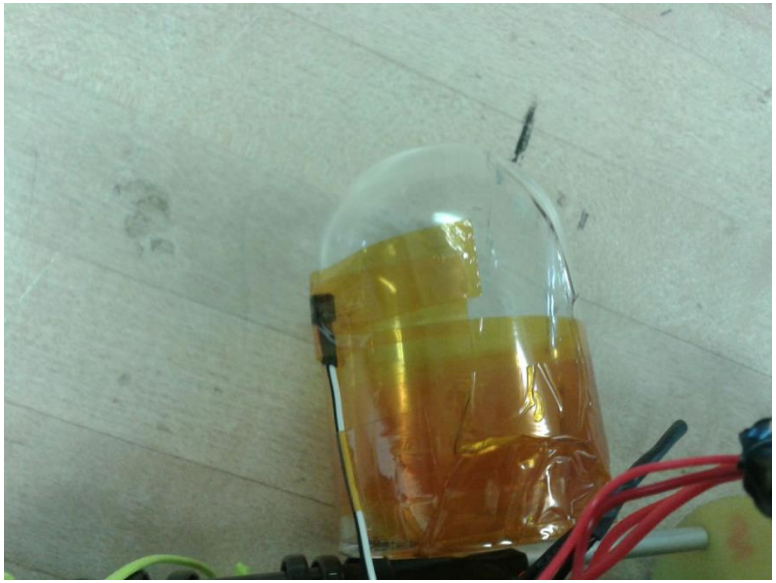


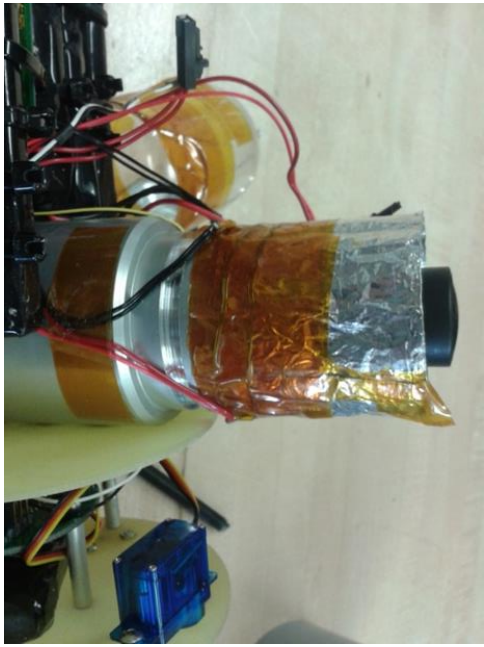
Night Launch

