MISSION CONTROL

Indoor Lunar Analogue Testbed

Updated March 2022

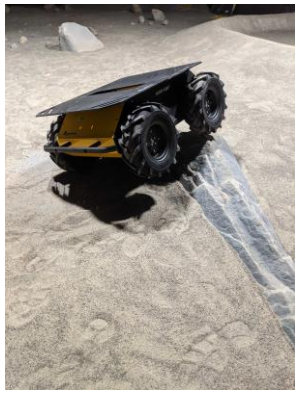
Indoor Lunar & Planetary Analogue Testbed

- 30x20m testbed at our HQ in Ottawa, Canada
- Geologically relevant features and reconfigurable landscapes
  - volcanic, polar, highlands, mare
- Lunar lighting conditions
  - Equatorial to polar
- Walls/ceiling painted matte black to minimize reflectivity
- Testbed designed for high-fidelity operations testing and dataset generation for AI & vision R&D

On-Demand Lunar Analogue Missions

- Real-time web-based control of payloads and robotics systems using our core platform: Mission Control Software (MCS)
- Simulated lunar comms
- System and operations testing for payloads and missions, ConOps validation
- Collect data for R&D in vision, robotics and AI
  - Images from a micro-rover's perspective
  - Labeled with terrain classes useful for navigation and science operations
- Use our rover for testing, or bring yours
- Add your lunar payloads for an end-to-end mission operations test
- Educational missions or HQP training

Book a Demo



Mission Control Software

Operate Your Payload From Anywhere

Connect to Spacecraft
Use MCS to interface with your payload in a spaceflight mission

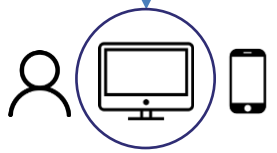
Seamless transition from testing to flight

Analogue Missions
Use MCS to interface with robotic platforms and science payloads in analogue missions

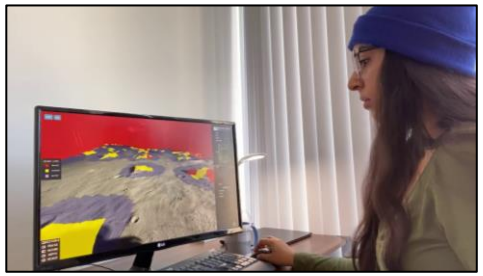
Mission Control Software cloud-based platform

Local deployments for scenarios without internet

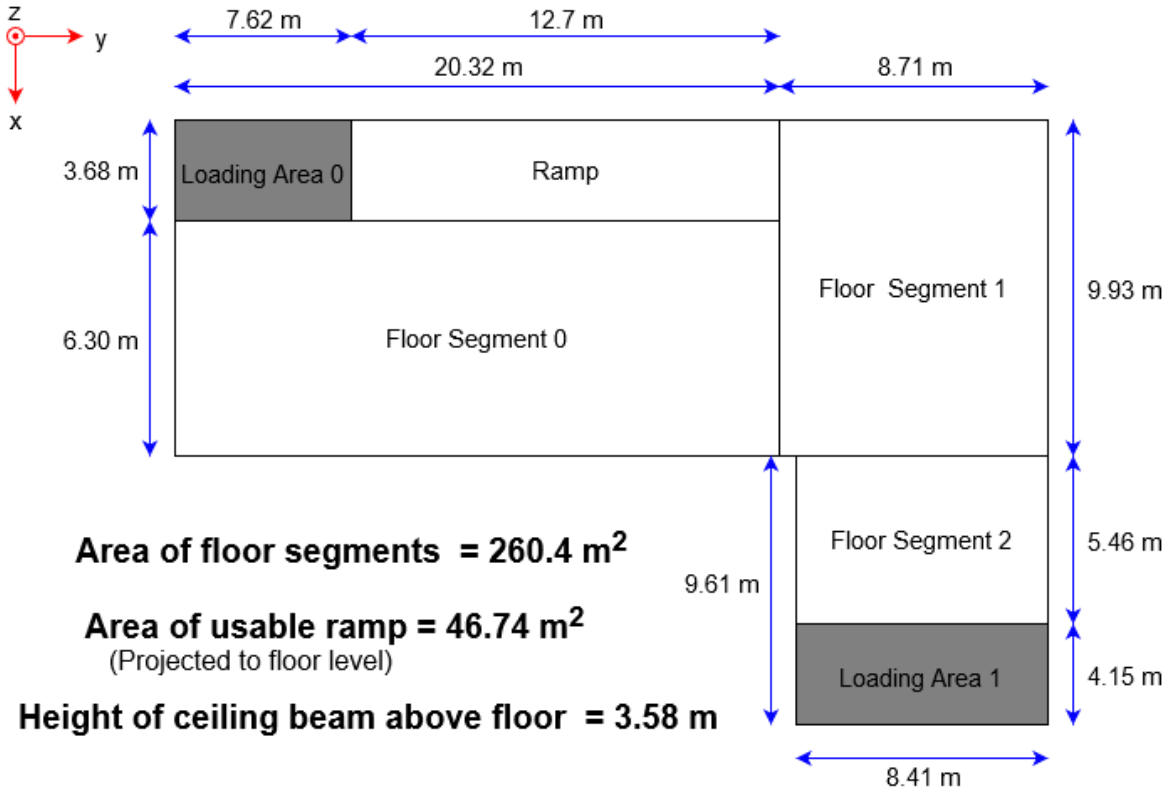
Mission Operations
With an internet connection:
- Operate from anywhere
- Integrate with our mission applications
- Let the world follow your mission

