

Control System Development and Testing of the Hydrothermal Vent Sampler (HVS)

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JPL Robotic Vehicles Group

Famous Quote

- *Imagination will often carry us to worlds that never were. But without it we go nowhere.*

-Carl Sagan

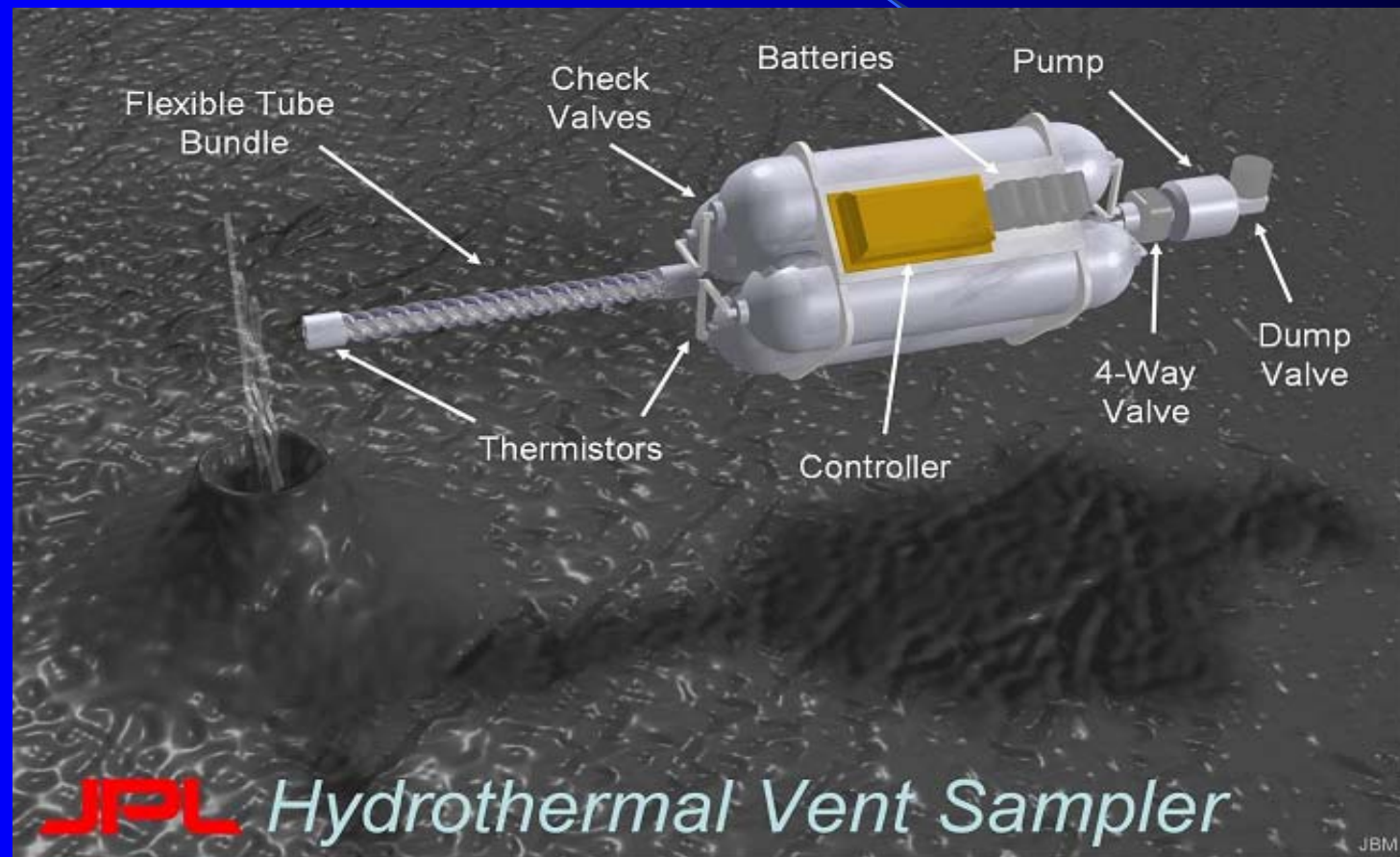
Topics Covered

- My Job
- HVS System Concept
- HVS System Objectives
- Importance of HVS Project
- Mechanical System
- Control System Concept
- Development and Testing, Future Work
- JPL Pictures

What is my job?

