
HUSKYWORKS
PLANETARY SURFACE TECHNOLOGY DEVELOPMENT LAB
1885
Michigan
Technological
University
MTUengineering
MECHANICAL ENGINEERING-
ENGINEERING MECHANICS

What is PSTDL?

- State of the art research and development lab located at Michigan Technological University
- Improving the technology readiness level of technologies related to Lunar and Martian missions.
- Founded in 2019
- Engages over 50 students on campus through lab projects and our enterprise team (M.I.N.E.)

What Do We Do?

Employ over 30 MTU Students and staff dedicated to the development of Lunar and Martian technology

Give students a unique opportunity to engage and interact with the aerospace industry in a meaningful and exciting way

Compete in challenges such as the 2020 BIG Idea Challenge, the Watts on the Moon Challenge, and the Break the Ice Challenge

NASA Break the Ice Challenge

Phase 1

System level design for collaborative lunar excavation rovers

PSTDL 1 of 10 runner ups as part of Team LIQUID
Won $25k Prize

Aug 2021

2022

Nov 2022

Phase 2 Level 1

Detailed proposal to build and test prototype system

PSTDL 1 of 15 to advance
Won $38k Prize

2023

Aug 2023

Phase 2 Level 2

Prototype vehicle tested in PSTDL built facilities at KRC

PSTDL 1 of 6 to advance
Won $75k Prize

2024

June2 024

Phase 2 Level 3

Head to head competition at NASA facility against other teams

PSTDL participating in June
$1.5M prize pool

The BTIC Team

Dr. Paul van Susante

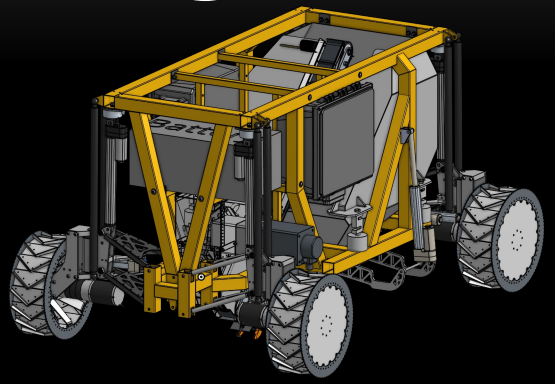
Chief Engineer
Parker Bradshaw

Project Manager
Kjia Moore

Hopper & Logistics	Command & Data Handling	Electrical Power System	Excavation	Chassis & Mobility
Mason K.	Austen G.	Will Jenness	Marcello G.	Lucas Frank
Robin A.	Matt Oujiri	Austin M.	Heather G.	Greg Redlon
	Jay Sweeney	Leif C.	Hunter M.	Connor D.
	Mack Miller	Audrey A.	Eli Sierra	
	Kevin D.	Walker S.	Ben Engle	
			Max Decker	

Professor
Graduate
Undergrad
Graduated
New U.G.

BTIC - Rover Design



PRIMROSE

- **P**ersistent **R**egolith **I**n-situ **M**ining **R**over with **O**nboard **S**urface **E**xcavator.
- Single rover solution that excavates, hauls, and delivers material
- Independent wheel steering and suspension
- Uses conventional chain trencher

BTIC - 15 Day Test Site

Lunar Proving Ground

- Temporary facility built for BTIL at KRC
- Has transportation area to simulate driving on the moon
    - 12,000 kg of lunar regolith simulant
- Excavation area has cement material to simulate permafrost
- Staffed 24/7 for 15 days by students