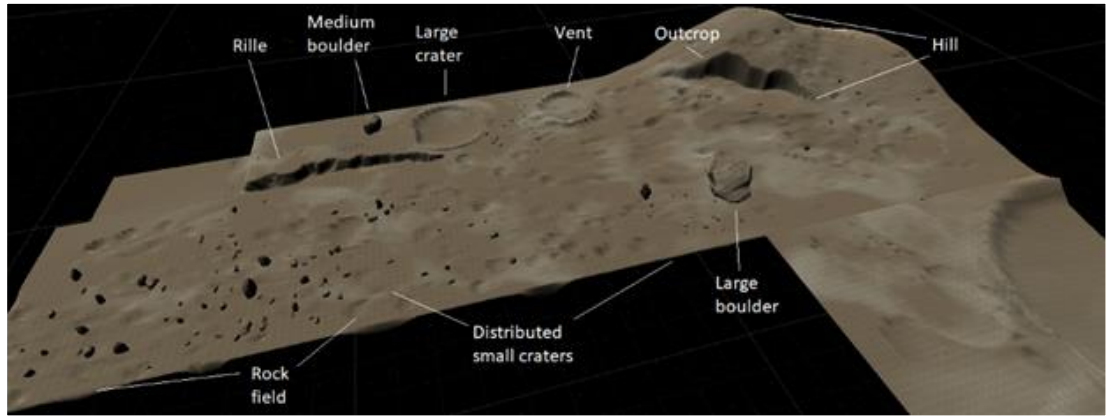


Secure web-based interfaces for payload operators, supporting:
Rover Navigators
Instrument Operators
Mission Scientists



