

THERMAL CAMERA CONTROL

Ramses Alcaide

Team Lead

John Thomson

Electrical Lead

Adrian Haruta

Mechanical Lead

QUICK UPDATE

- Aerogel was approved
- All Equipment Ordered
- Prototyping in Process
- New Design Has Increased Budget

DESIGN CRITERIA

- Handle 1200C Heat for 2 min
- Rotate in 20 Sec
- Handle 50 MPH Wind
- Keep Camera Under 50 C
- Record Infrared Data
- Rotate 360 Degrees
- Less than 50 lbs

ELECTRICAL COMPONENTS

John Thomson

COMPONENTS LIST

- Thermopiles
- Processor
- Amplifier
- Lens
- Motor

CONTROLLER: MODIFICATIONS MADE

- Nonlinear Controllers / Estimators = BAD
- Replacement: Kalman Filter
- New sensors needed: Thermopiles

ELECTRONICS PARTS SELECTION

- Microcontroller:

- Cost
- Simplicity
- Support



- Motor / Driver

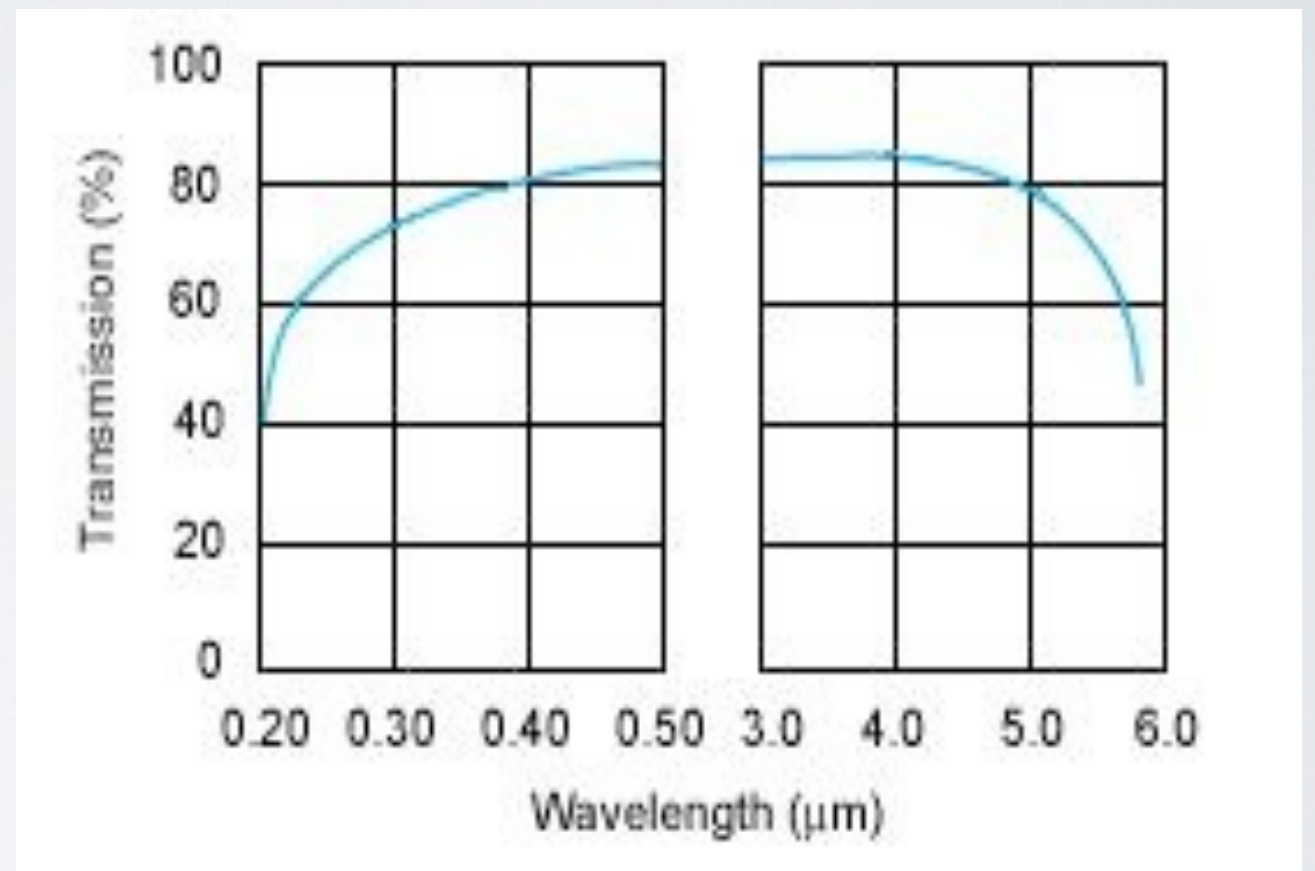
- Quad encoder
- Two way directionality
- Strength



