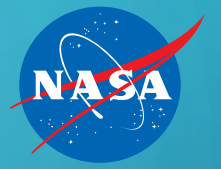


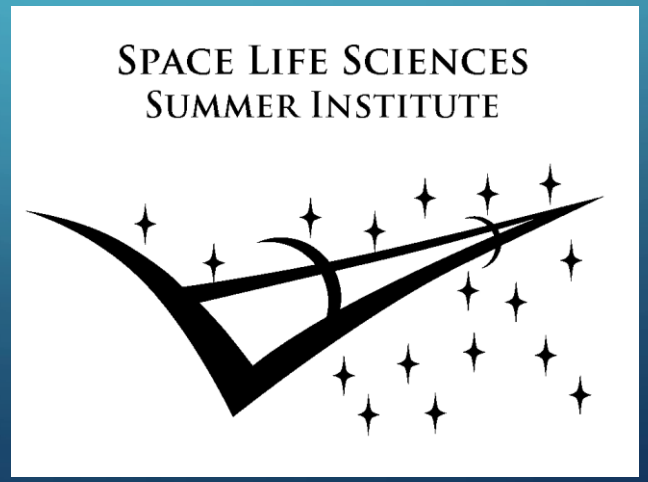
AUTONOMOUS, DUAL CHAMBER BIOREACTOR FOR THE GROWTH OF 3-D EPITHELIAL-STROMAL TISSUES IN MICROGRAVITY