- Design, Build, and Test Engineering.
- Design the electrical control system on paper.
- Find off-the-shelf hardware that will work.
- Build the subsystems.
- Test the subsystems in lab. We try to mimic environmental conditions.
- Repeat steps and modify system as necessary.

HVS System Concept



HVS System Objectives

- To develop an *in-situ* instrument that collects deep-ocean hydrothermal vent fluids from four different temperature regimes and filter out biological material without contamination from the surrounding cold water.
- To keep the captured biological material at 85°C to ensure survival for bio-analysis at the ocean surface.
- To ensure system survival at an ocean depth of 6500 meters.

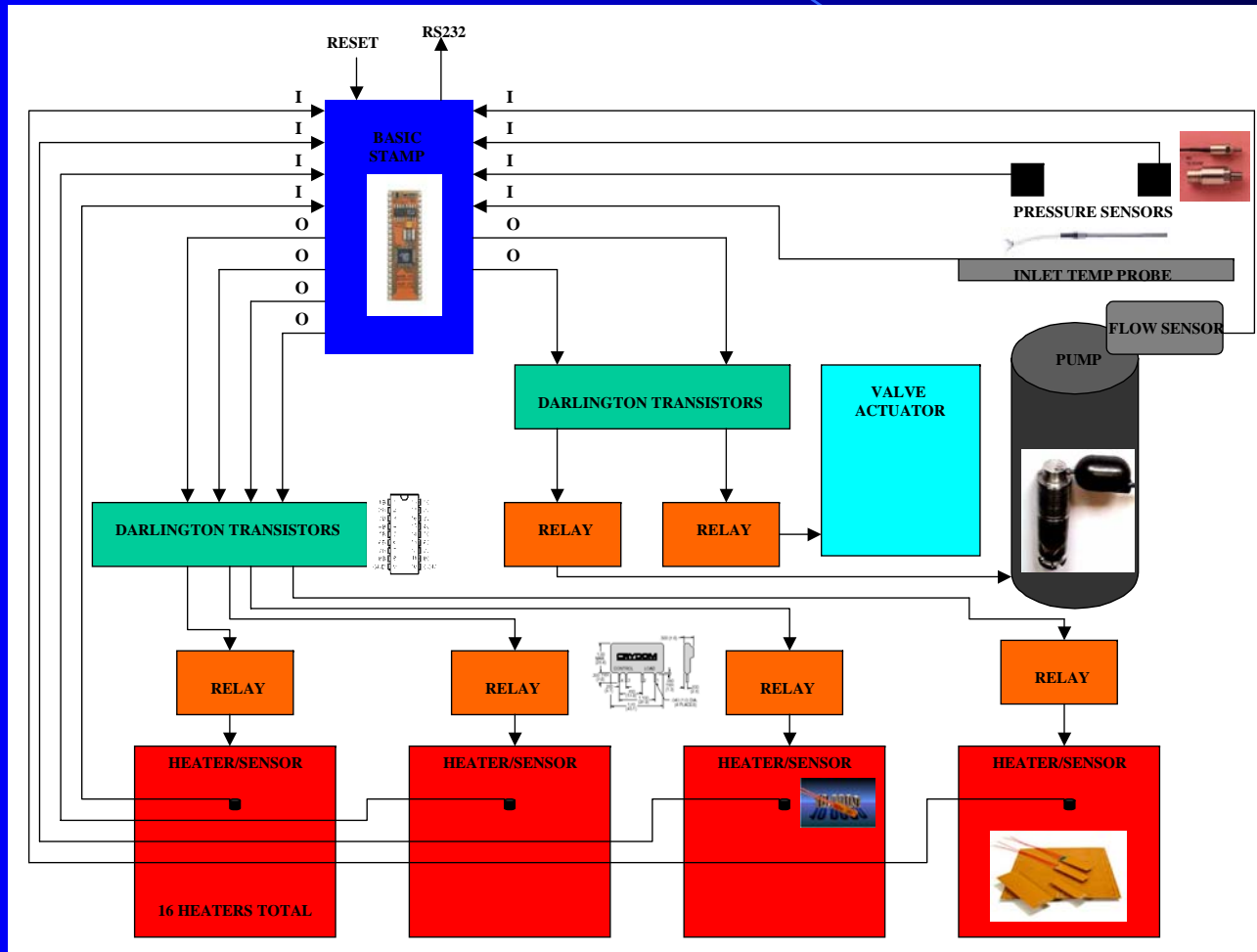
Why is the Project Important?