Flight #2 Nighttime: Pre-Flight and Design

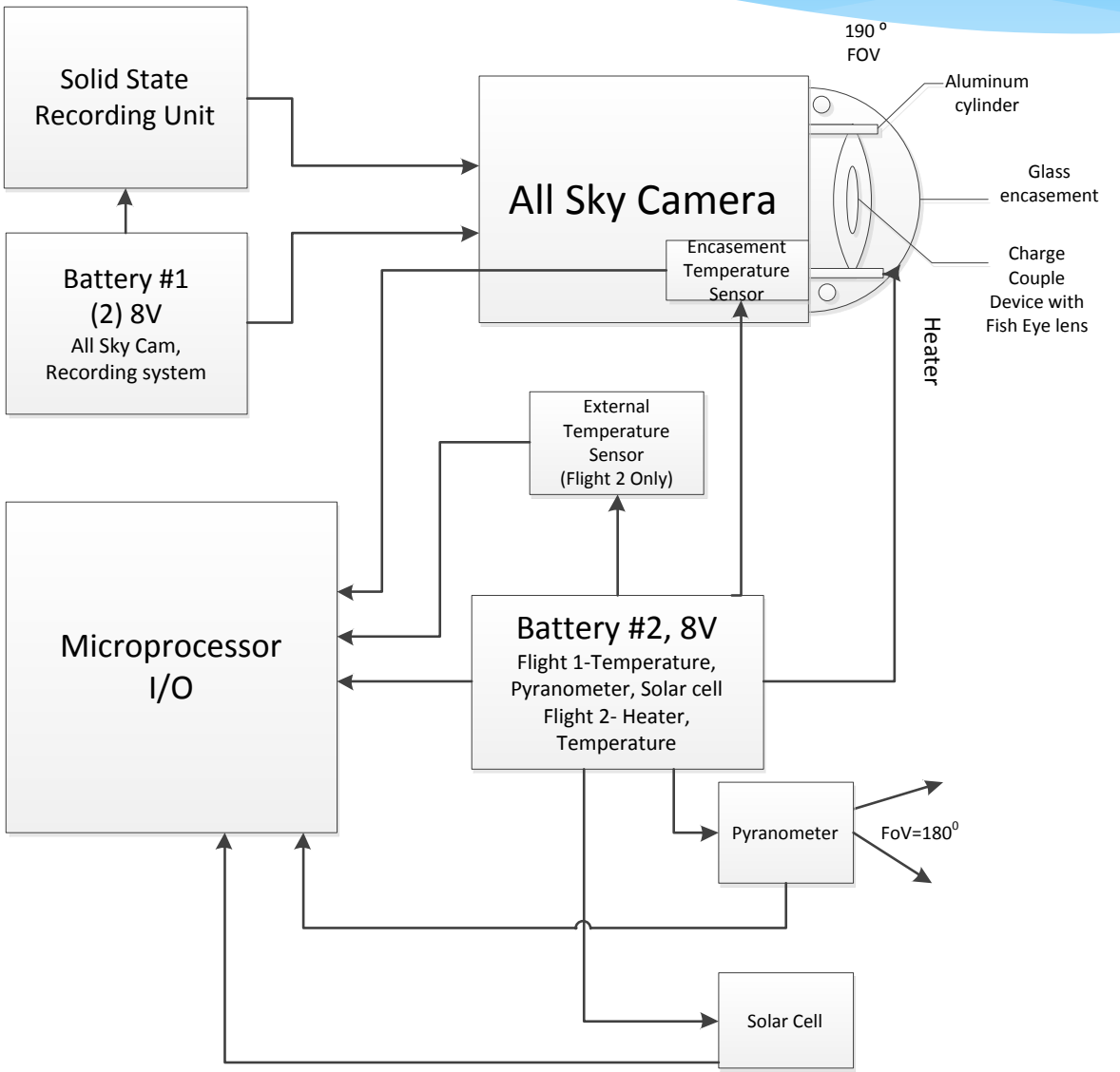




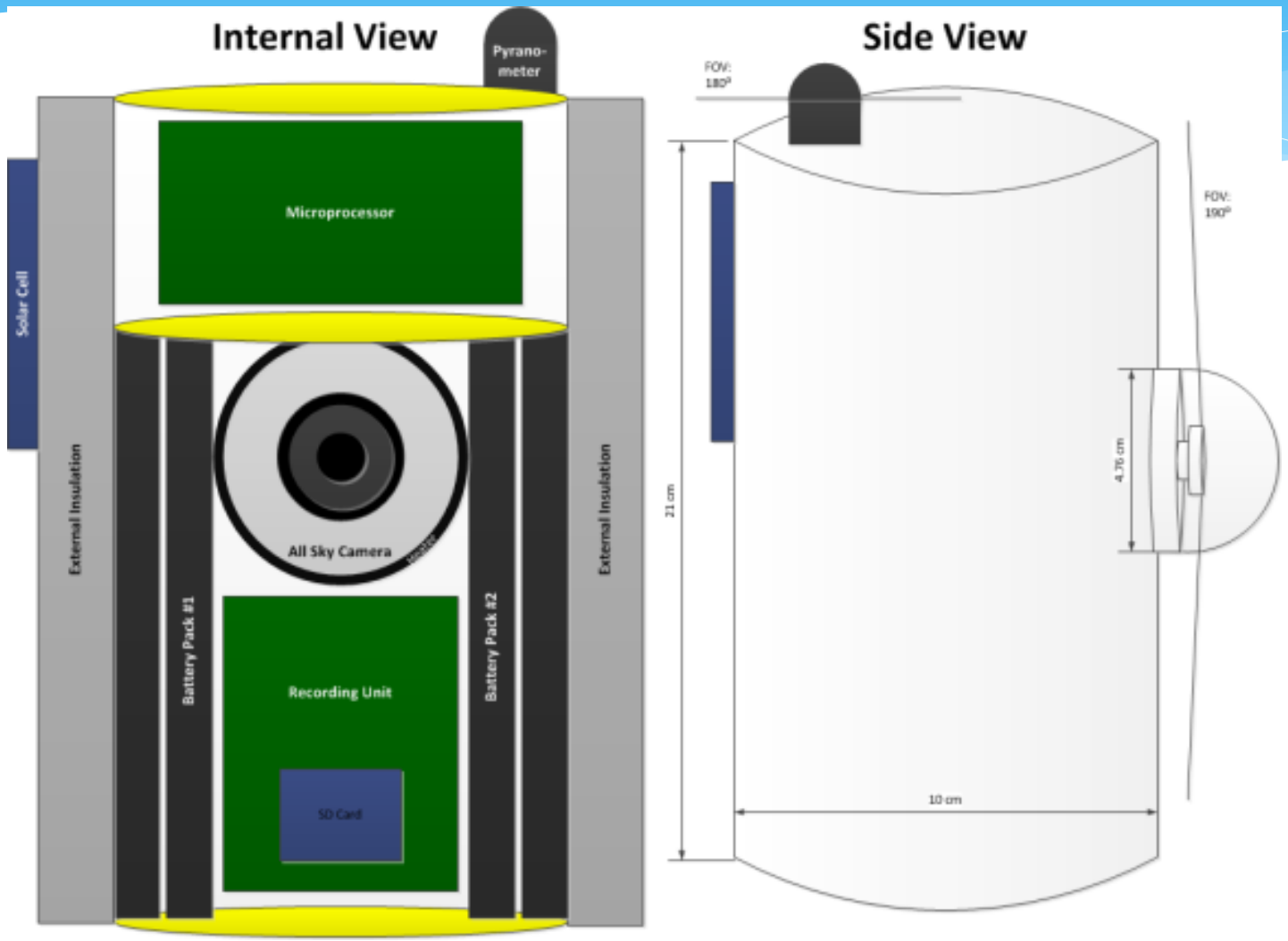




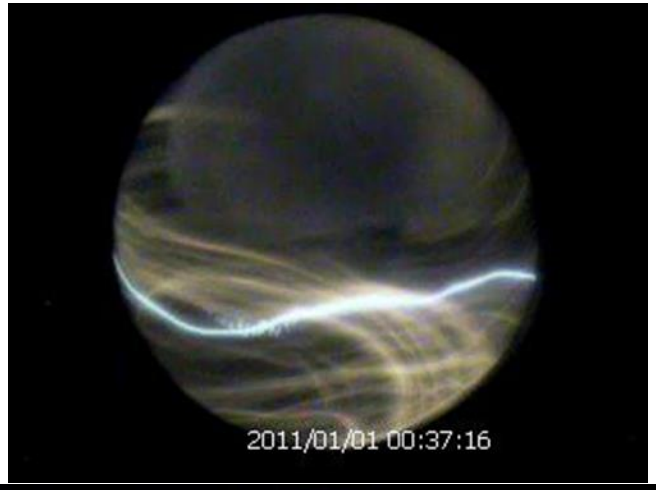
Block Diagram: Combination of Flight #1 and #2