LAUREN RYAN

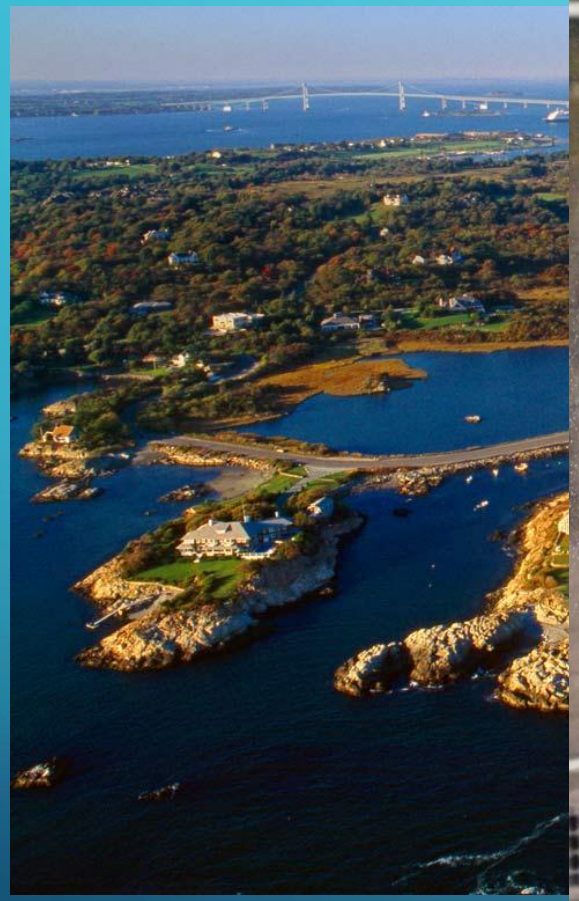
THE GEORGE WASHINGTON UNIVERSITY

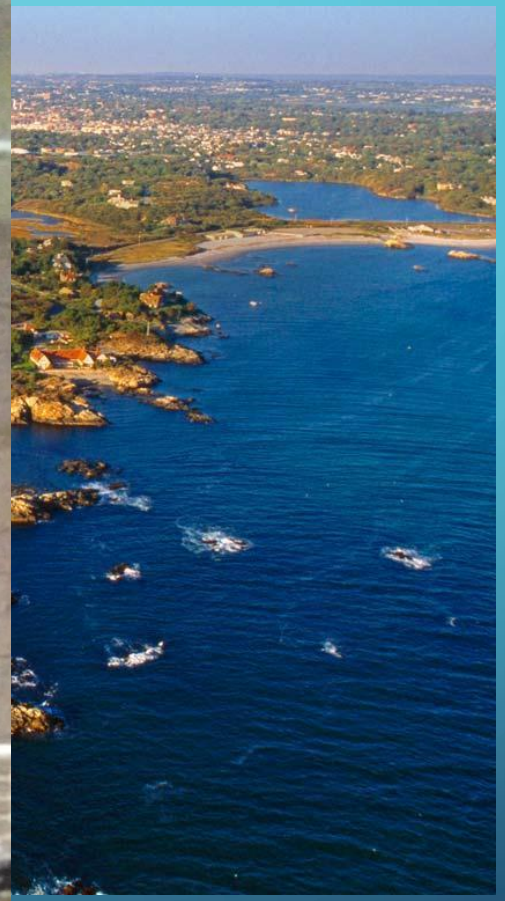
DR. ZARANA PATEL

RADIATION



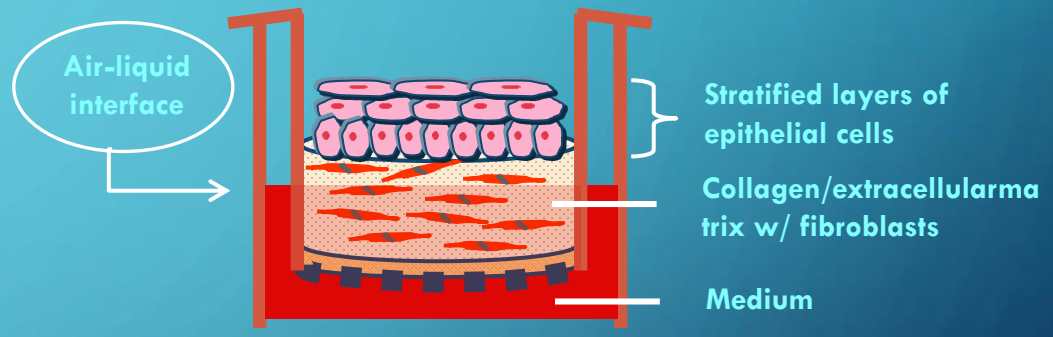
ABOUT ME





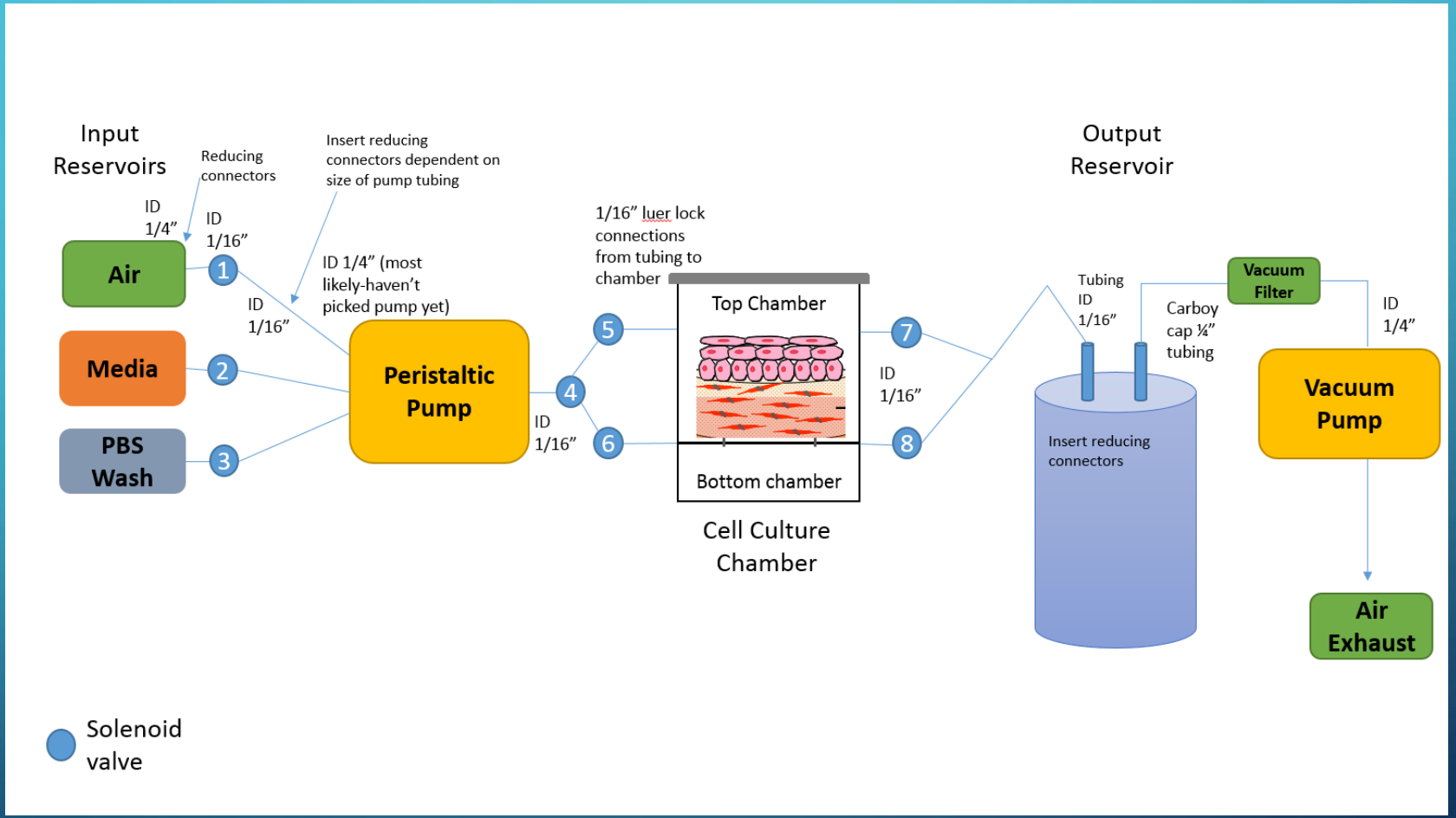
PROJECT BACKGROUND

- Using 3D organotypic models
  - Closely linked to characteristics of normal human tissue