Layout





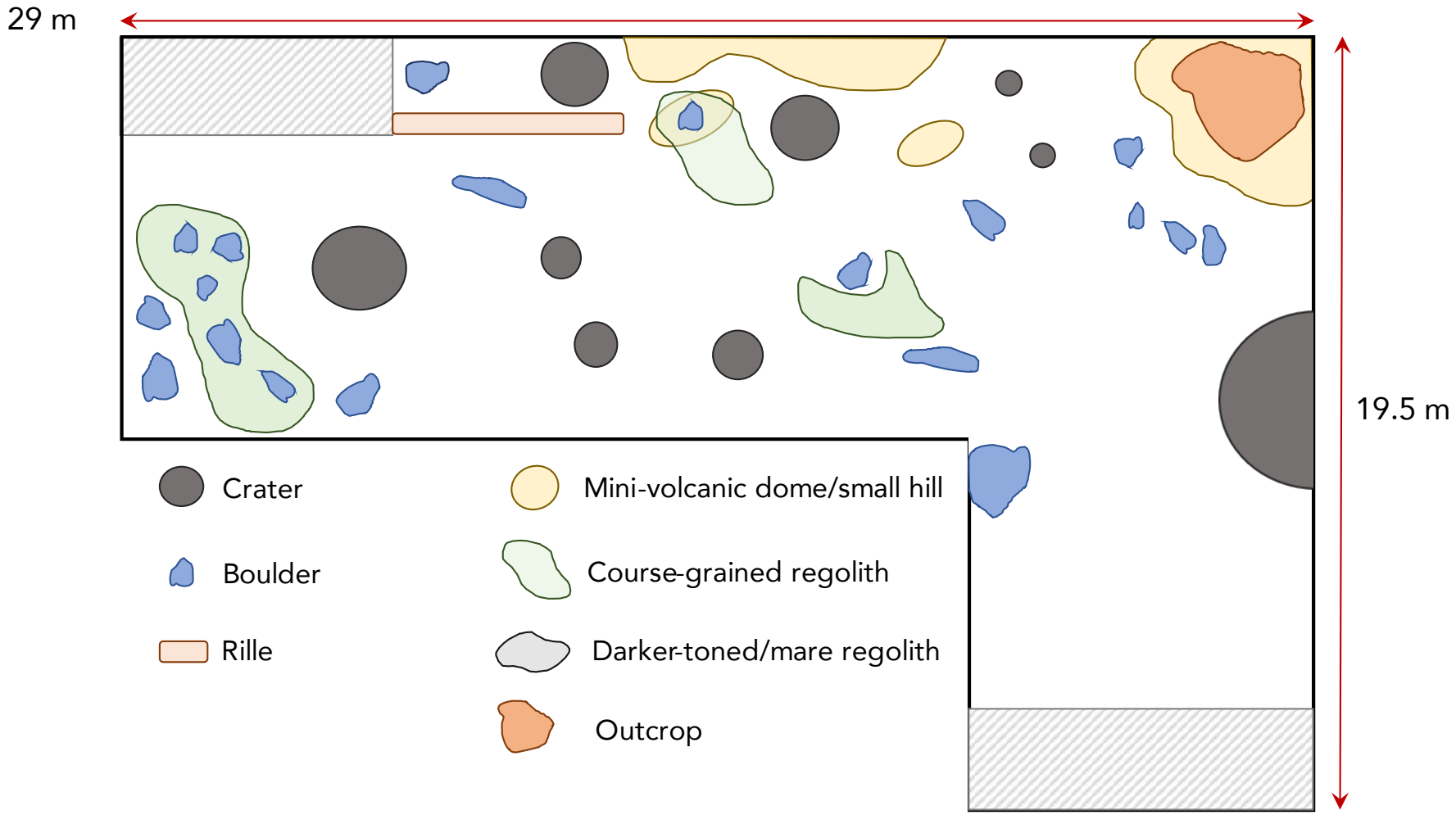
Reconfigurable Terrain

Polar region

Highland rock field

Reconfigurable Terrain – Example Config

Polar Terrain



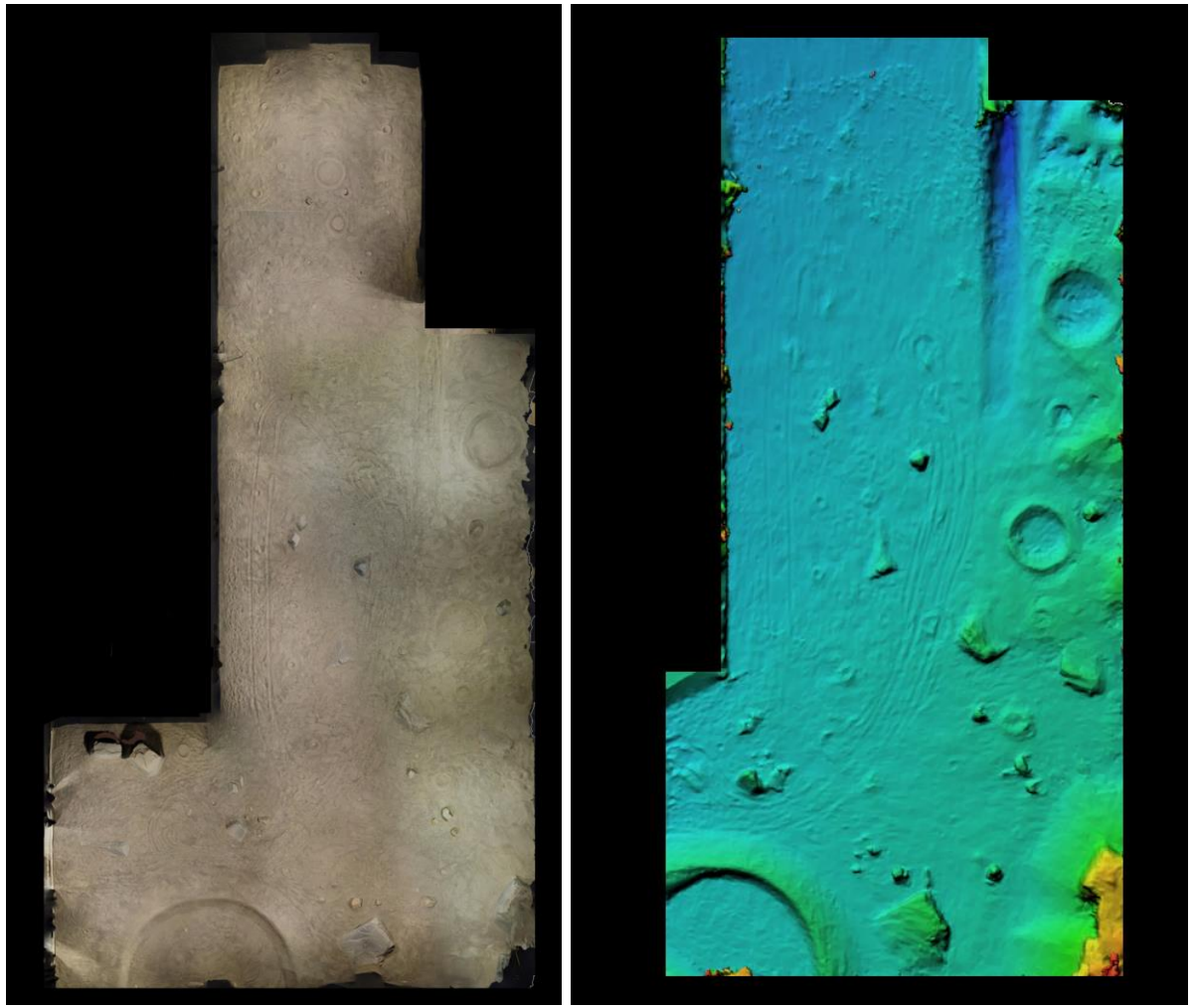
Rock Samples

- High-fidelity rock samples to support science instrument testing
- We have 25 pieces of lunar-analogue anorthosites and basalts (5-40 cm)
- Lithologies include:
  - Shawmere anorthosite from Ontario
  - Morin anorthosite from Quebec
  - Twin Sisters olivine/Basalt Scoria samples from the Lorena Butte Formation, Washington State
  - Prineville basalt of the Columbia River basalt group, Oregon

Left: Olivine sample from the Twin Sisters Formation.
Center: Anorthosite sample from the Shawmere Formation
Right: Basalt Scoria sample from the Lorena Butte Formation.