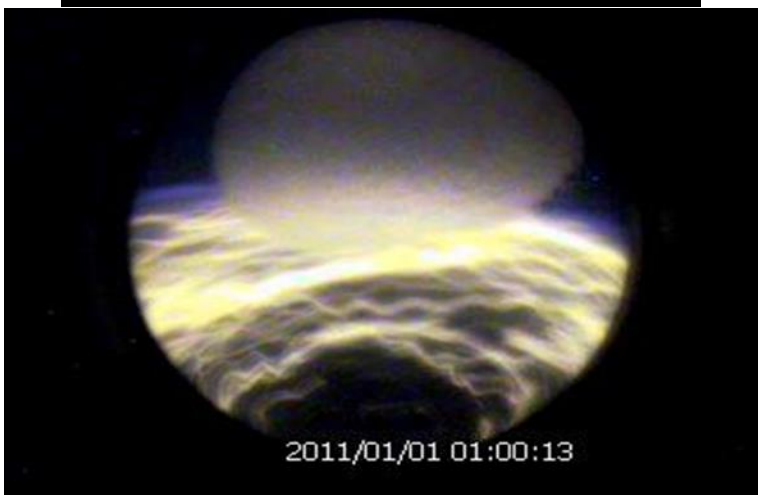


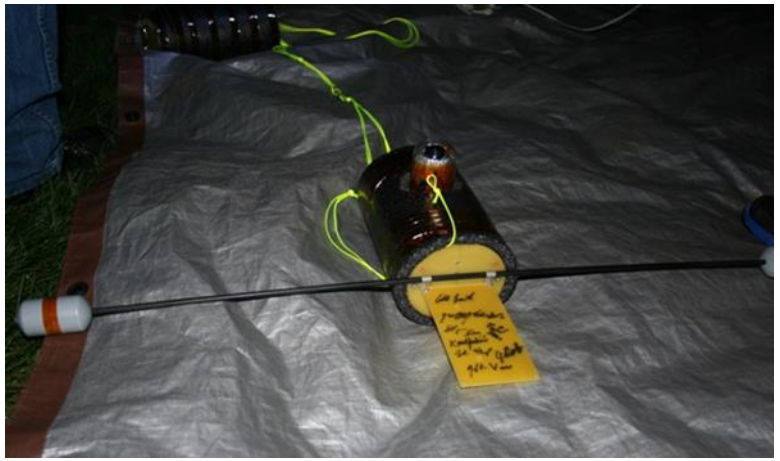
Mechanical Design: Combination of Flight #1 and #2

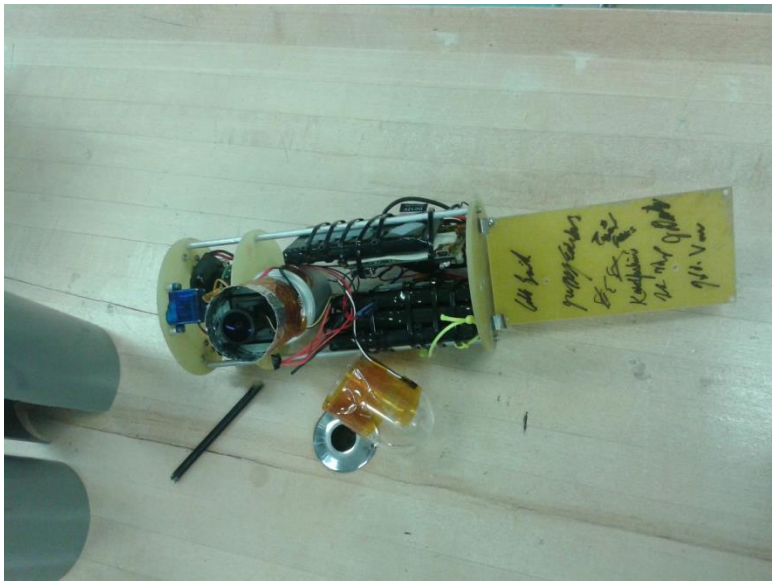


Flight #2 Nighttime: Results and Failure Analysis







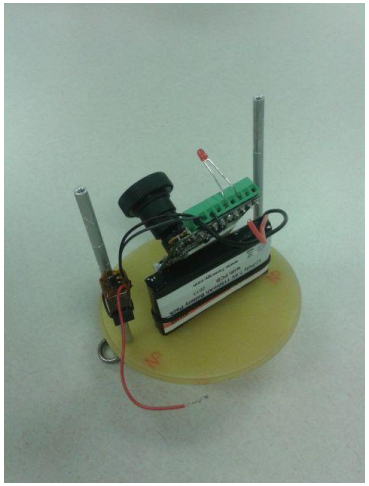


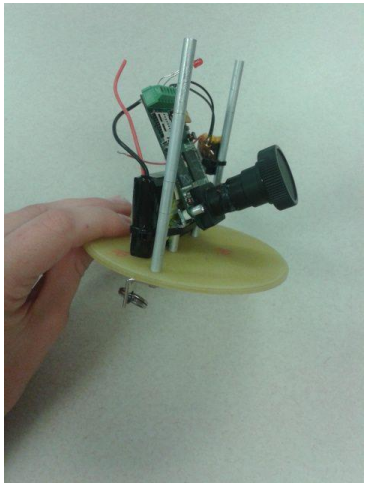
Project Specifications/Requirements

* All Sky Camera Specifications:
  * Effective Pixels across Field of View: 546x457
  * Field of View: 190°
  * Exposure time: (1/100,000) – 4 seconds
  * Sensitivity: Min 0.002 Lux

