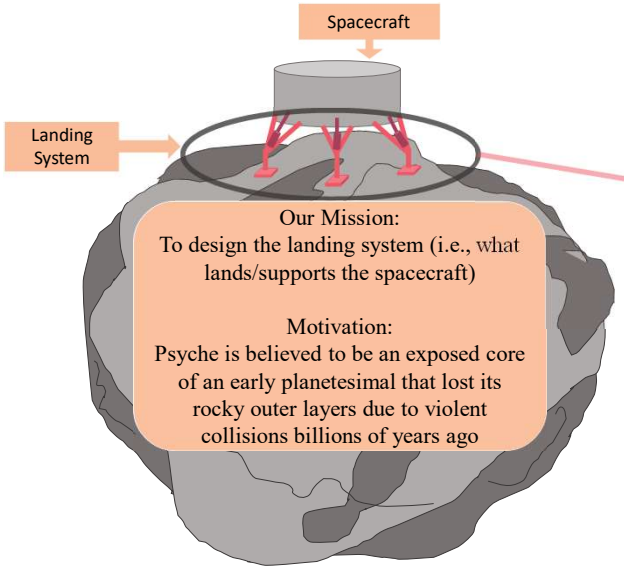
Team 501: Landing System for Uncertain Terrain

FAMU-FSU Engineering

Saralyn Jenkins, Elzbieta Krekora, Andrew Sak, Julio Velasquez

The objective of this project is to design a landing system capable of safely landing on the assumed range of hypothesized surfaces and terrains of (16) Psyche.



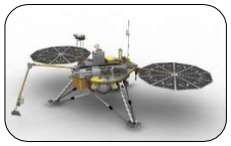
Project Goals and Critical Targets

- Lander can accommodate for hypothesized surfaces (rocky, uneven, mostly metallic terrain)
- Dampens impact energy (2700 J)
- Prevents lander from tipping (~10° tipping angle to correct)
- Lander is stable on the surface
- Landing system can support weight of entire spacecraft (21.6 N on Psyche with gravity of 0.144 $\frac{m}{s^2}$)

Previous Landers:

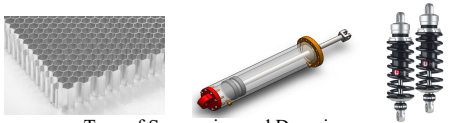
- Philae Lander
  - Landed on a comet with icy surface
  - Feet drilled into surface
  - Mass: 100 kg

- Mars Phoenix Lander
  - Landed on Mars with rocky flat surface
  - Feet just rested on surface
  - Mass: 350 kg



Landing System Broken Into Components For Concepts

Suspension



Type of Suspension and Damping

Legs

Type of Legs and Adjustability

Feet

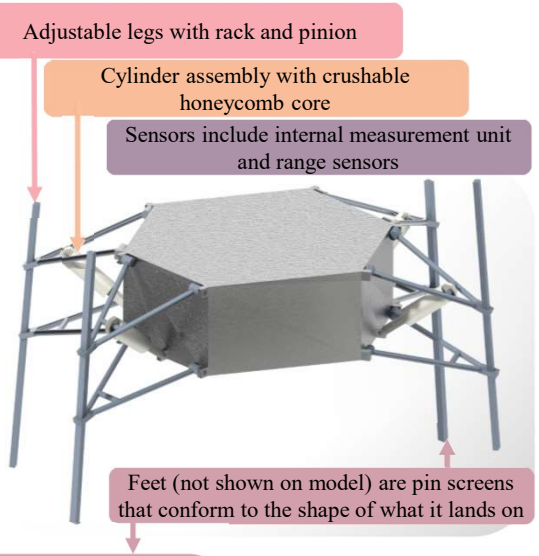
Type of Feet Design

Sensors

Type of Sensors

Final Design

- Developed by combining different components and looking at how well they would fulfill our project goals and targets
- Design size: (2.2 x 1.2 x 0.5-1) m (adjustable height)
- Total mass of design ~150 kg
  - Prototype will weigh less
- Since the prototype is not going into space the material used will be mostly aluminum



Future work:

- Simulate in ADAMS to get forces on legs
- Planning to test physical prototype with motor-controlled drop and different terrains