Jet Propulsion Laboratory
California Institute of Technology

Snapshot - Mobility and Robotics System Section, Robotics Modeling and Simulation, JPL

Space Automation and Robotics Technical Committee (SARTC) Meeting

AIAA Space 2016

Dr. Cornelia Altenbuchner, NASA JPL

Meeting Lightning Round – September 2016

Introduction

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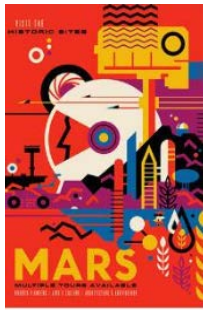
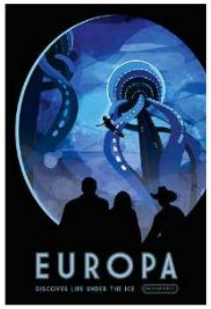
- **Mobility & Robotics System Section, Lead Section in JPL Robotics**

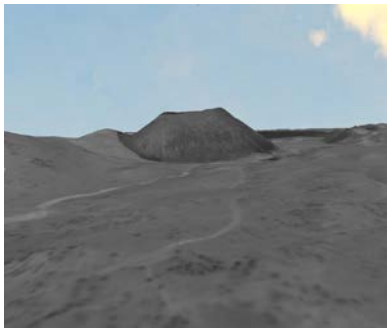


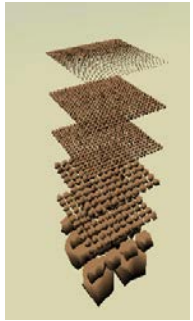


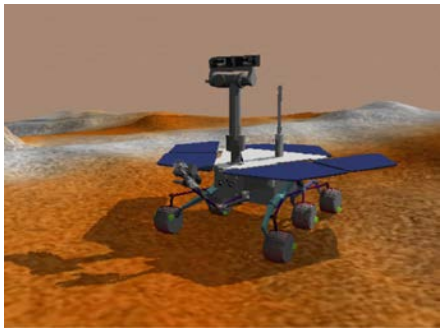
& Many More

Developing facilitating Robotics for NASA's high priority missions

- **Robotics Modeling & Simulation Group**

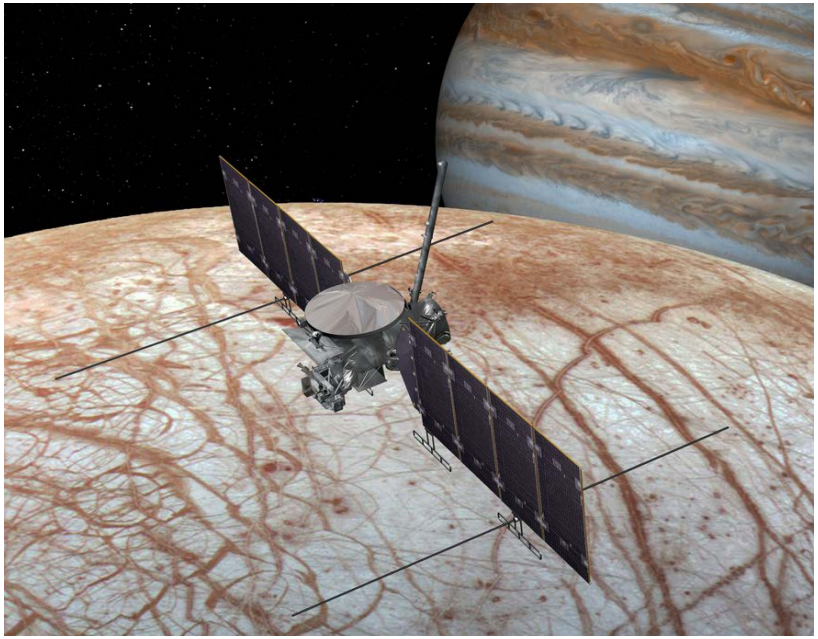






Model, Simulate, Demonstrate, Analyze and Plan Robotics Systems and Mission

Why we model, simulate and visualize at JPL?



- **Replicate conditions**

  e.g. in space or planetary surfaces

- Cover a large **range of time** and **space scales**
- **Analyze** the **feasibility** of **new concepts** and **evaluate alternatives**
- **Design and Performance Optimization**
  - Perform **Monte-Carlo** and parametric analysis that modify variables in multiple simulation runs

Why we model, simulate and visualize at JPL?