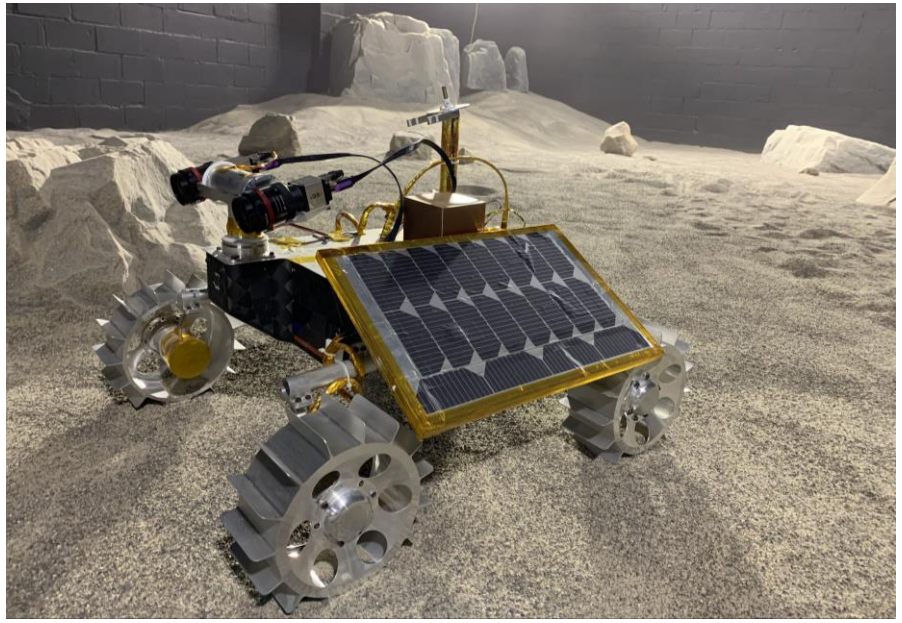
Map Generation and Localization

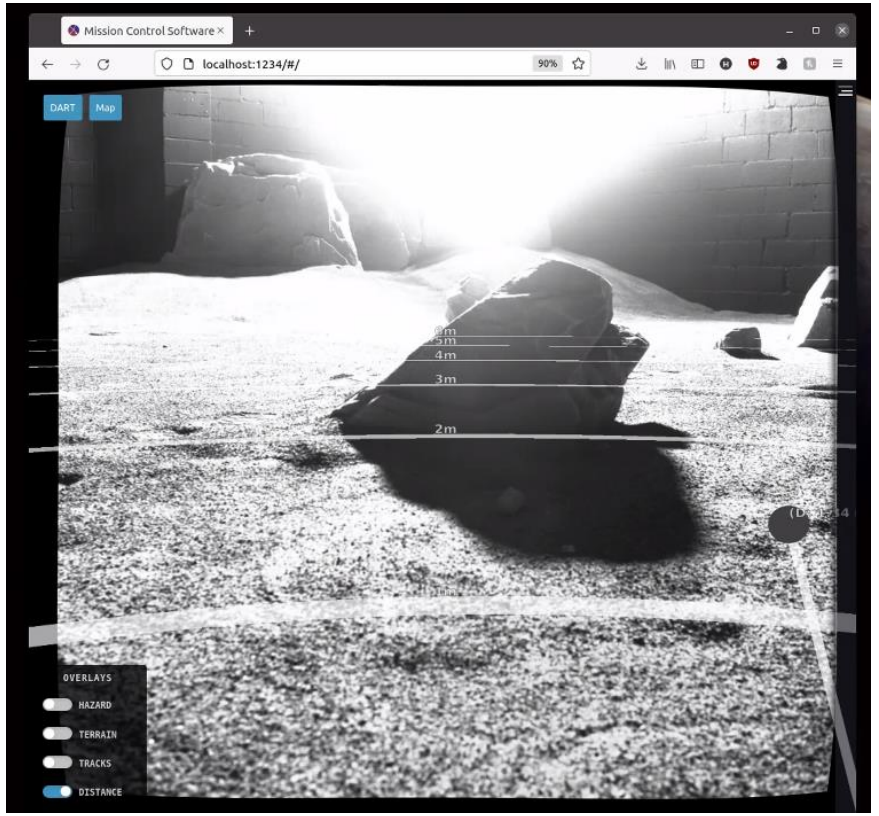
- We can produce an overhead map with a Digital Elevation Model to support testing.
- Ground-truth localization can be provided using our high-precision real-time 3D tracking system: absolute +-2cm accuracy at 8Hz.



