High power densities up to 1400 W/cm² are expected to be produced by electronic subsystems in next gen aircrafts. These expectations present a significant thermal management problem for these components that would degrade under their own power generation. Air Force Research Laboratory has partnered with universities to actively research cooling solutions to address the issue.

**Background**

- High power densities up to 1400 W/cm² are expected to be produced by electronic subsystems in next gen aircrafts.
- These expectations present a significant thermal management problem for these components that would degrade under their own power generation.
- Air Force Research Laboratory has partnered with universities to actively research cooling solutions to address the issue.

**Goal & Objective (Winter 2020)**

- **Goals:** Test how high Rod temp can get, design a user friendly cooling technique for Liquid Nitrogen, create a labview code to read multiple temps in real time
- **Objective 1:** Conduct heating test to determine average temp Rod reaches in an hour
- **Objective 2:** Design a technique for liquid nitrogen cooling so user does not have to cotinously deal with -40C Nitrogen directly
- **Objective 3:** Learn LabView fundamentals and create a multi temp reading program

**Budget**

We are funded by UROP and Samueli School of Engineering at UCI. Awarded $830 until June 30, 2020.

**Current Rod Design**

![Current Copper Rod design and heat cartridge holder. Cu rod diameter is 0.75 inches, and has 4 holes for thermocouples](image)

**Vacuum Insulated Chamber**

Vacuum insulated chamber that can handle cryogenic and high temperatures (400°C+) on a structure made using calcium silicate.

**Cooling Solution**

![Isometric CAD view of cooling solution and vacuum chamber assembly](image)

**General A.Y. Project Timeline**

- **Fall 2019**
  - Develop project and Cu Rod design understanding
  - Order new heat cartridge and adjust rod design
- **Winter 2020**
  - Develop a cooling chamber for LN2
  - Create a LabView code to acquire multiple temperature readings
- **Spring 2020**
  - Work with LN2 dewar tank and vacuum pump
  - Continue tests and adjust design to better results

**The Team:**

- **Newsha Nejatfard** (Team Lead)
- **Alan Manriquez**
- **Juan Plascencia**
- **Sriram Velmanikandan**
- **Adetola Soyemi**

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*See HHF member for any questions/comments*