- Funded by NASA ASTID Program (Astrobiology Science and Technology Instrument Development).
- Space mission traceability.
- Supports NASA's Origins of Life Program.

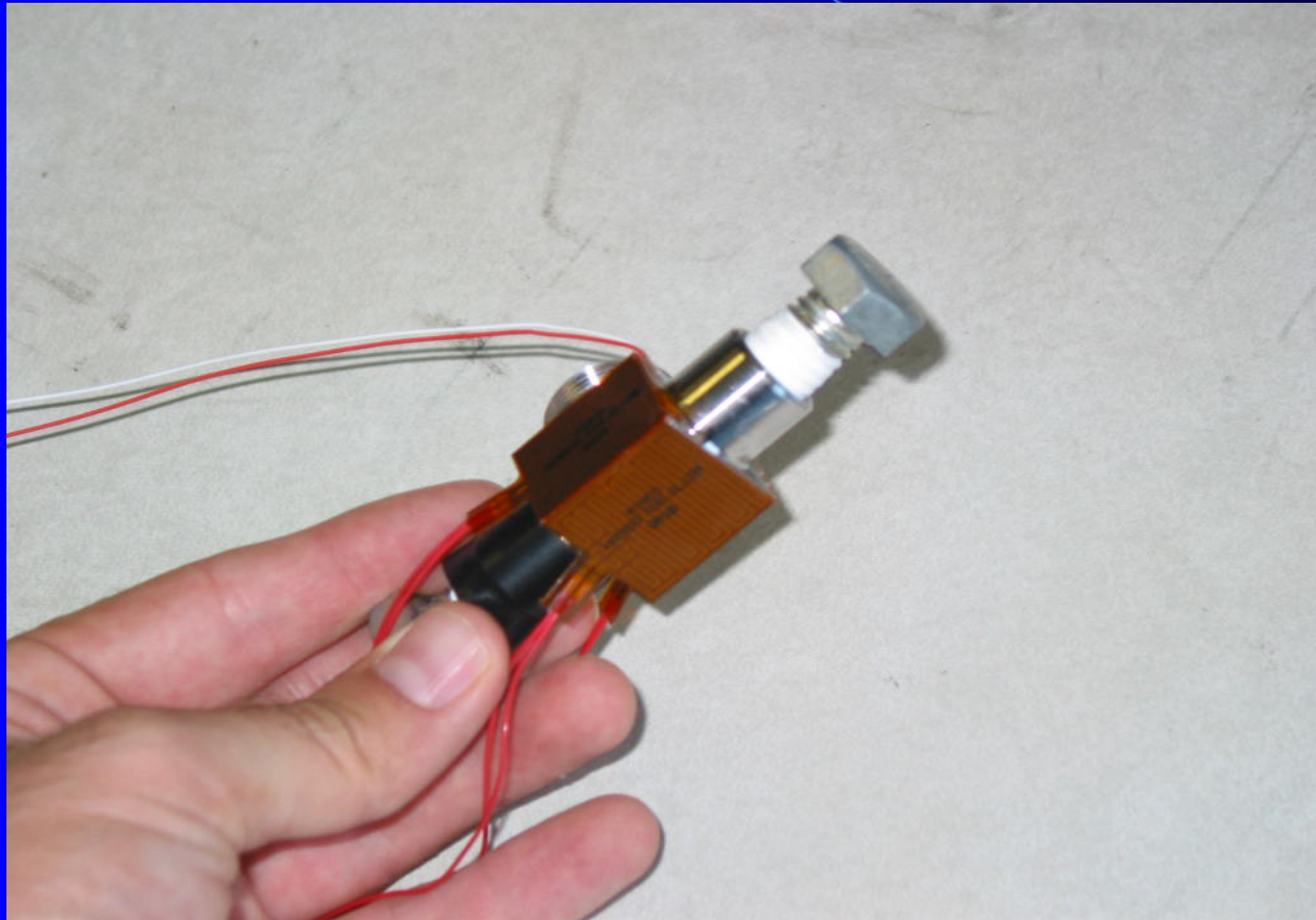
Mechanical System



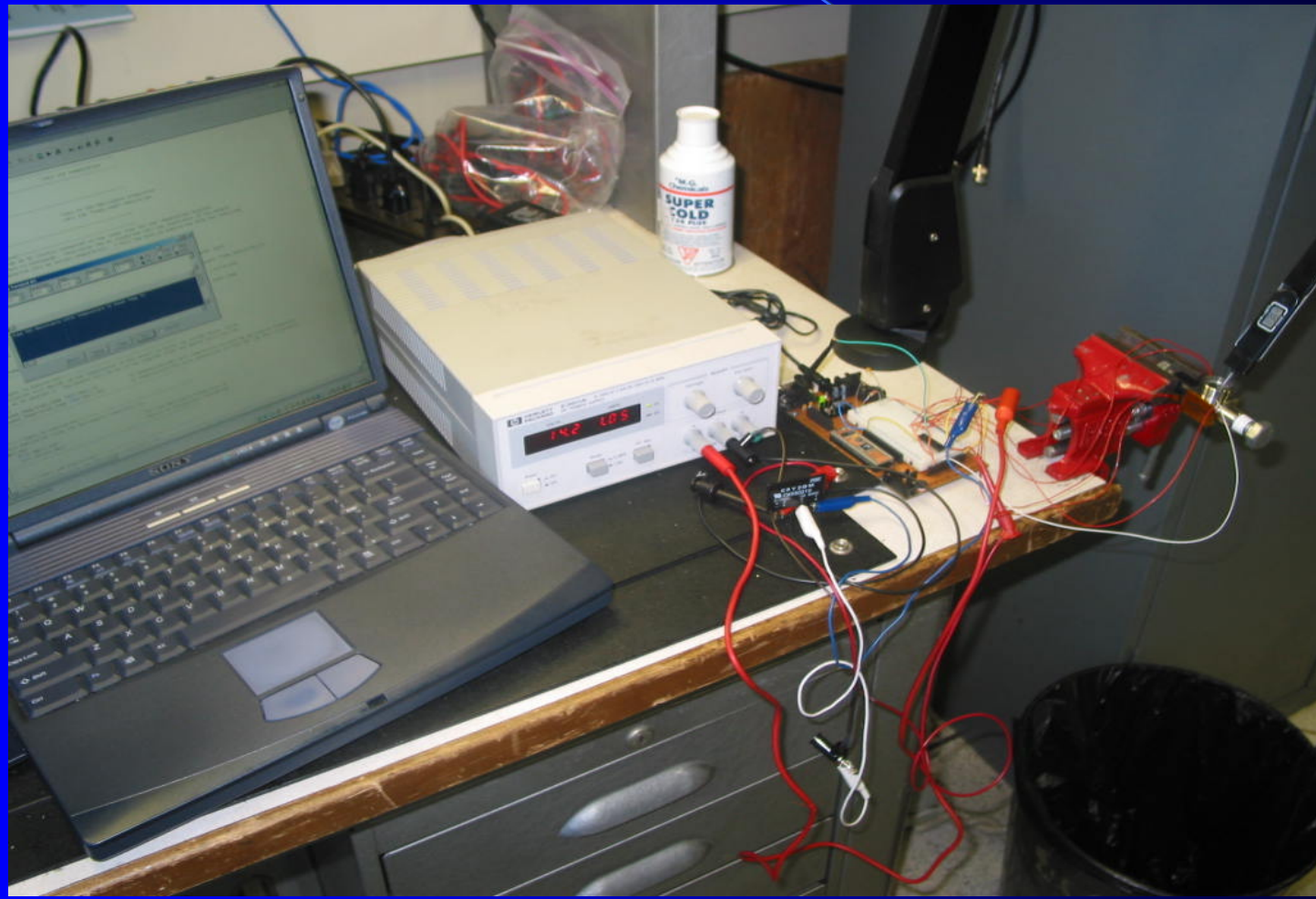
HVS Control System Concept