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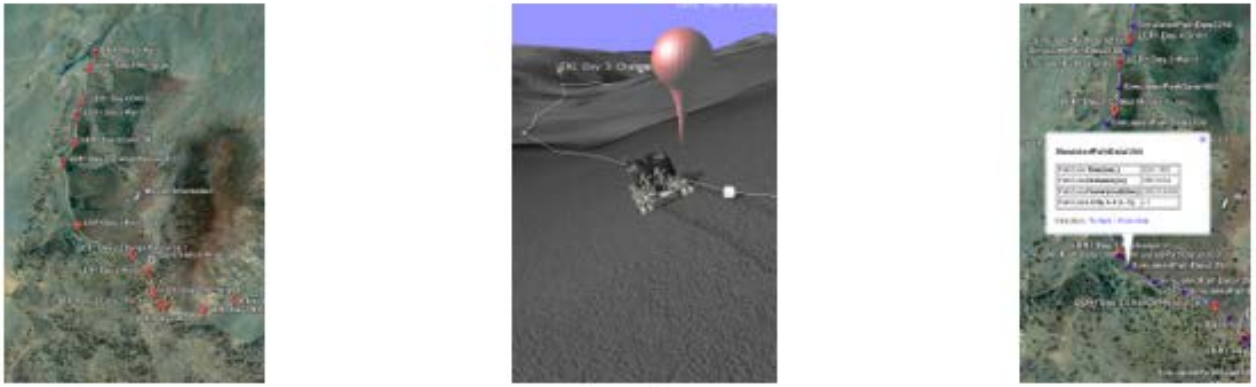
- **Operational Scenarios**
  - Find **optimal operations**
  - Investigate **alternative operational scenarios**
  - **Operational demonstrations**



plan → simulate → analyze

- **Validate and verify** against alternative **analytical studies** and physical analog **testing**
- **Visualize and quantify** performance of **planned operations**
- Advise and **inform mission & technology development**
- Aid **control design**