Recent Use Cases: Mission Control Intelligence(MCI)

In 2021, we worked with Axiom Research Labs to use their ECA micro-rover in a series of science-driven lunar rover operations tests





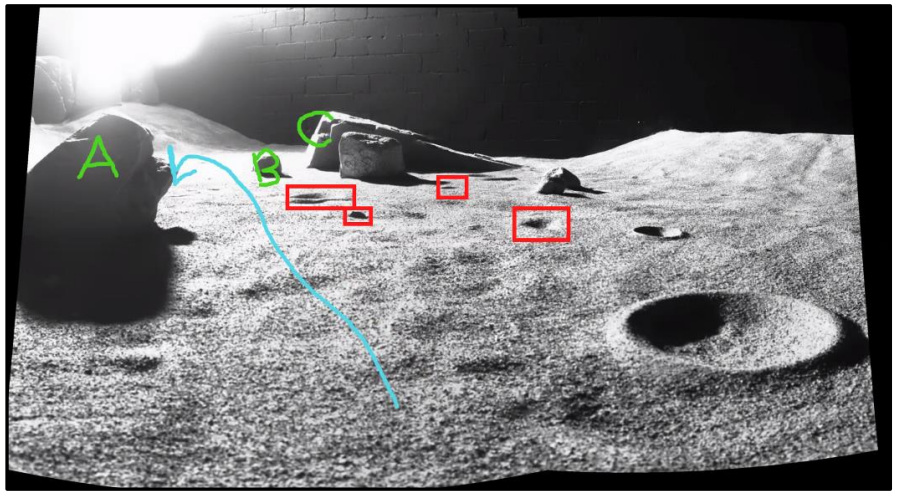
Example of how our Mission Control Software user interface was used to identify distance to targets of interest.

Recent Use Cases: Evaluating Science ConOps

“The Moonyard is an invaluable resource that puts Mission Control above the competition. Using the Moonyard has greatly improved my experience as a science operation intern. Being able to run operation scenarios in real time allows us to identify the strengths and weaknesses in our planning, notably for the I-SPI (Intelligent Science and Perception in Infrared) project”

The user interface is easy to operate the rover and being able to meet online via Zoom allows for extra flexibility to annotate features and plan traverses. Working in the Moonyard also helps build communication skills as the scientists need to be able to effectively communicate with the engineers to execute commands.

The collaboration among Mission Control staff, as well as external users, creates a dynamic and exciting work environment with ample opportunities for learning and engaging with the public.”



Screen capture of the Moon Yard with annotated features (Rocks A, B, C; red boxes = crater) and traverse direction (blue arrow).

Cosette Gilmour

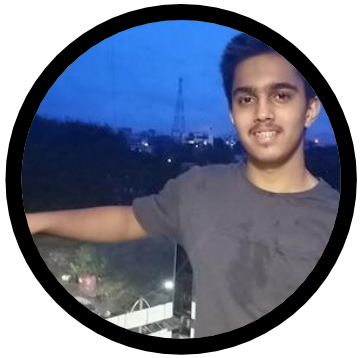
Science Operations Mitacs Intern, Ph.D. Candidate in Earth and Space Sciences at York University

Recent Use Cases: Reach for the Moon

- The Moonyard is an excellent facility for educational activities and public engagement
- In a recent project, *Reach for the Moon*, six students from around the world had the unique opportunity to drive our rover and learn about lunar exploration

Contact us if you would like your students to participate in an educational activity at the Moonyard!

"This experience was awesome, and it leaves me more curious than ever."
- Krish Pagar



Sample Images

About Mission Control

Mission Control is a space exploration and robotics company with a focus on mission operations, onboard autonomy, and artificial intelligence. We believe in sustainable exploration and inspiring the next generation to always keep exploring.

In this new paradigm of commercial lunar exploration, we believe the right software can enable cheaper and more efficient missions, and live mission accessibility – the key to democratizing space exploration.

Let's Connect

Are you interested in using our facility for your next lunar and planetary analogue missions? Please contact us to learn more and book a rover driving demonstration.

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