  - Model for effect of microgravity
  - Stressors combined with microgravity



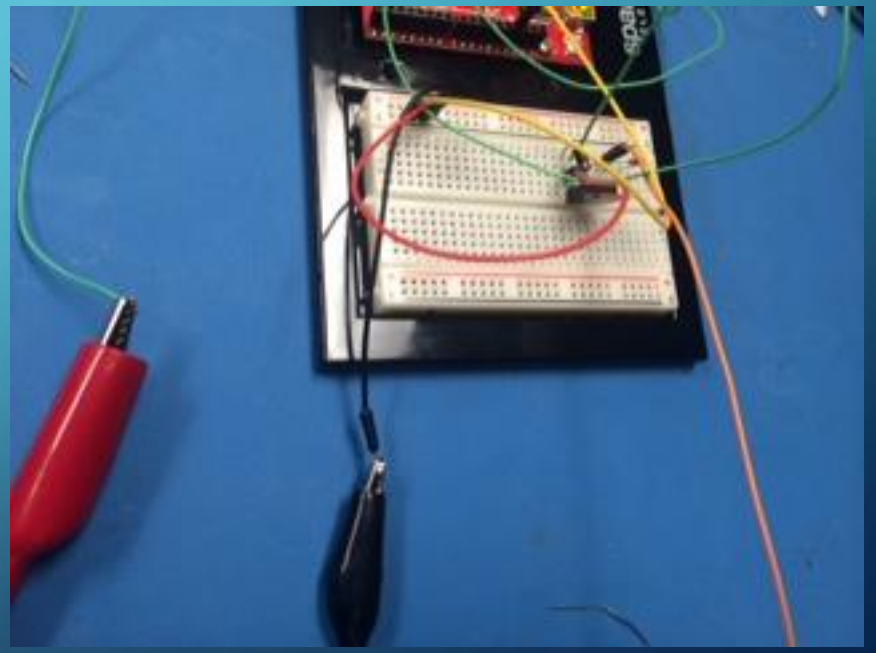
- Critical Air Liquid Interface
  - Bioreactor available for microgravity cell culture does not accommodate
  - This project creates autonomous dual chamber bioreactor allowing for research on 3D tissue models

