

# MLI Pressure Sensor Virtual Design Review 1

Team 11 Members:

Qinjie Chen  
Justin DiEmmanuele  
Jordan Eljaiek  
Benjamin Hallstrom  
Marie Medelius

Senior Design Coordinator:  
Shayne McConomy



# Introduction



Ben Hallstrom  
Team Lead



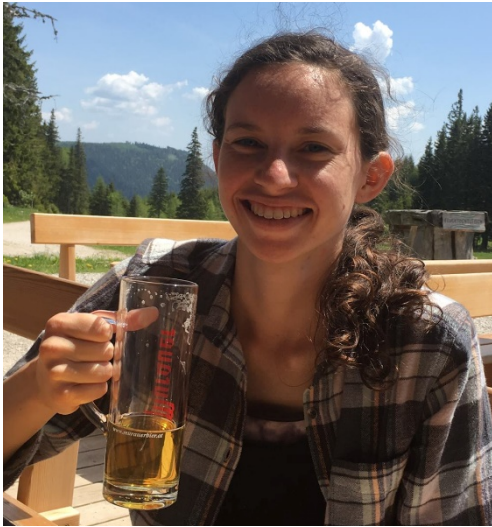
Jordan Eljaiek  
Assistant  
Team Lead



Qinjie "Sam" Chen  
Design Lead



# Introduction



Marie Medelius  
Treasurer



Justin DiEmmanuele  
Secretary



# Description & Background

- Compact pressure sensing device
- Measure Multi-Layer Insulation (MLI) interstitial vacuum
  - Alternating layers of Double Aluminized Mylar (DAM) and Dacron spacers
  - Placed in vacuum sealed wall
- Measure 760 torr to  $10^{-4}$  torr



# Description & Background

- Radiation protection of cryogenic propellant tanks for NASA
  - Spacecraft & satellites
- Pressure needs to be less than  $10^{-3}$  torr
  - At higher pressure the residual gas provides increasing thermal conductivity
- Measure ability to achieve vacuum



# Project Scope

- **Key Goals**
  - Measure 760 torr to 10<sup>-4</sup> torr
  - Minimize Size
  - Minimize Power Consumption
- **Primary Market**
  - Aerospace industry
  - NASA-Marshall Space Flight Center (MSFC)
- **Secondary Market**
  - Cryogenic research
  - Meat-packing industry
  - Meteorological field
  - Nuclear energy field



# Customer Needs

1. Measure 760 torr to  $10^{-4}$  torr
2. Operate at 77K
3. Minimally invasive to the MLI blanket
4. Sample 1 per second
5. Minimize power consumption
6. Minimal parts, wires and size



# Functional Decomposition

- Must react to a change in pressure
- Has to output a signal that is proportional to the change in pressure
- Take a sample once every second
- Avoid interference with MLI components
- Maintain integrity under all experienced temperatures





# Resources

Bellini, S; Carvalho, J.; Johnson, S.; Kiefer, M. (2017). Development of a Compact Pressure Sensor for Multi-Layer Insulation in a Vacuum. Retrieved from [https://www.eng.famu.fsu.edu/me/senior\\_design/2017/team15/index.html](https://www.eng.famu.fsu.edu/me/senior_design/2017/team15/index.html).

McConomy, S. (2017). Senior Design Project Definition. Retrieved from <https://famu-fsu-eng.blackboard.com>