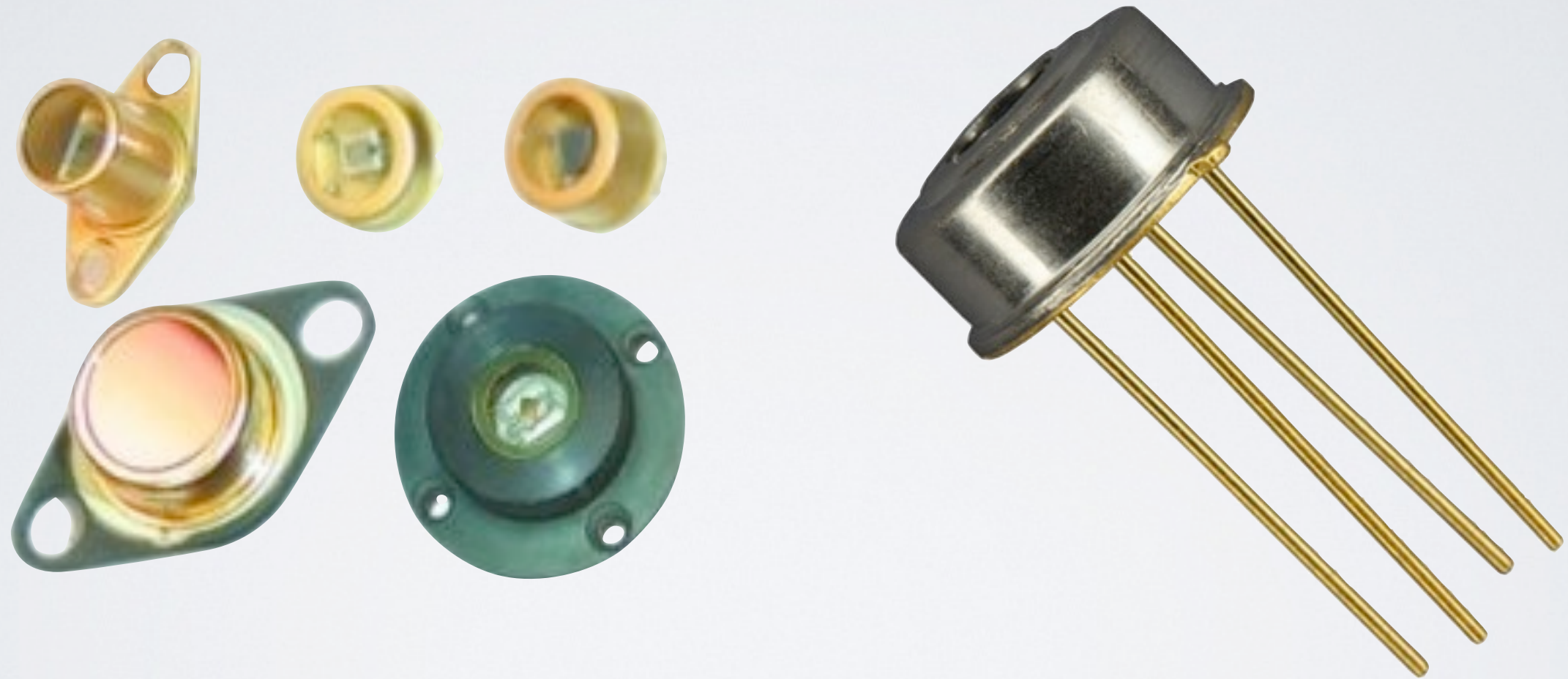
WINDOW SELECTION



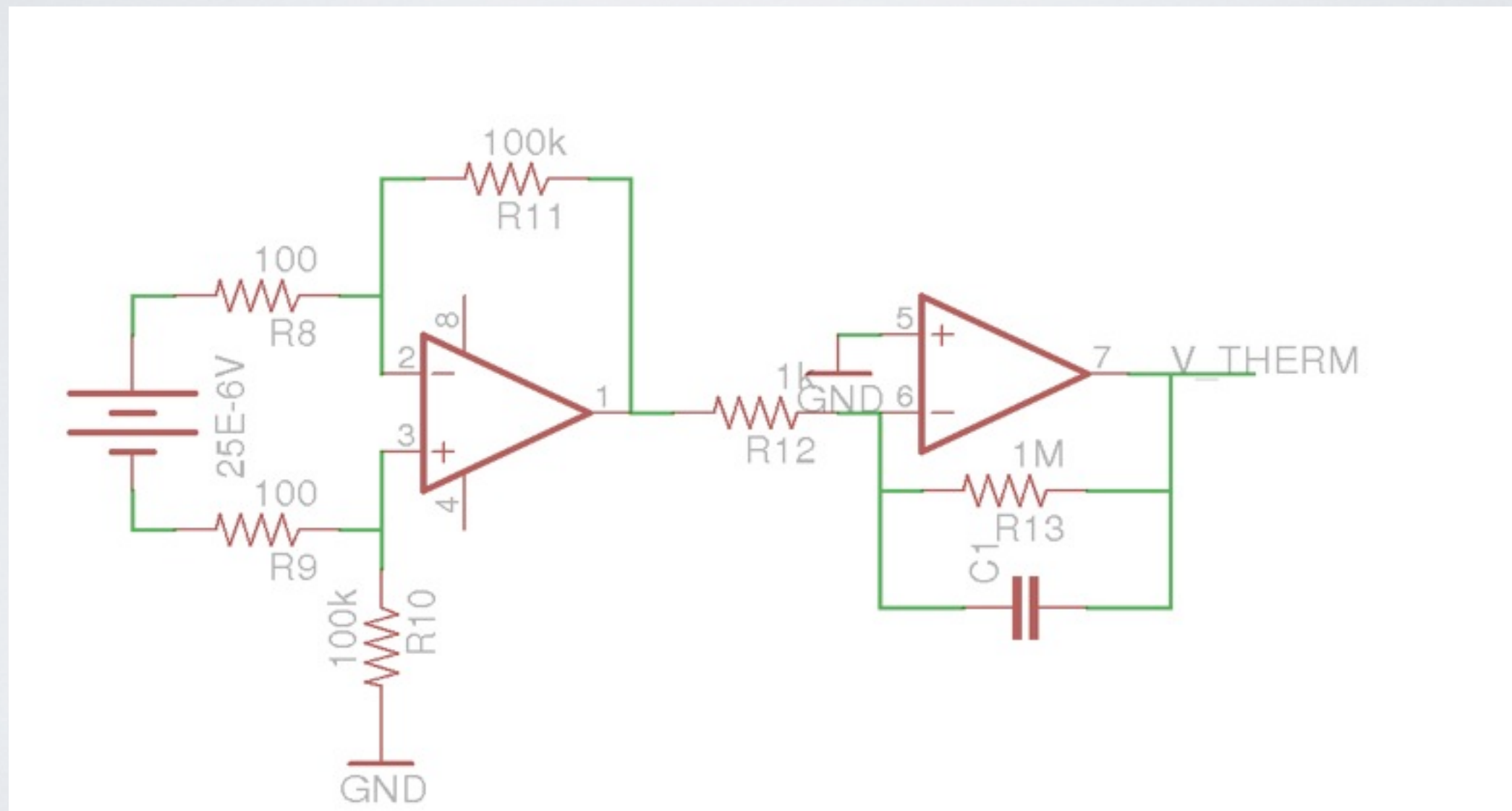
WINDOW SELECTION



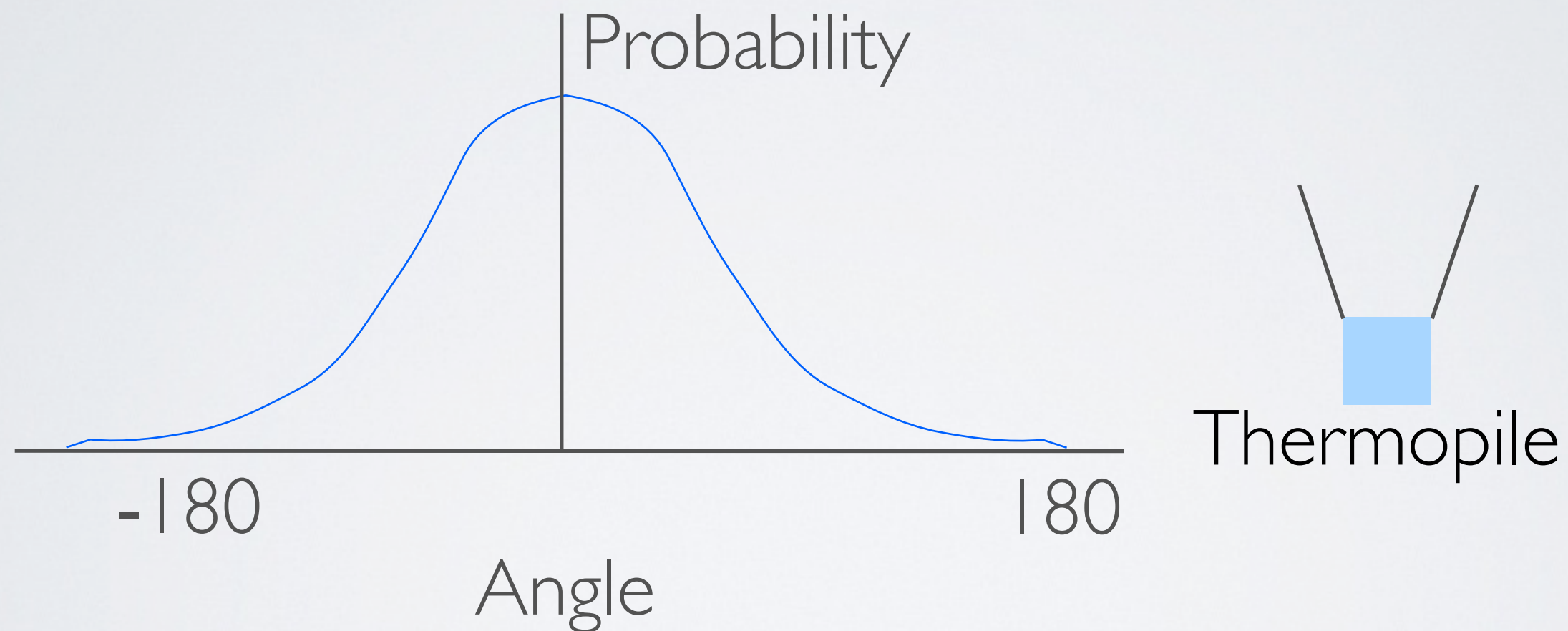
THERMOPILE SELECTION