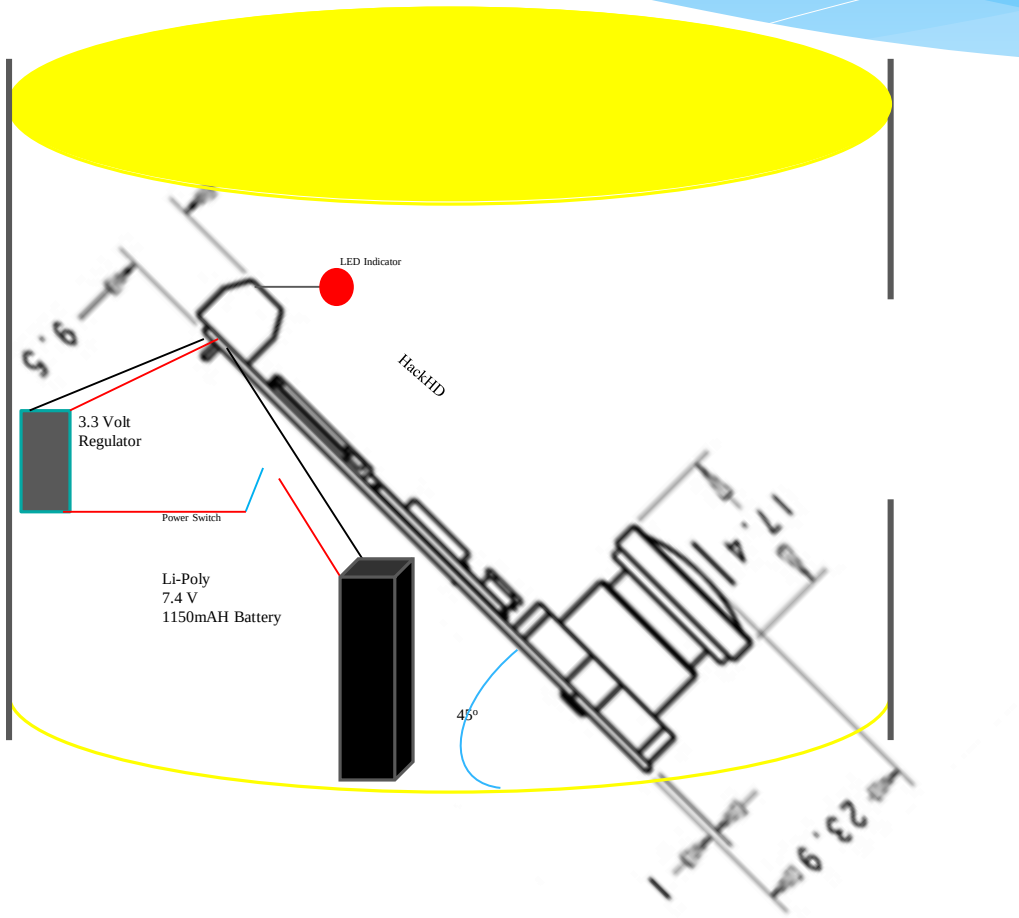
* The HackHD Specifications:
  * Resolution: 1080P HD
  * Frame Rate: 30 FPS (frames per second)
  * Aspect Ratio: 16:9
  * Lens: Interchangeable M12 Lens. Includes 2.5mm (EFL), F2.8, 160 degree (diagonal) wide angle lens
  * Video Output: Composite video 480P resolution
  * Dimensions: 65mm x 40mm x 25mm LxWxH
  * Power Supply: External 3.7V, 1100mAH minimum. 5V safe
  * Power Output: 3.7V DC, 500mAH
  * Working Temperature: -10degC to +45degC
  * Storage Temperature: -20degC to +70degC

Flight #3 Daytime: Pre-Flight and Design

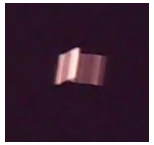
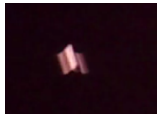
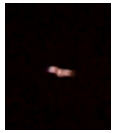