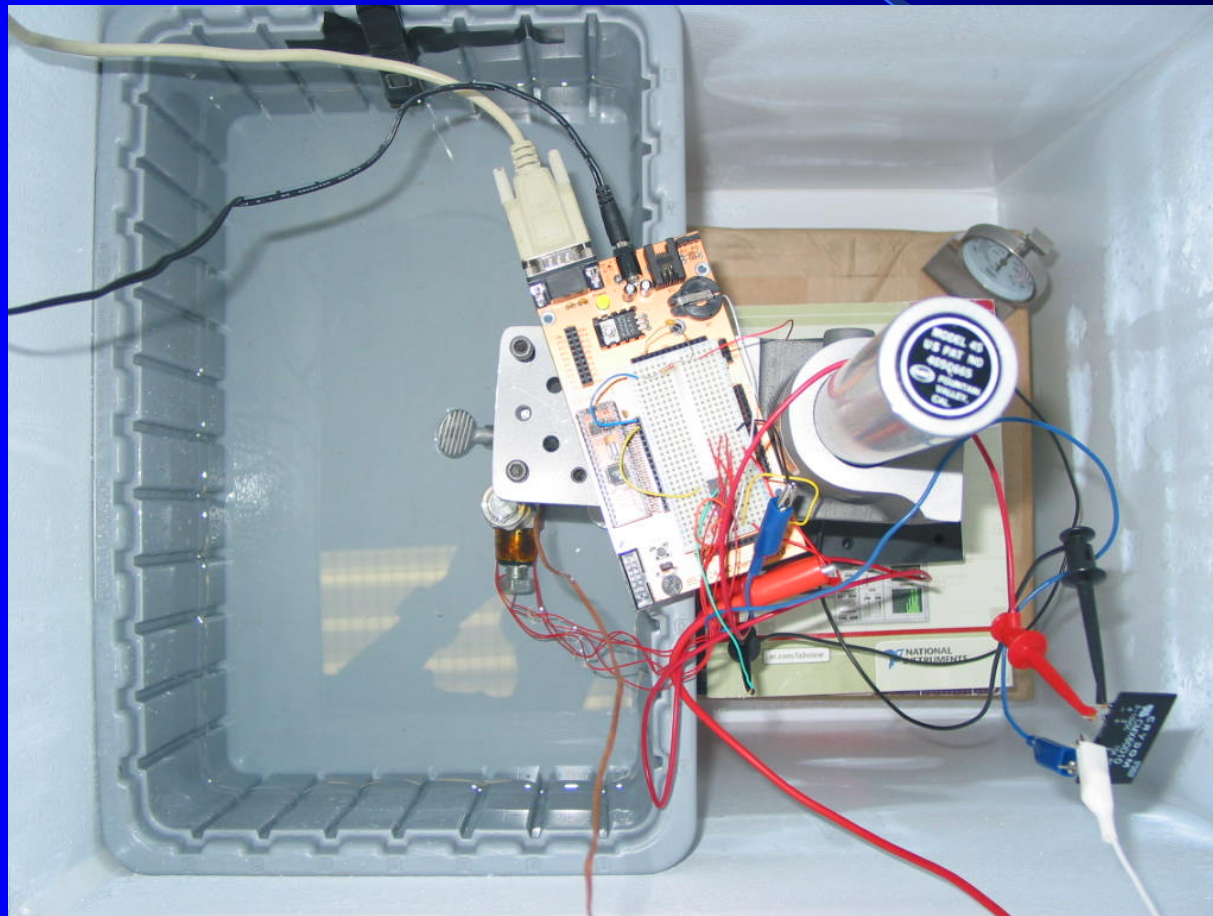
Filter and Heater Assembly



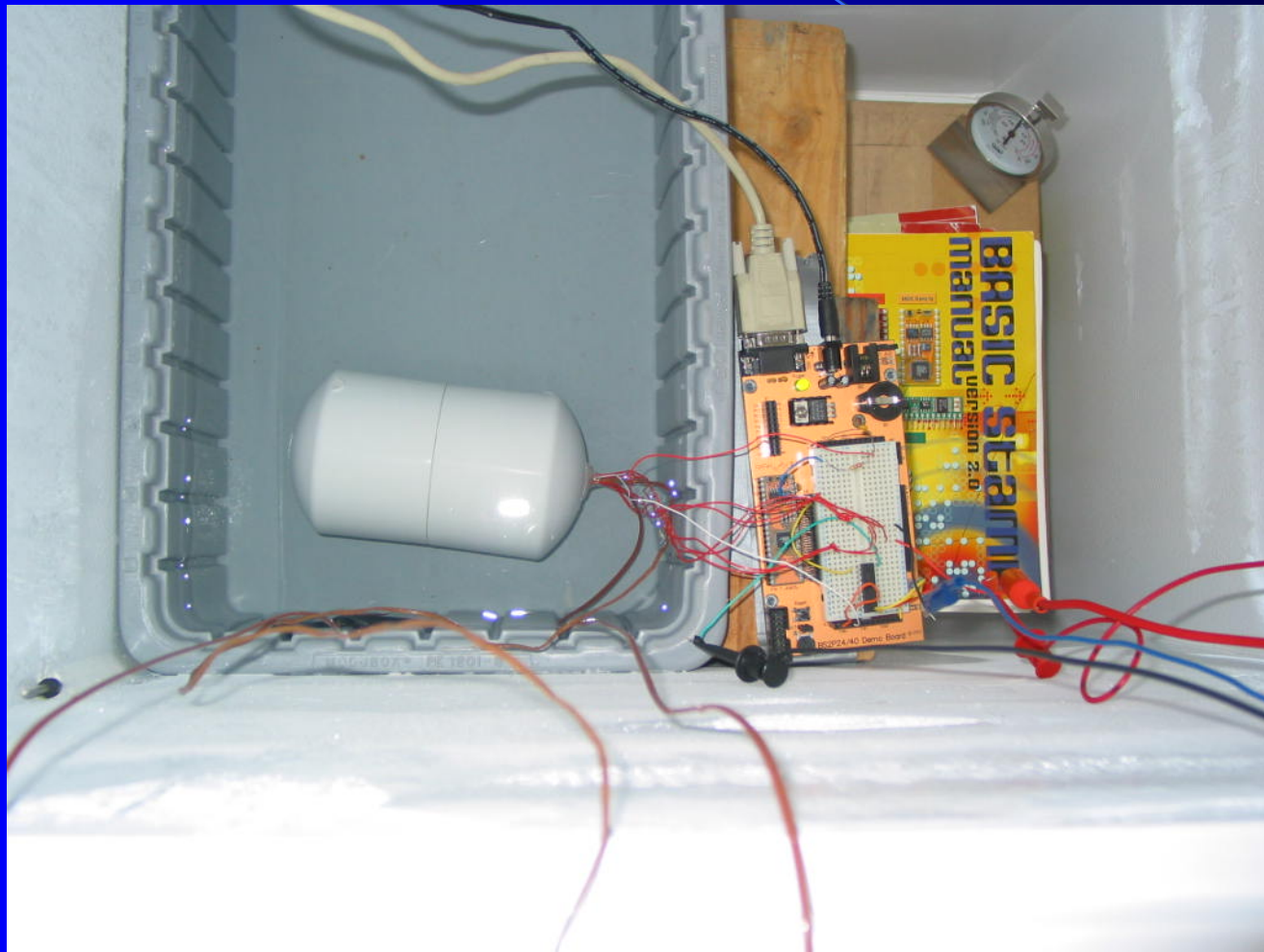
Heater Control Test



Cold Water Test



PVC Encased Cold Water Test



Future Work

- Finish Prototype HVS – Integrate Mechanical and Electrical Systems.
- Deployments: (1) Yellow Stone National Park, (2) UK ROV Isis, and (3) The Japan Marine Science and Technology Center (JAMSTEC) research vessel (Yokosuka) and submersible (Shinkai 6500)

Shinkai 6500



The image features a dark blue gradient background that transitions from a deep navy blue at the top to a lighter, vibrant blue at the bottom. A thin, white, curved line starts on the left side and arcs across the upper portion of the frame. The text "JPL Pictures" is centered in the middle of the image in a white, bold, sans-serif font. The background is divided into two main sections by a curved boundary: a darker blue area on the left and a lighter blue area on the right.