BTIC - 15 Day Test Results

Real World Performance

- Total rover mass: **332 kg**
- Total collected permafrost: **2990 kg**

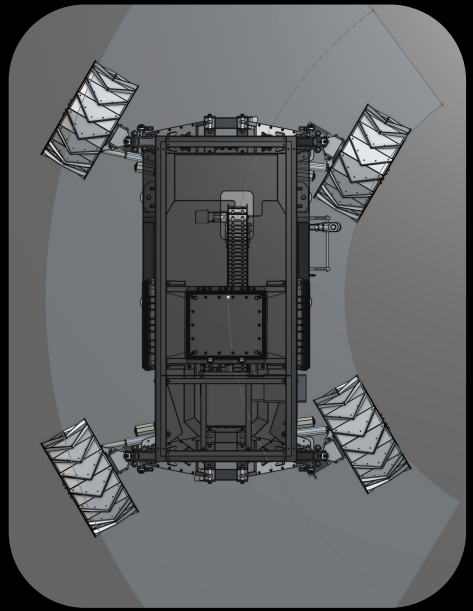
Performance Bottlenecks

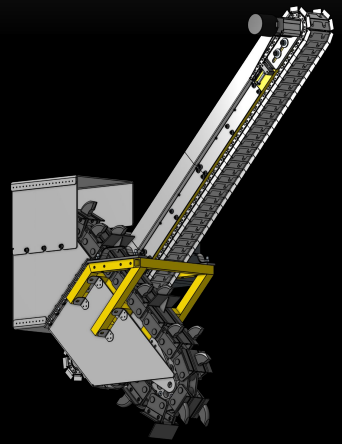
- Mobility issues in regolith simulant track
- Moisture content of terrestrial test facilities
- Excavated CLSM transfer efficiency
- Lack of advanced controls automation

BTIC - Level 3 Upgrades

Mobility Upgrades

- Larger wheels, modified steering angles
- New excavator conveyor belt design
- More sensors, more automation





BTIC - Level 3 Upgrades

Camera Integration for Increased Visibility

Redesigned Suspension and Steering Linkages

Long Range Antenna for More Reliable Connectivity

Larger Wheels for Improved Mobility

BTIC - Level 3 Field Testing

The Keweenaw Peninsula

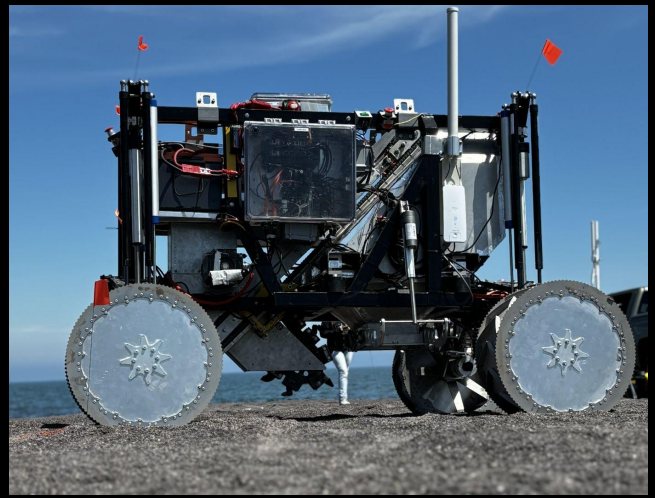
Keweenaw Stamp Sands

Mohawk Mining Company

Unique Terrain Perfect for Field Testing

Metal Rich Fine Gravel with Slopes, Craters, and Other Challenges

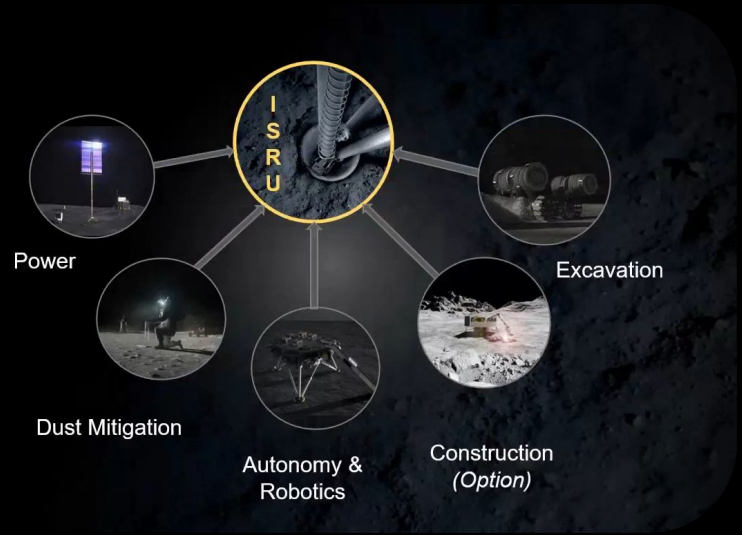
BTIC - Level 3 Field Testing



What's Next for PSTDL?

Lunar Technology

- NASA has ISRU missions being planned now
- BTIL experience is related to mission objectives
- Students with space hardware experience



Contact Us!

Website:
www.HuskyWorks.space

Email:
pjvansus@mtu.edu

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