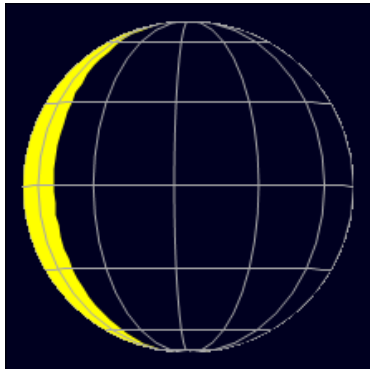


Mechanical Diagram: Flight #3



Flight #3 Daytime:
Results and Failure Analysis

 28097 feet/ 8564 meters 24:48 into the flight	 28445 feet/ 8670 meters 24:59 into the flight	 28465 feet/ 8676 meters 25:03 into the flight	 28465 feet/ 8676 meters 25:08 into the flight	 29058 feet/ 8857 meters 25:35 into the flight

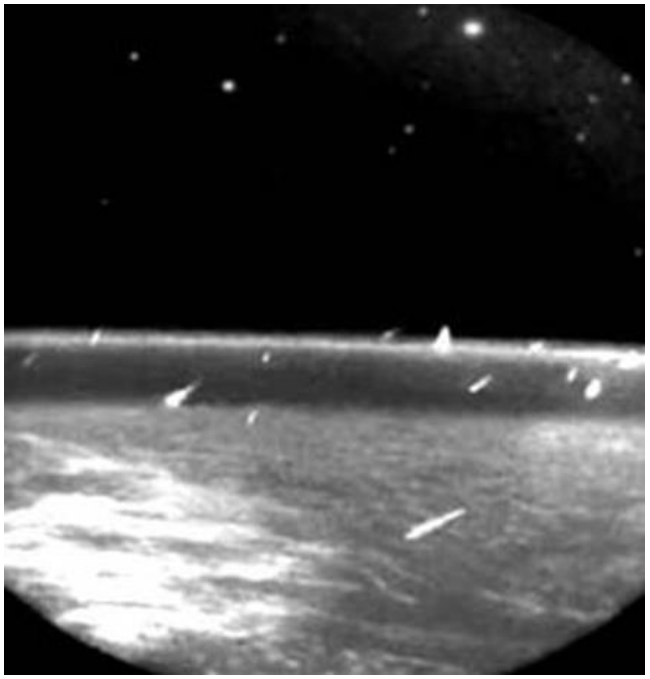


The Phase of the Moon at 09:27:38 on June 05, 2013 according to http://www.heavens-above.com/moon

Conclusions

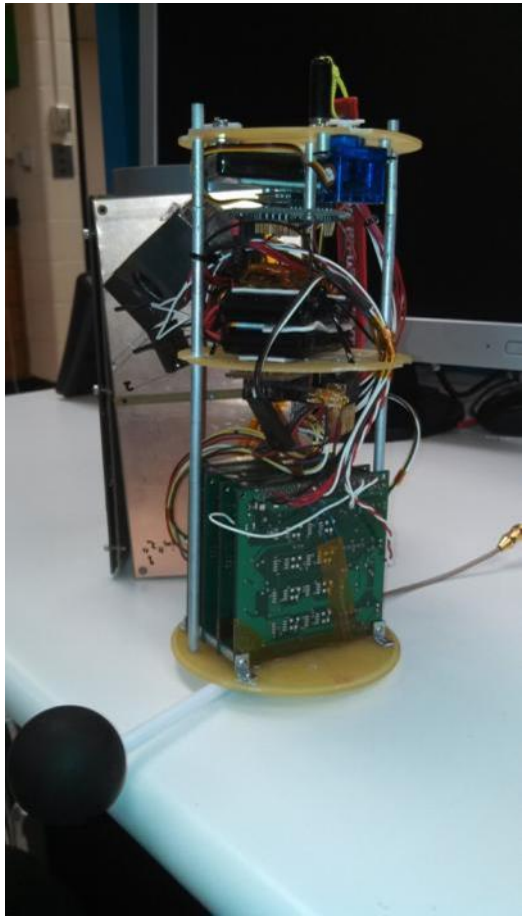
Next Step

http://www.space.com/12630-photos-perseid-meteor-shower-2011.html



http://www.solarspace.co.uk/Meteors.php

Educational Value



Questions?

Acknowledgements

* We would like to thank Dr. Hank Voss and Professor Jeff Dailey for helping us make our launch possible. Without them we would never have gotten off the ground. We also thank our fellow classmates for all the support and encouragement they provided and thanks to Moonglow Technologies and the HackHD for giving us this unique perspective and opportunity. Also, we would like to thank the UNP-AFSOR for the Student Satellite Grant, NSF CCIL Grant and the Indiana Space Grant Consortium for support of this project.