JPL Pictures

Robotic Vehicles Group Students



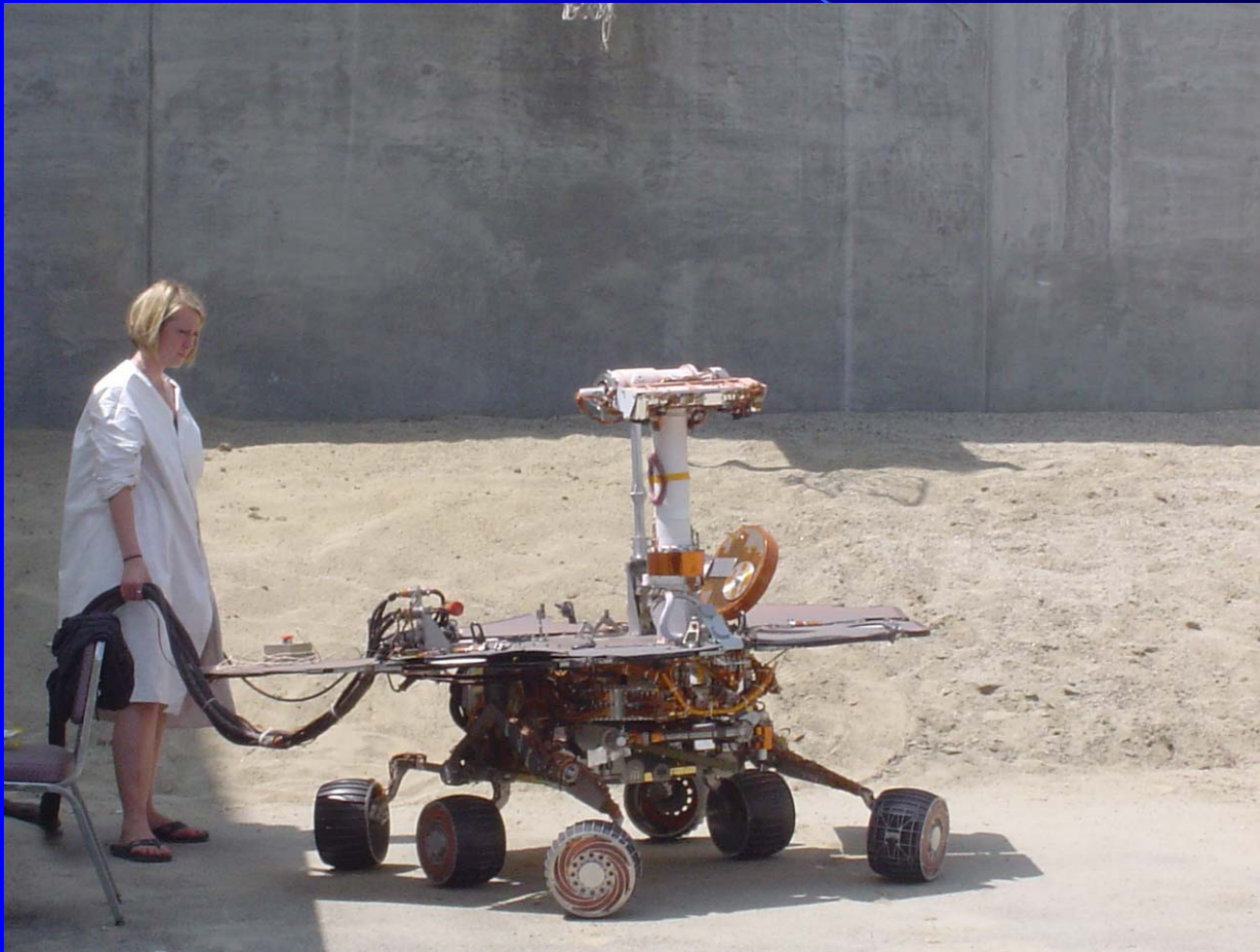
JPL Control Room