PROJECT SCHEMATIC



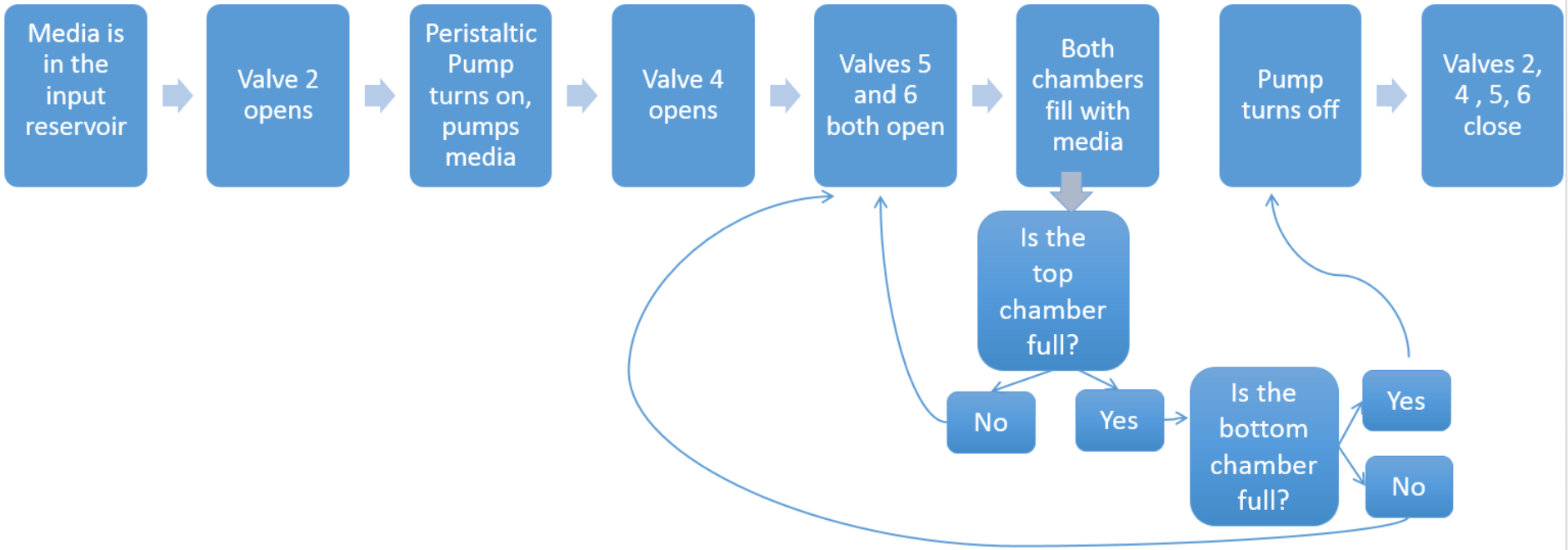
METHODS AND PROCEDURES

- Spent time working at Rice University
- Responsibilities:
  - Researching Parts
  - Electronics and Coding
- Skills and Techniques:
  - Arduino
  - Troubleshooting Code/Circuit
  - Design Process
  - Teamwork
  - Building a System



