Psyche Asteroid Rover

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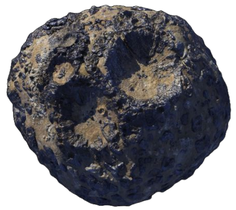
Background

- In October 2023, NASA launched an orbiter to learn more about metallic asteroid 16 (Psyche)
- They hypothesize it is an exposed nickel-iron core of an early planetesimal
- Images of the surface will be available in 2029 when the orbiter arrives
- Goal: to learn more about planet formation and test scientific equipment



Our Objective

Design a robotic leg with a large range of motion capable of traversing Psyche's unknown terrain for far future mission applications.

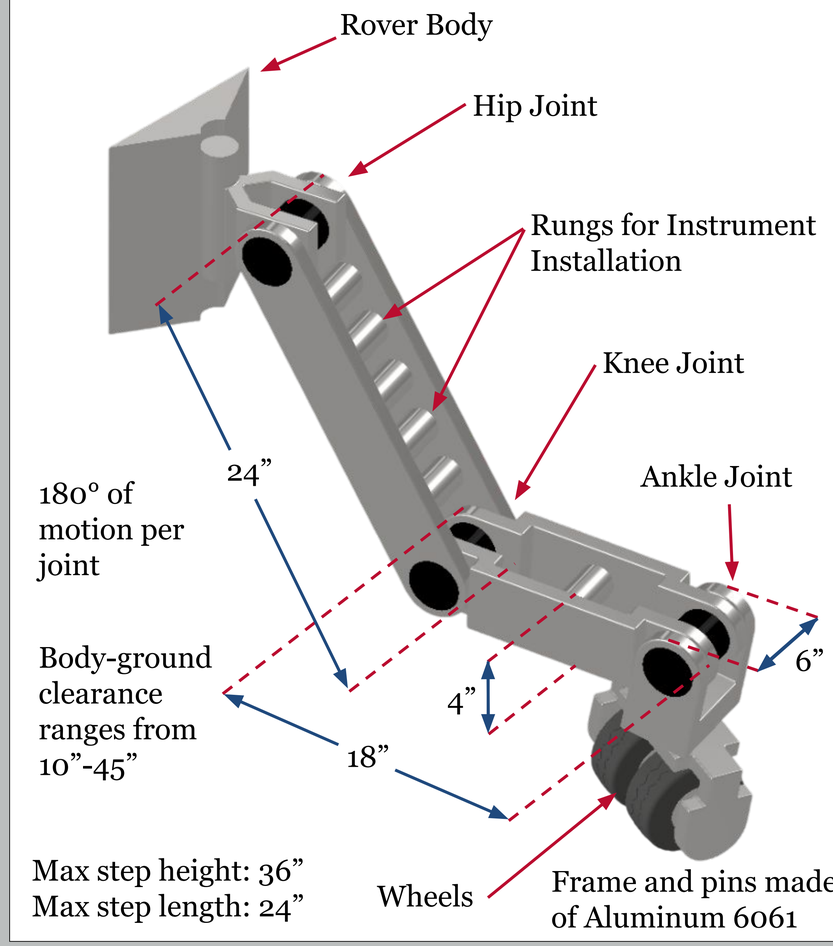
Surface conditions to consider:

- Metallic debris fields
- Large rocks
- Steep inclines/declines
- Crevasses

These conditions are not conducive of traditional rover design.

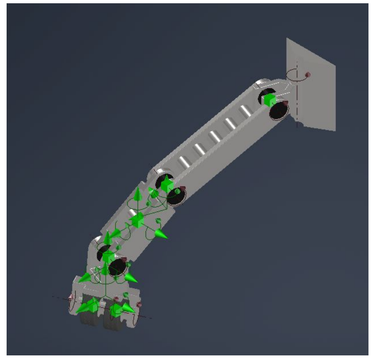
Solution

Rover with 6 identical limbs, designed for aggressive terrains. Each limb employs human leg biomimicry and is capable of both rolling and stepping motions adaptable to most environments.

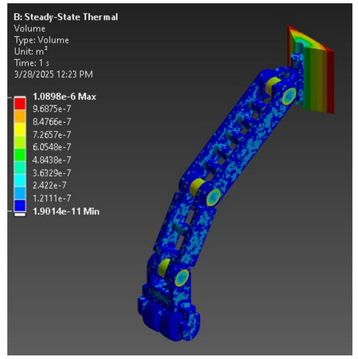


Analysis

Kinematic Joint Analysis



Thermal Analysis



Next Steps

This design offers a novel approach to rover mobility with strong mission potential.

Further testing needed:

- Fatigue & Impact Testing
- Redundancy/Fault Tolerance
- Sensor Fusion & Error Correction
- Dust & Debris Tolerance
- Power Consumption
- Radiation Testing

These steps will support scaling to a full, mission-ready rover.

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Sponsor/Client: NASA Psyche Mission

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