ELECTRONICS:THERMOPILE AMP



FIRE ESTIMATOR: KALMAN FILTER

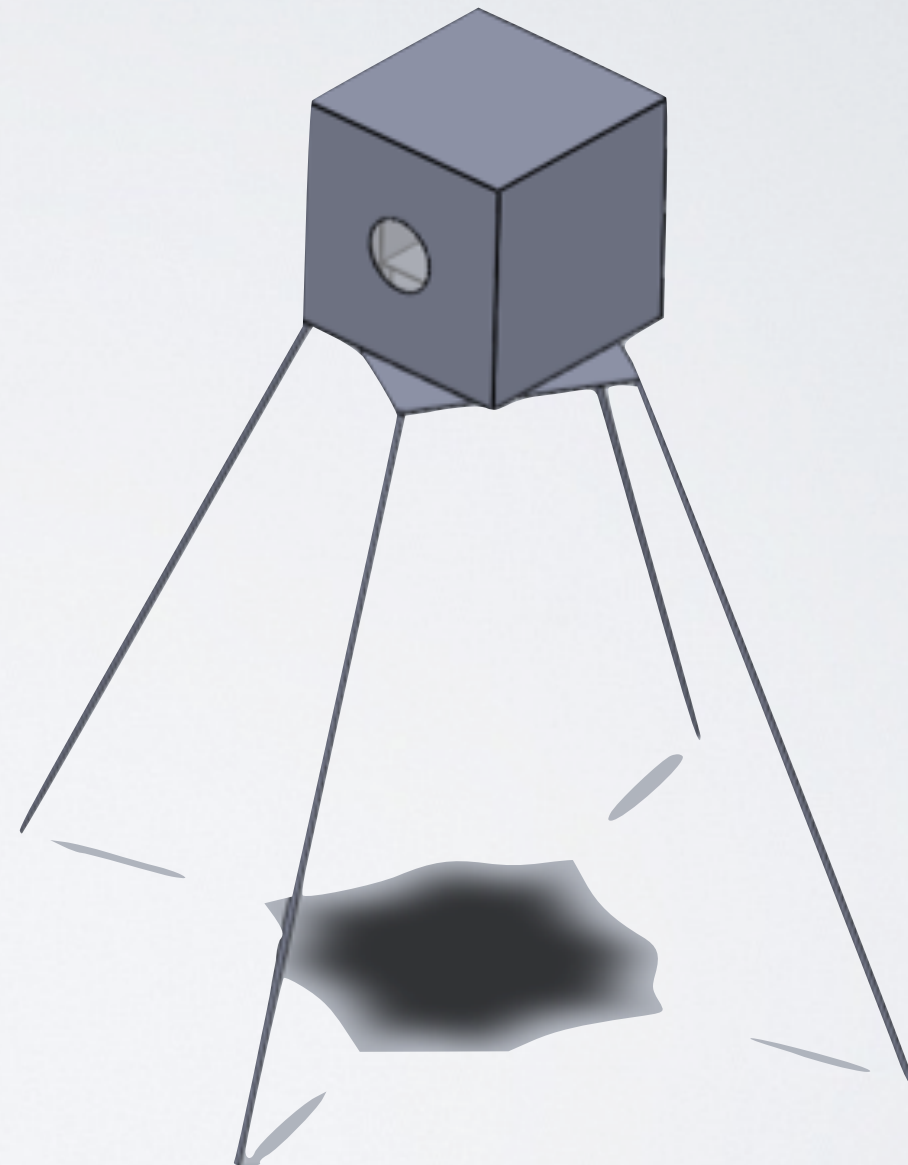


MECHANICAL COMPONENTS

Adrian Haruta

COMPONENT LIST

- Inconel