Facilitating Exploration - **Mobility and Robotics Concepts & Analysis:**

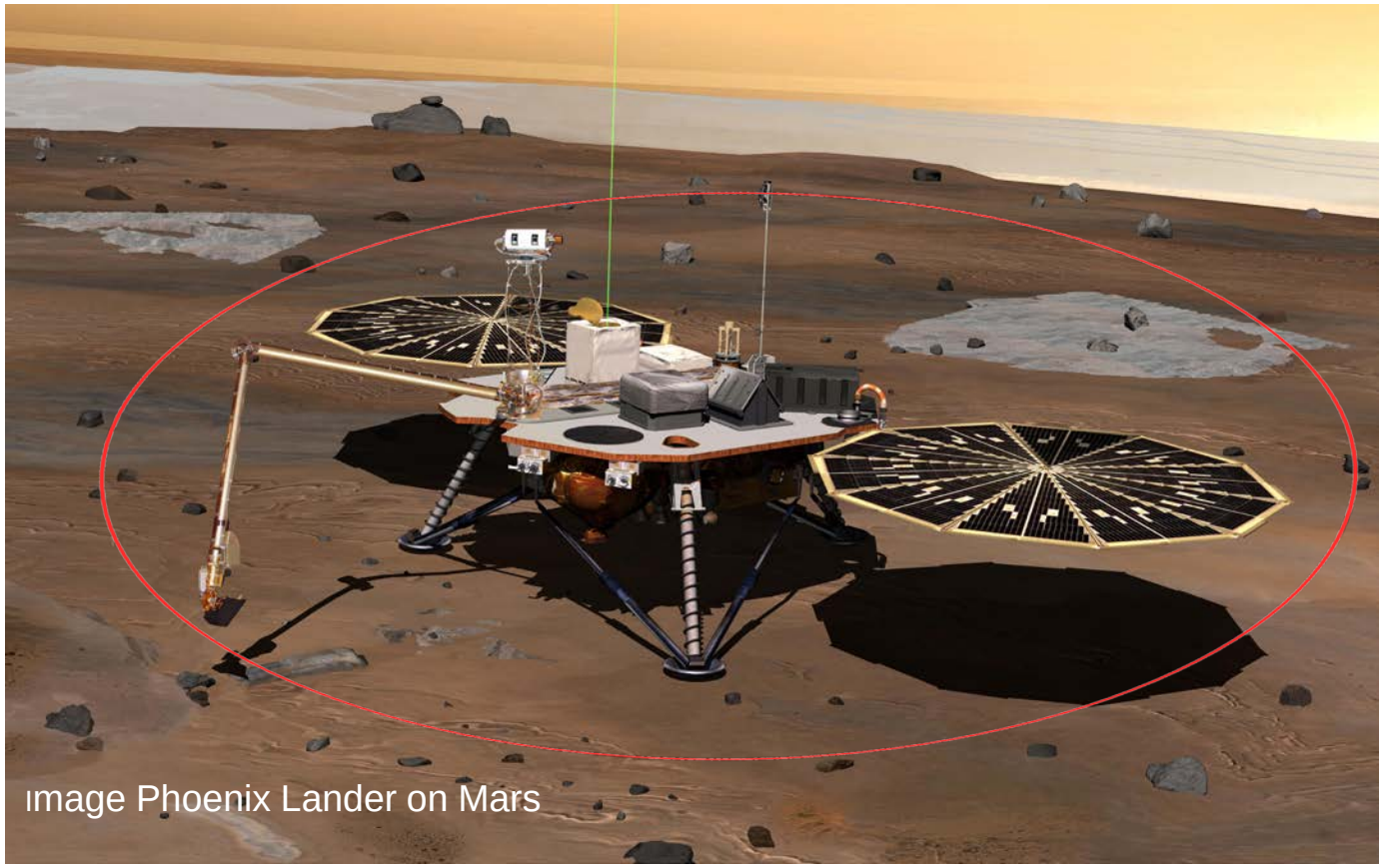


ımage Phoenix Lander on Mars

Challenges Addressed:

- **Lander Proximity Sciences**

Facilitating Exploration - **Mobility and Robotics Concepts & Analysis:**

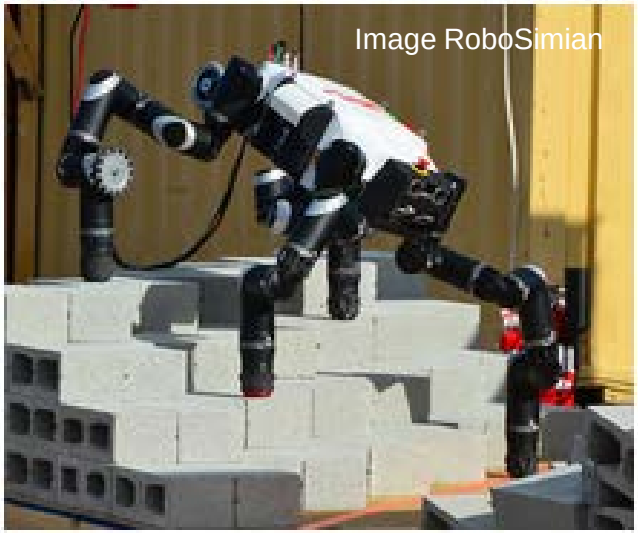


Image RoboSimian

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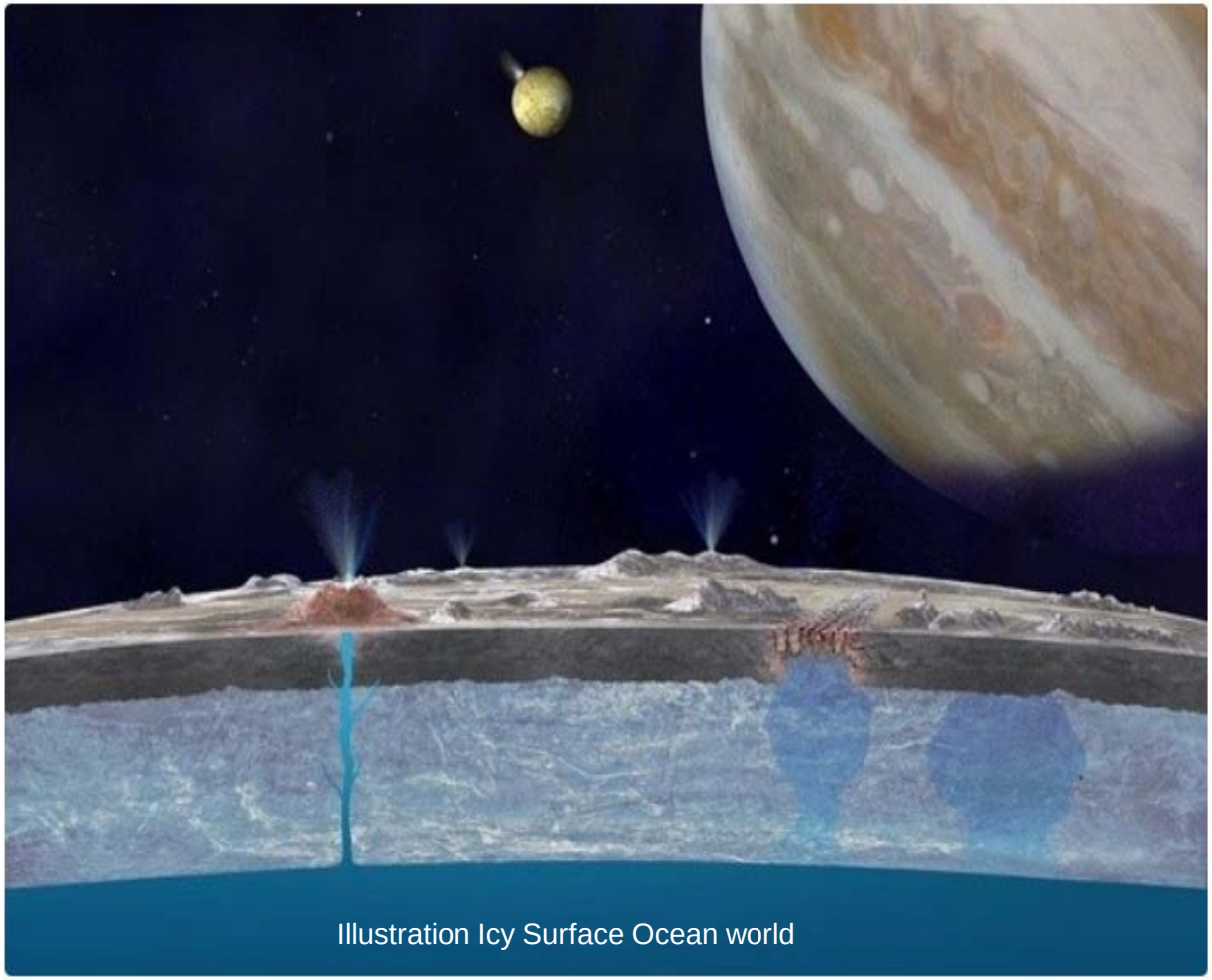
Challenges Addressed:

- **Long Range Mobility**

Image MSL

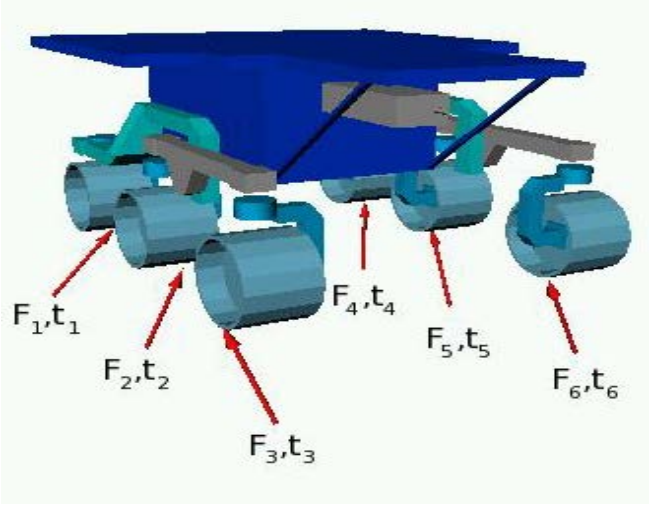
Facilitating Exploration - **Mobility and Robotics Concepts & Analysis:**