Spacecraft Assembly Room



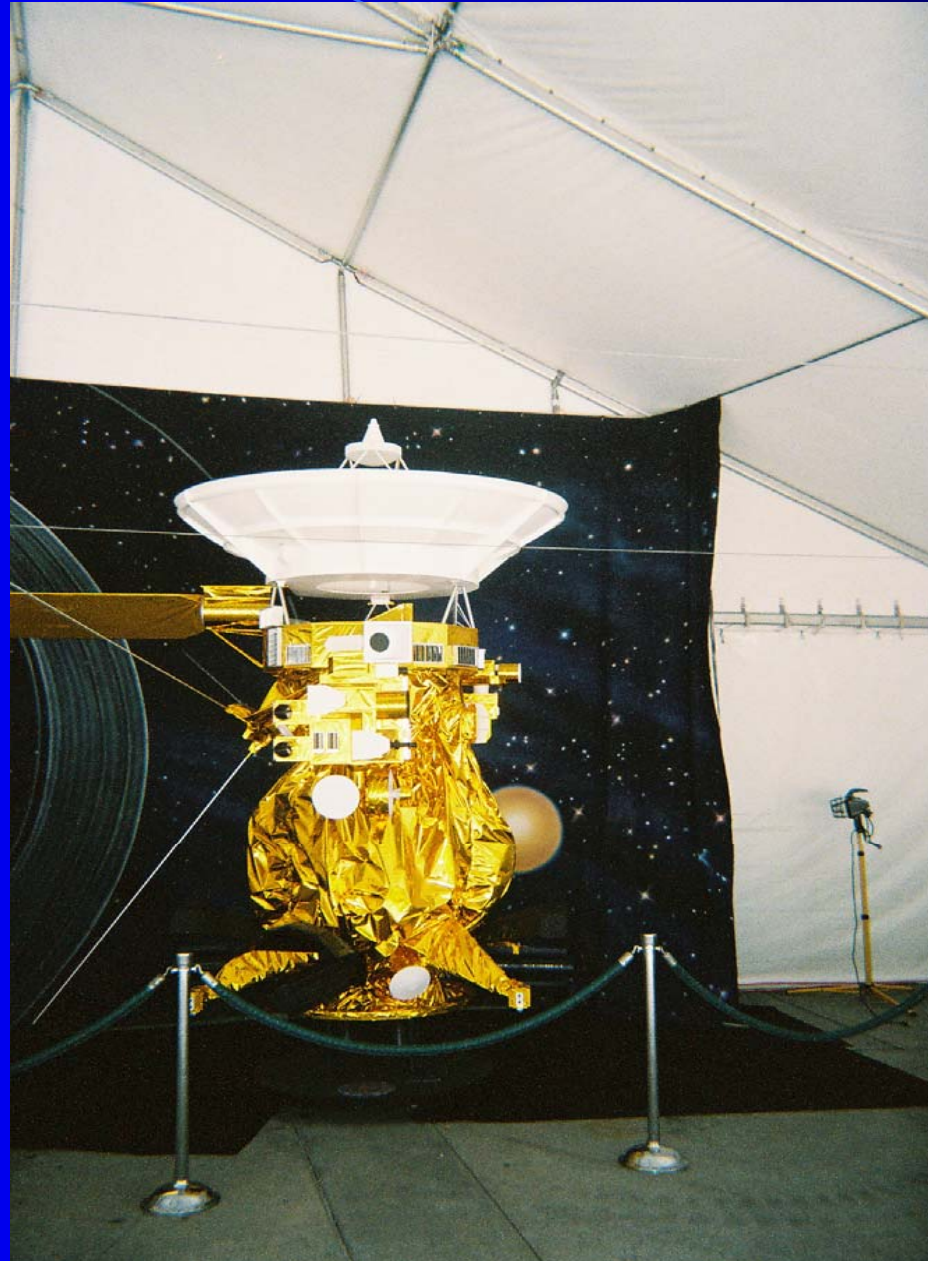
Rover Testing



Sojourner



Cassini Model



Deer!