- Aerogel
- Phase Change Material
- Rotational System



INCONEL

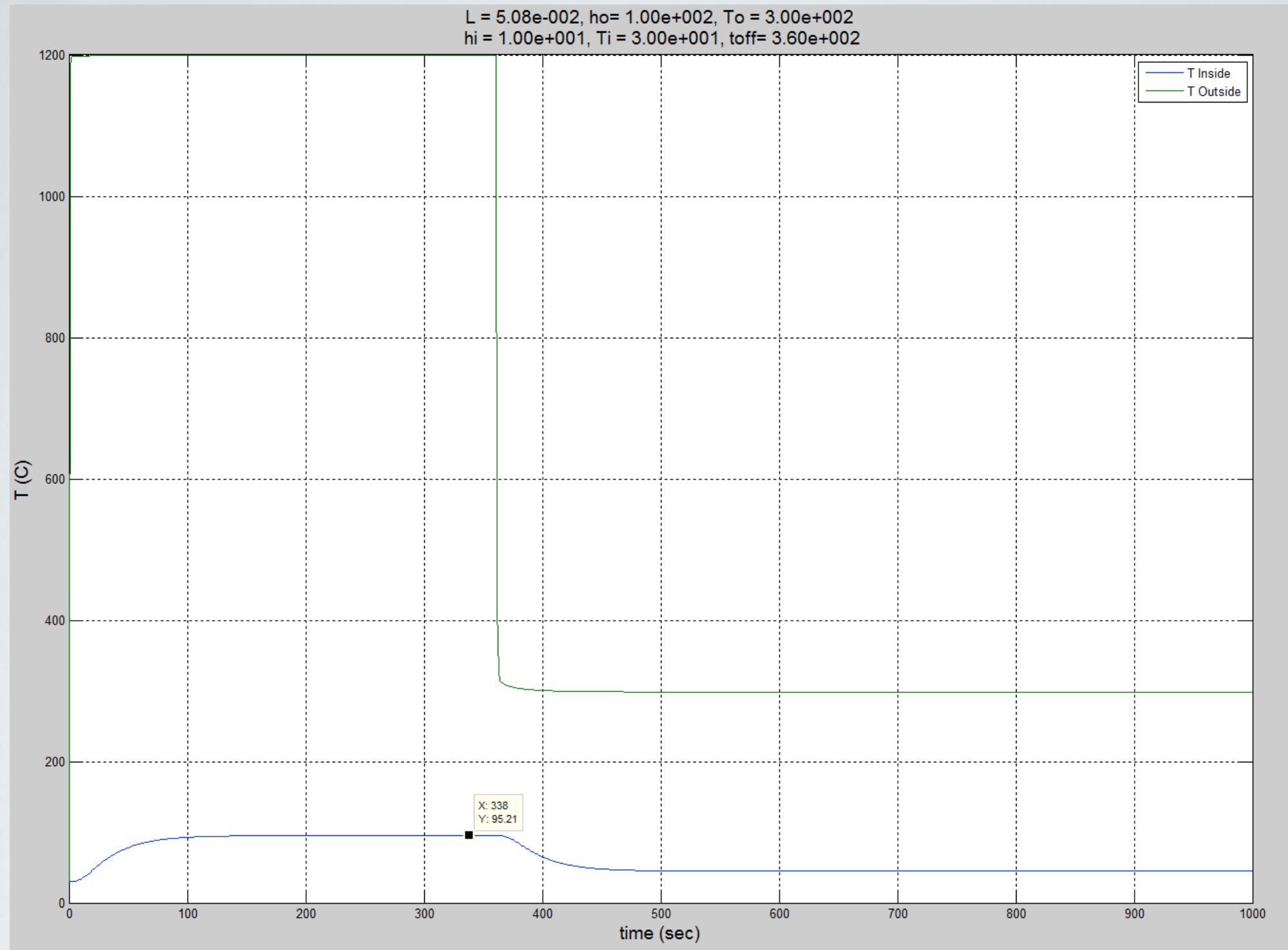
- Super Alloy
- Nickel-Chromium Alloy
- Highly Corrosion and Oxidation resistant
- Can withstand 1200C



AEROGEL

- Silica Nanogel
- Lowest Thermal Conductivity of any Material
- Very Low Weight 99% Air
- Lowest Bulk Density of Any Known Porous Solid