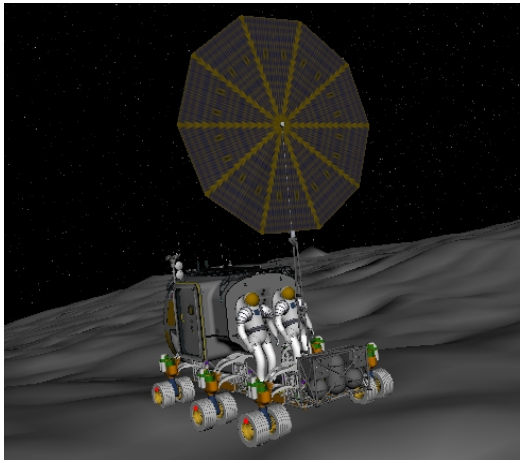


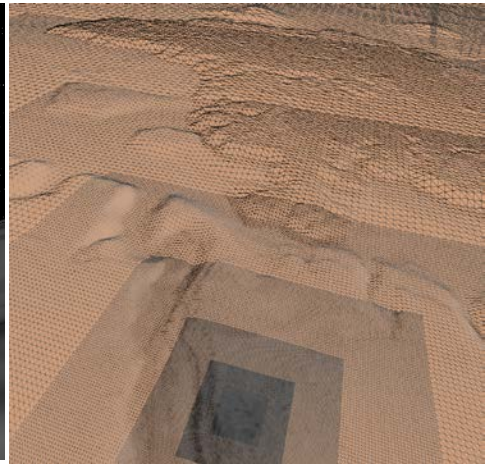
Challenges Addressed:

- **Deep Subsurface Access**
- **Sampling Systems**

Ocean worlds – Rocker Bogie Dynamics Optimization







Ocean worlds – Robotics Concepts for Crevasse

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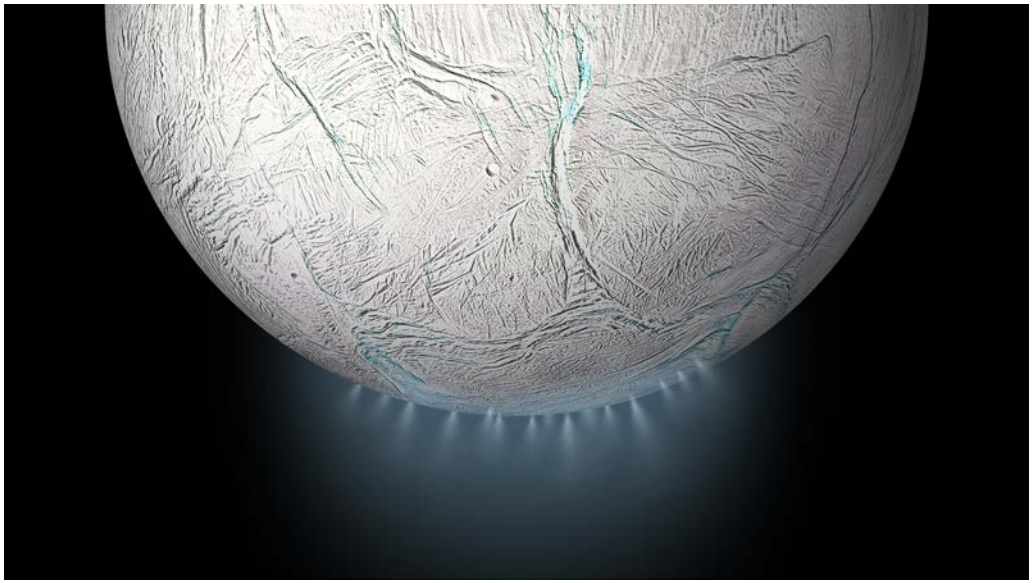