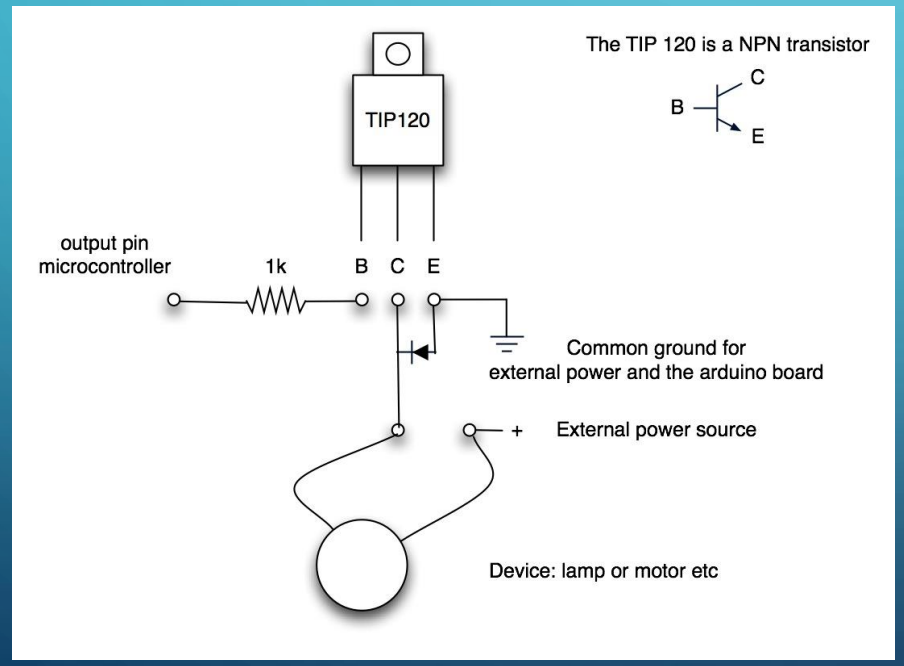
ELECTRONICS AND CODING

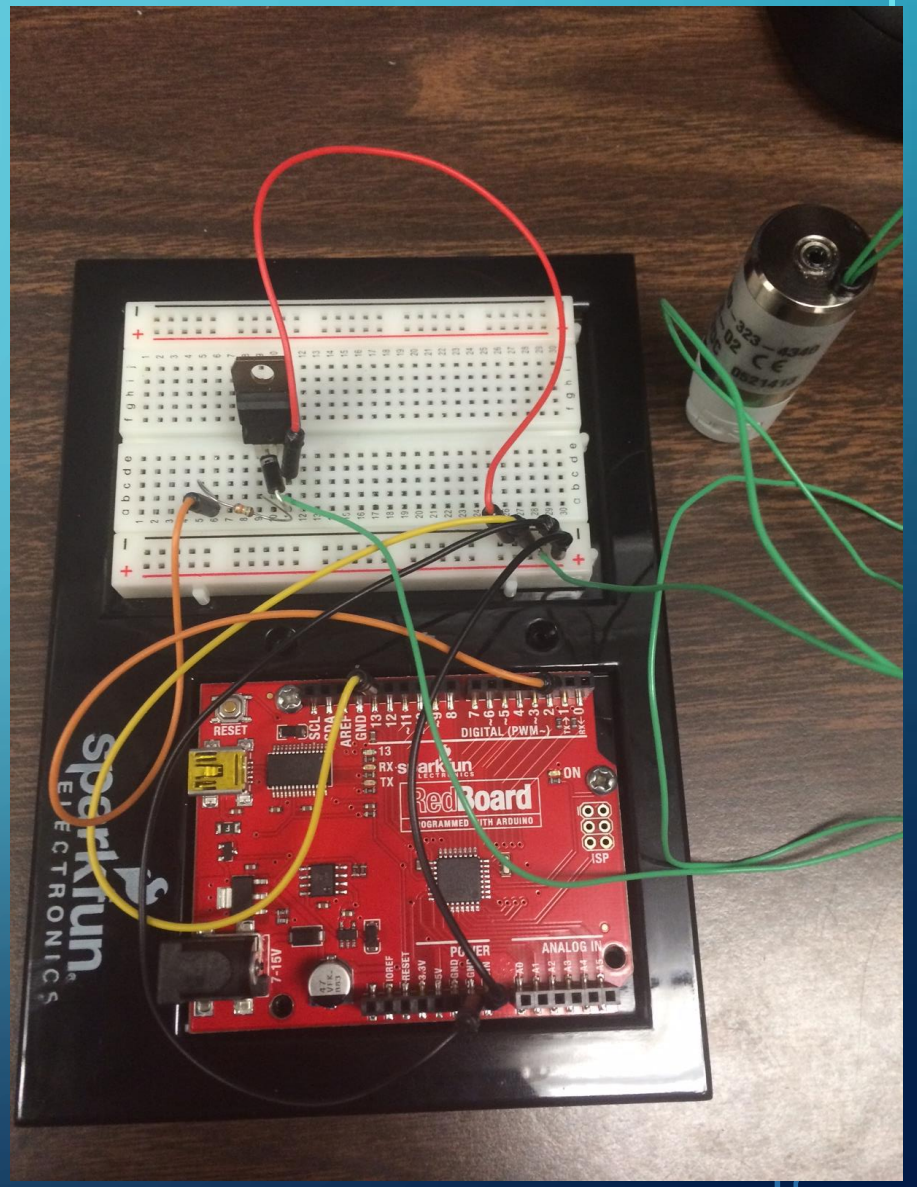
Case 1: What Happens At T=0 (when the Media Fills The Entire Chamber)