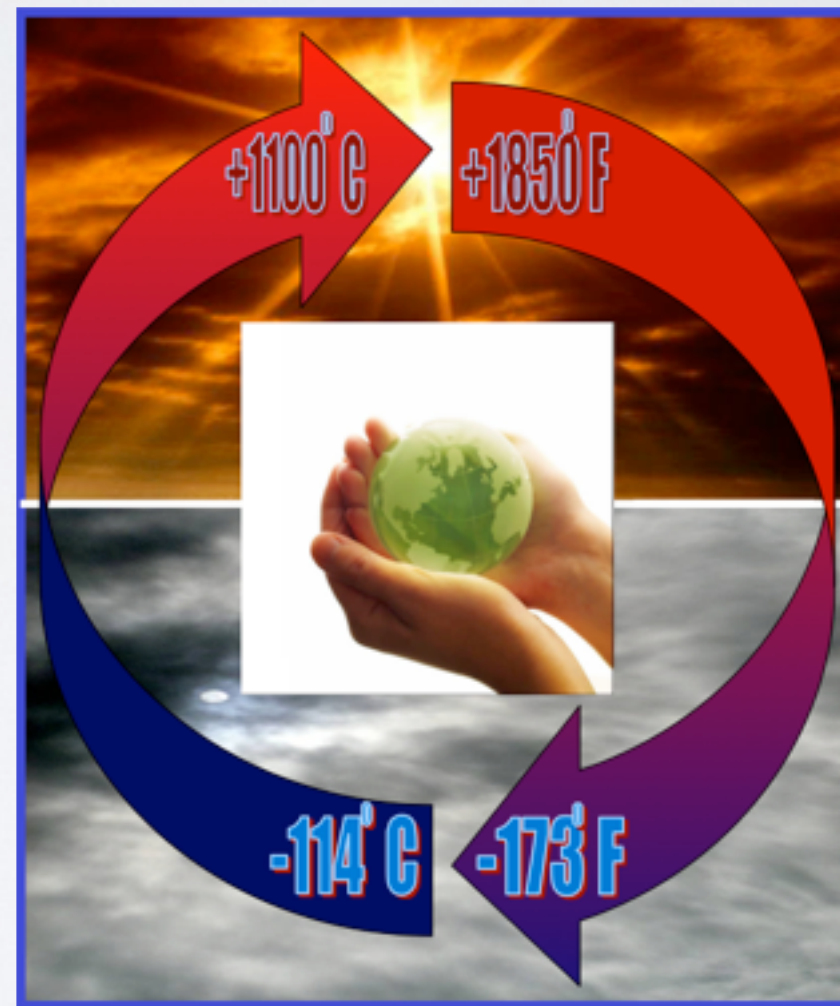


2 inch thick Aerogel exposed to 1200C for 6 minutes SS = 44.97C, peak temperature 95.19C

PHASE CHANGE MATERIAL

- Plus Ice PCM
- Solid-Solid Phase Change
- 40C Phase Change
- High Energy Absorption