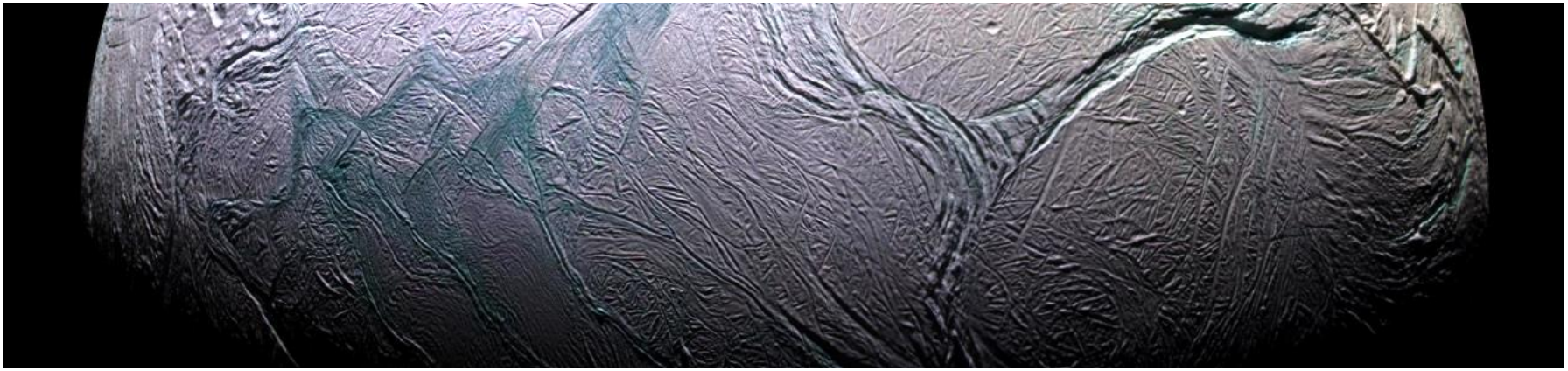
Enceladus – Cassini Mission Pic

Concept Design

- Design and technology development concept

Modeling & Simulation

- Demonstration of Operation
- Operational capability analysis



Robotics Assembly of Large Space Structures

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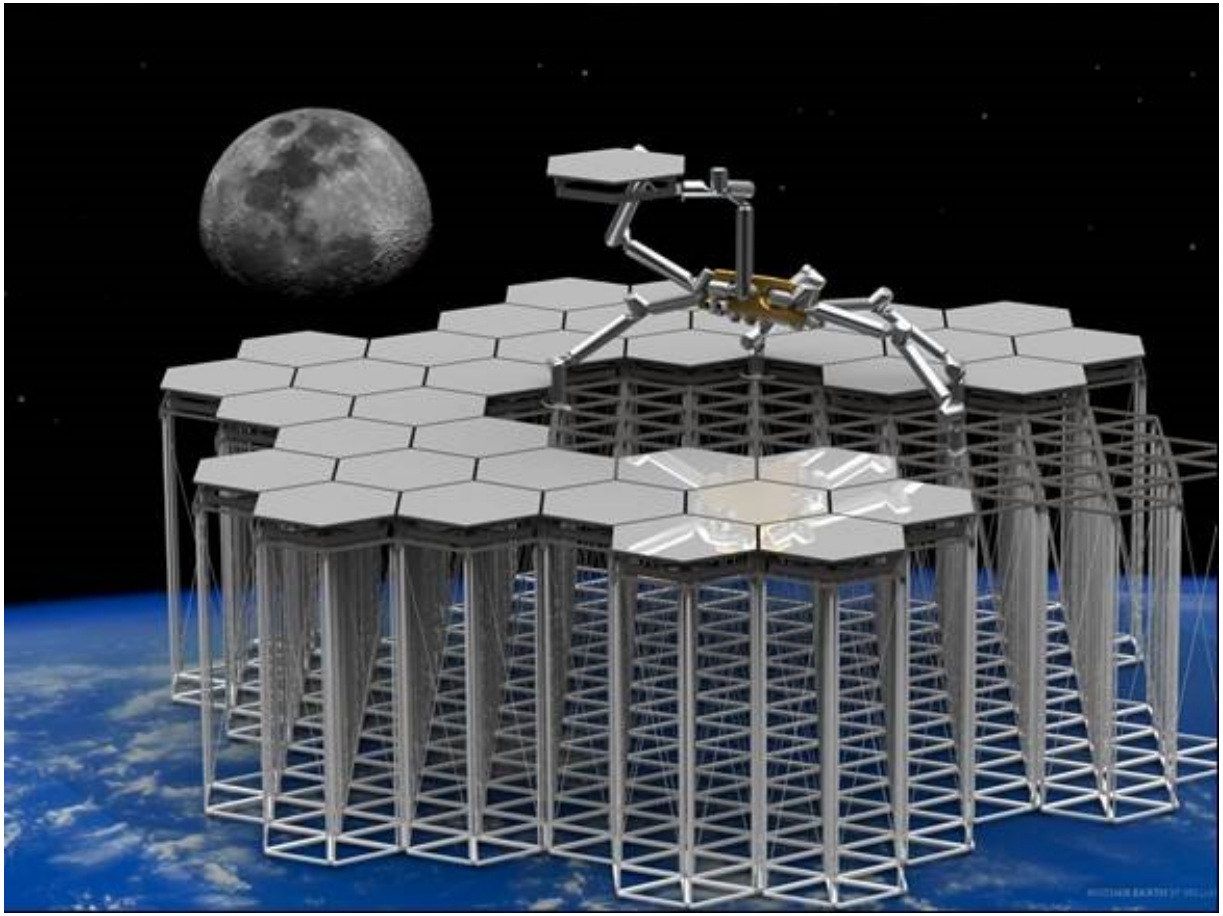

Modeling & Simulation

- Demonstration of Operation
- Structural and Operational optimization

Concept Design

- Design Concept
- Build Concept

Thank you !

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