Honeybee Robotics Summer Internship

Project: Lunar Instrumentation for Subsurface Thermal Exploration with Rapidity (LISTER)

Mentor: Luke Sanasarian
(Honeybee Robotics)

Xenia Estey
(Citrus College)

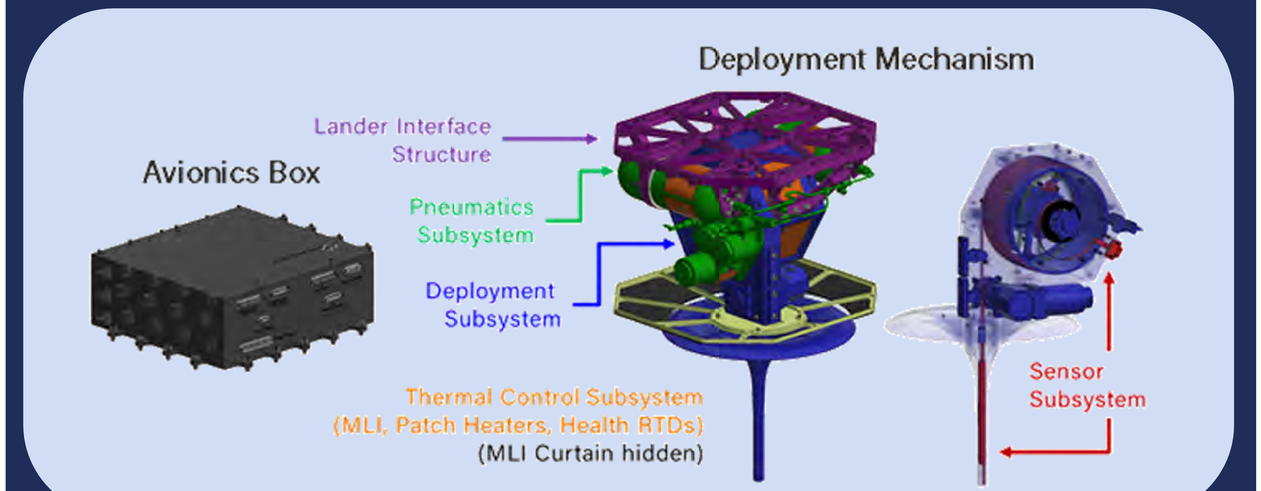
Project Description:

Who:

- Collaboration between Texas Tech Professor Seiichi Nagihara and Honeybee Robotics
- Funded by NASA's CLPS program

What:

a pneumatic drill developed to measure the thermal gradient and conductivity of the lunar subsurface penetrated by its drilling probe tip



How It Works:

- Drills up to 3 meters deep into the lunar surface using pressurized N2 gas contained within the 2 gas tanks and circulated through the pneumatics subsystem and the coiled tubing
- Measures the temperature and rate of temperature rise when applying heat to regolith at multiple depths to determine the thermal gradient and thermal conductivity

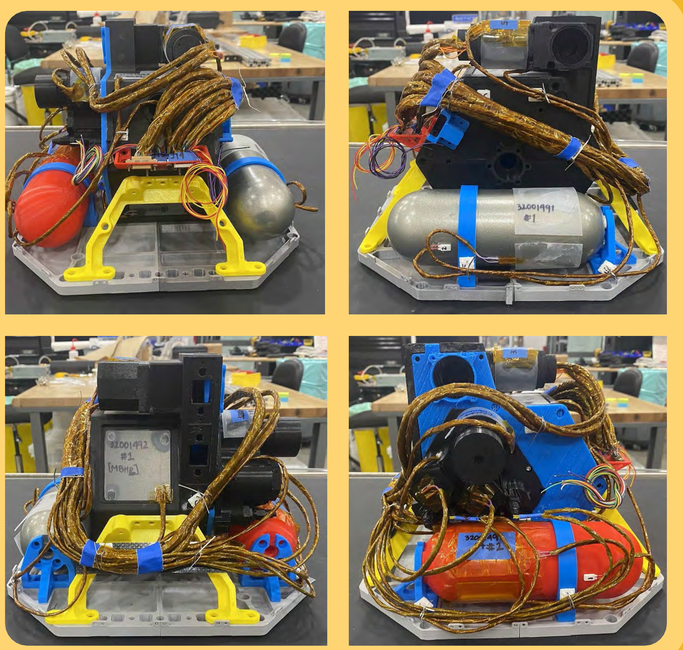
Acknowledgements:

I would like to thank Honeybee Robotics and everyone at their Altadena Exploration office, Luke Sanasarian, Zach Mank, the LISTER team, Pathways to STEM, the Citrus College Summer Research Experience program, Dr. Marianne Smith, Monica Hernandez, and the STARS Program, a U. S. Department of Education Title III HSI-STEM grant for funding this opportunity.

What I Did:

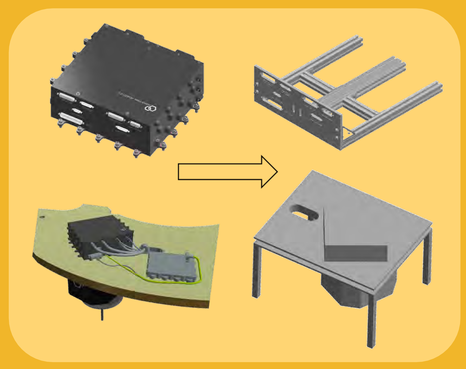
Configured Harnessing Mockup

- 3D printed and assembled 1:1 scale mockup with all components and wires
- Configured wire-routing
- Following NASA workmanship standards, determined the location of and created fake splices
- Documented process and final splice locations
- Wrapped and bundled wires using layers of shield and kapton tape



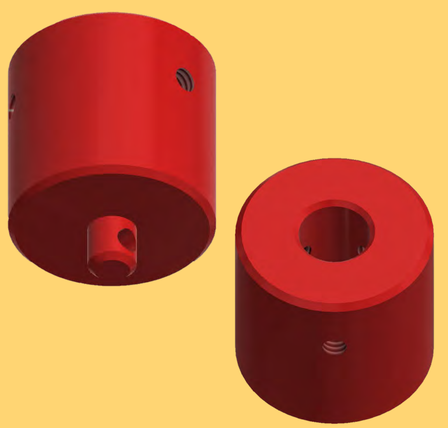
Wire harnessing is an assembly of wires bound together by durable material. It is an important, often overlooked part of every mechanism. The more components a system has, the more complicated the wiring. Harnessing is particularly important in the aerospace industry as in addition to the electrical importance, it also needs to withstand extreme vibrations during takeoff.

Designed Supports for Mockup



CAD Program Used: Autodesk Inventor

Designed "Remove Before Flight" Cap for Dust Deflector



Assembled Pneumatics Subsystem in ISO 7 Cleanroom

Alternate Text

Xenia Estey

'Project: Lunar Instrumentation for Subsurface Thermal Exploration with Rapidity (LISTER)'

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Visual representation of relevant different parts and mechanisms.

How it works: Drills up to 3 meters deep into the lunar surface using pressurized n2 gas contained within two gas tanks and circulated through the pneumatics subsystem and the coiled tubing. [It] measures the temperature and rate of the temperature when applying heat to regolith at multiple depths to determine the thermal radiant and thermal conductivity.

What I did: Configured Harnessing Mockup: 3D printed and assembled 1:1 scale mockup with all components and wires. Configured wire-routing following NASA workmanship standards, determined the location of and created fake splices. Documented process and final splice locations. Wrapped and bundled wires using layers of shield and Kapton tape.

Images of wire wrapping

Wire harnessing is an assembly of wires bound together by durable material. It is an important, often over looked part of every mechanism. The more components a system has, the more complicated the wiring. Harnessing is particularly important in the aerospace industry as in addition to the electrical importance, it also needs to withstand extreme vibrations during take-off.

Designed Supports for Mockup.

Image labeled *CAD Program Used: Autodesk Inventor.*

Designed "Remove Before Flight" Cap for Dust Deflector.

Visual representation of cap

Assembled Pneumatics Subsystem in ISO7 Clean room.

Image with subsystem

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