ELECTRONICS AND CODING

- Needed to control 12 VDC devices with Arduino
- Built a solid state relay to act as an electrical switch
- Troubleshooting



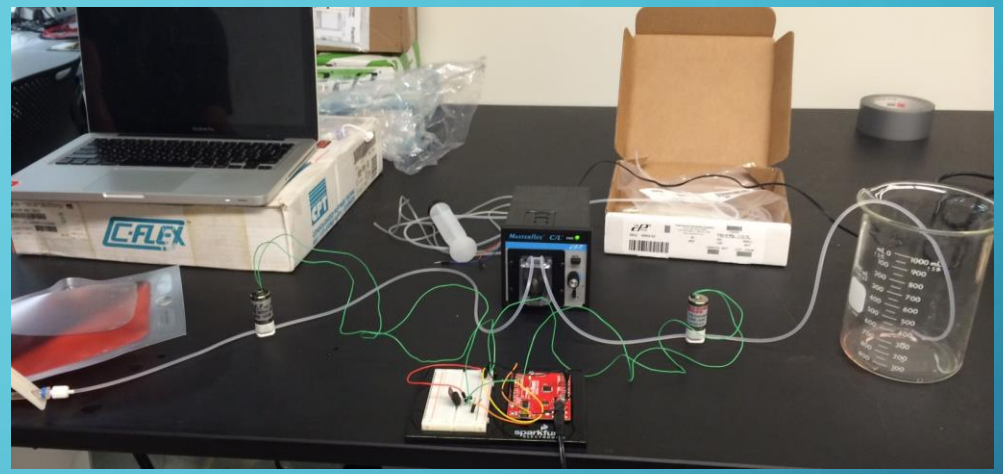


RESULTS

- Valves Opening, Pump

  Turning On According to Code

- Putting it All Together in the System



DISCUSSION

- Contributions:
  - Integral part of the system
  - ISS experimentation
- Lessons Learned:
  - Arduino Coding
  - Technical Ordering
  - Patience in Troubleshooting
  - Working in a Team to Build a System

SLSSI

ACKNOWLEDGEMENTS

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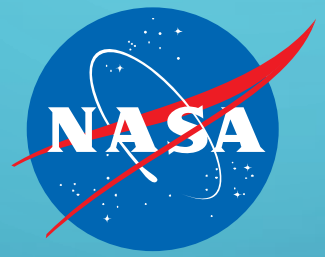
- Ron McNeel


NASA