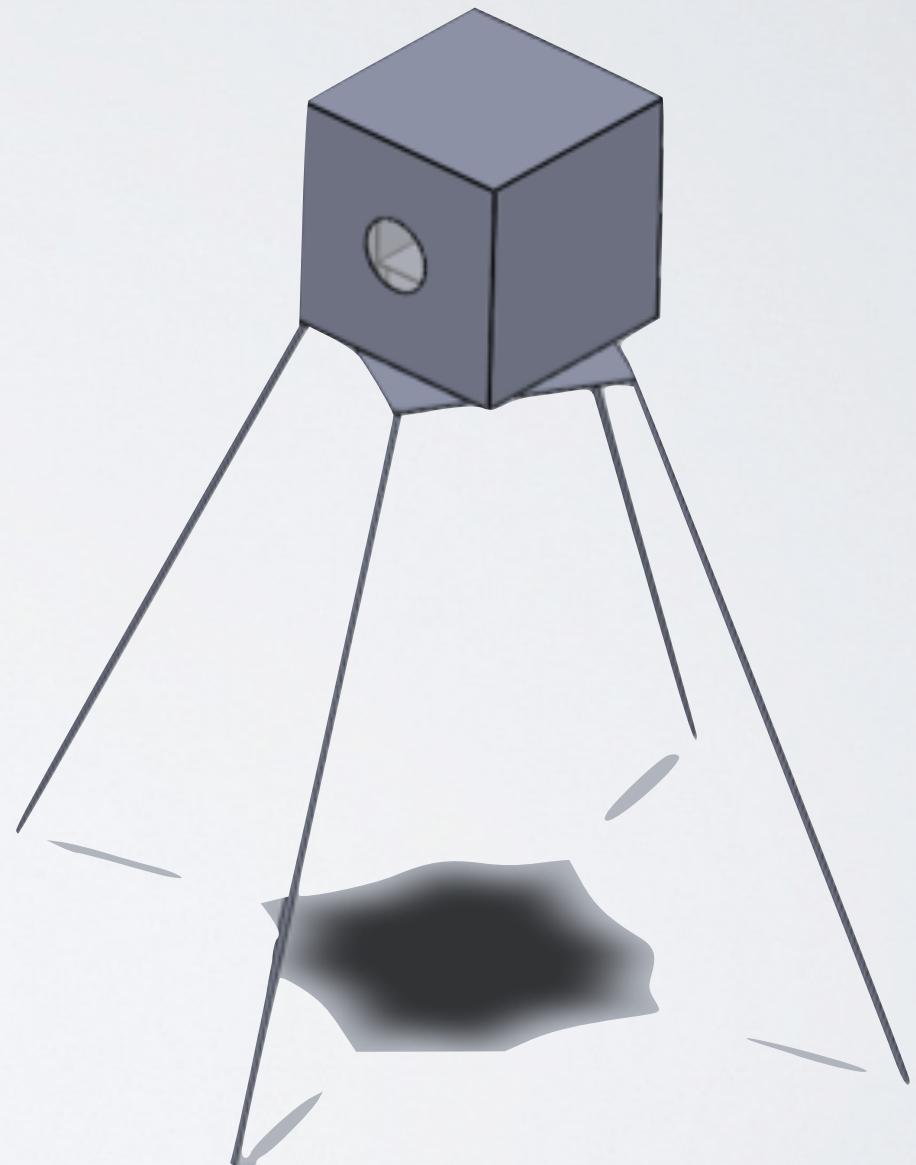
PlusICE[®]
Phase Change Materials



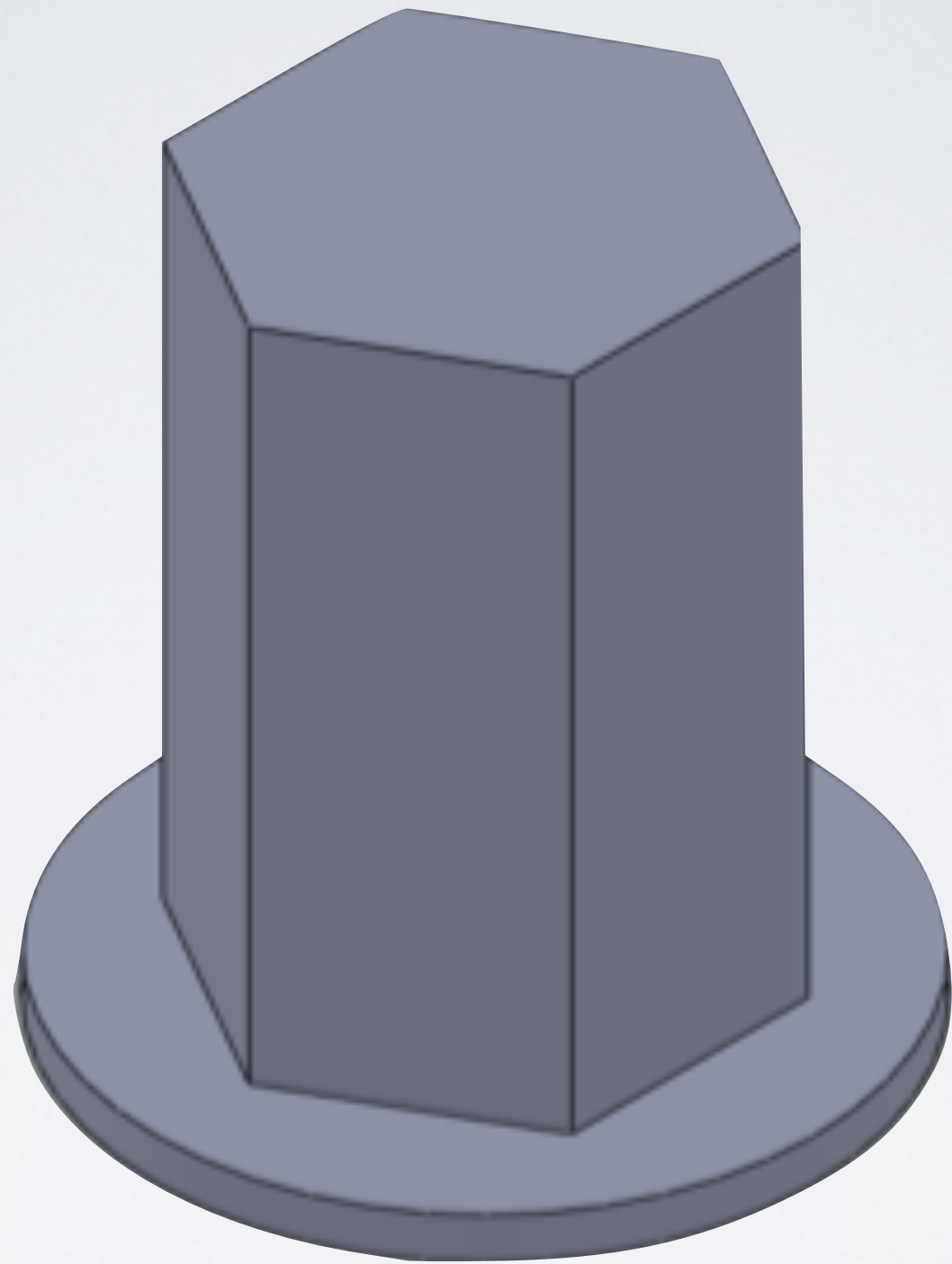
 **PCM** PHASE CHANGE MATERIAL PRODUCTS LIMITED

ROTATIONAL SYSTEM

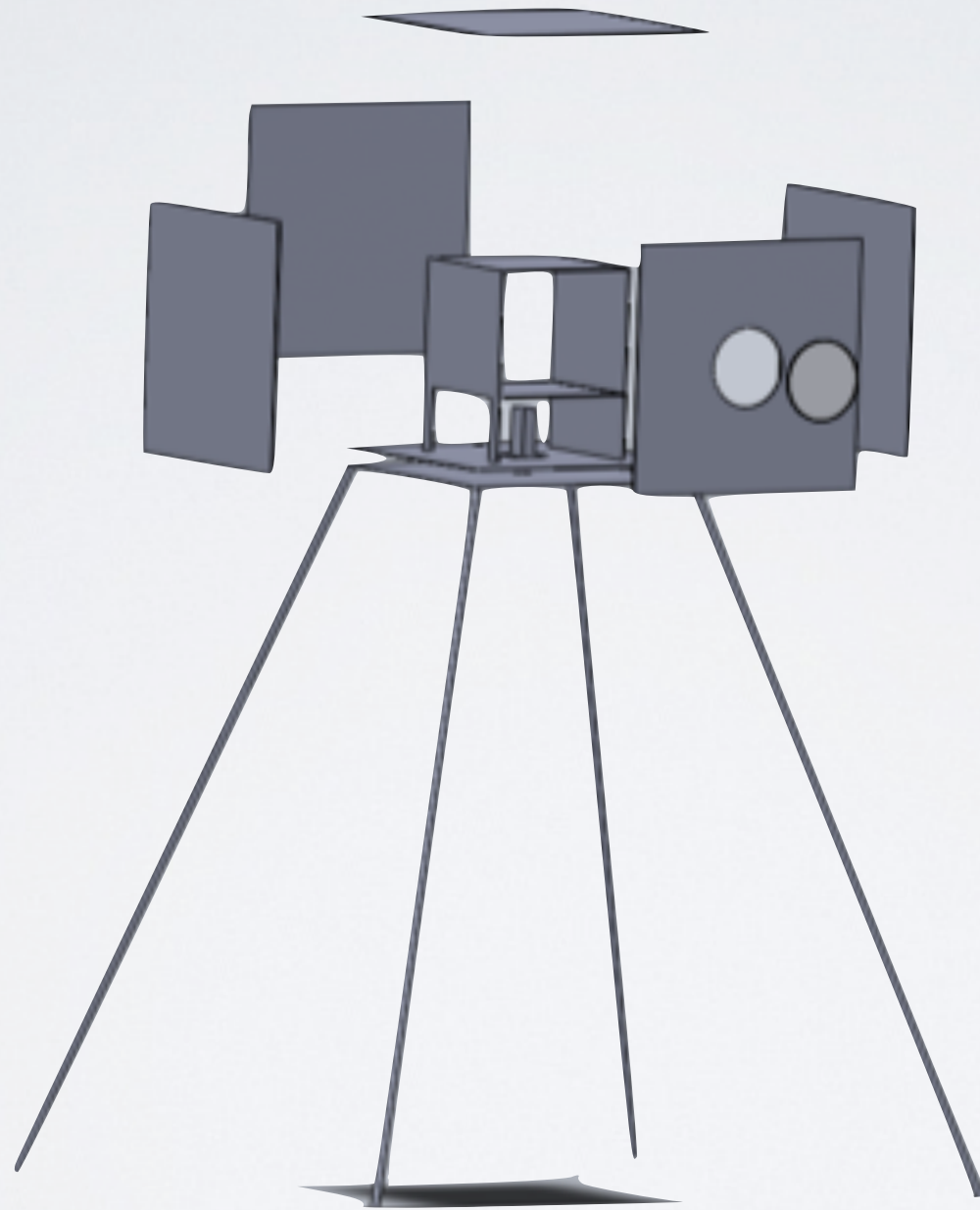
- Hexagonal Bearing Rotation
- Fully Enclosed
- Detachable
- 360 Degree Rotation







FINAL DESIGN



REFERENCES

Haynes 214

Haynes: H3008 PDF

www.haynesintl.com/pdf/h3008.pdf

PIR Sensor Characteristics

Futurlec: <http://www.futurlec.com>

FiberFrax Blanket S

FiberFrax: Form C-1462 Insulfrax S Blanket 12-08 PDF

<http://www.fiberfrax.com/>

Solid Solid Phase Change Material

Plus Ice: solid_solid_pcm_range PDF

http://www.pcmproducts.net/Solid_Solid_PCMs.htm

Sapphire Optics

Red Optronics: <http://www.redoptronics.com>

[/sapphire-optical-material.html](http://www.redoptronics.com/sapphire-optical-material.html)

Circuit Diagram

Sparkfun Electronics: <http://www.sparkfun.com>

Digikey Corp.: <http://www.digikey.com>

Inconel

Inconel Alloy 718.pdf

Phase Change Material

Phase Change Material Products Unlimited: http://www.pcmproducts.net/Solid_Solid__PCM.htm