Pioneering the Future:

AI, Moon robotics and the metaverse

Innovation Management in a Moon Village Association hackathon

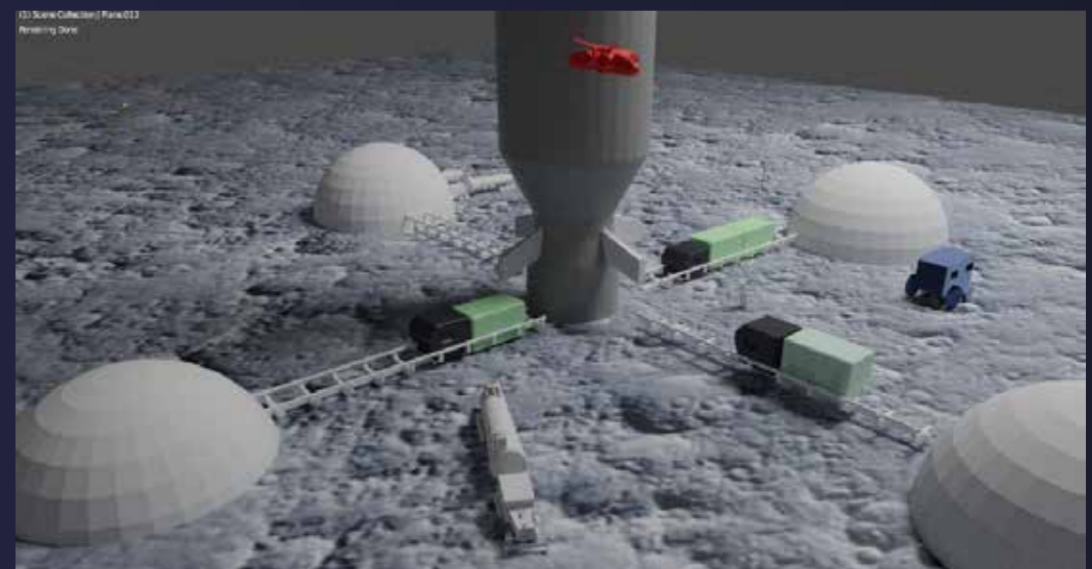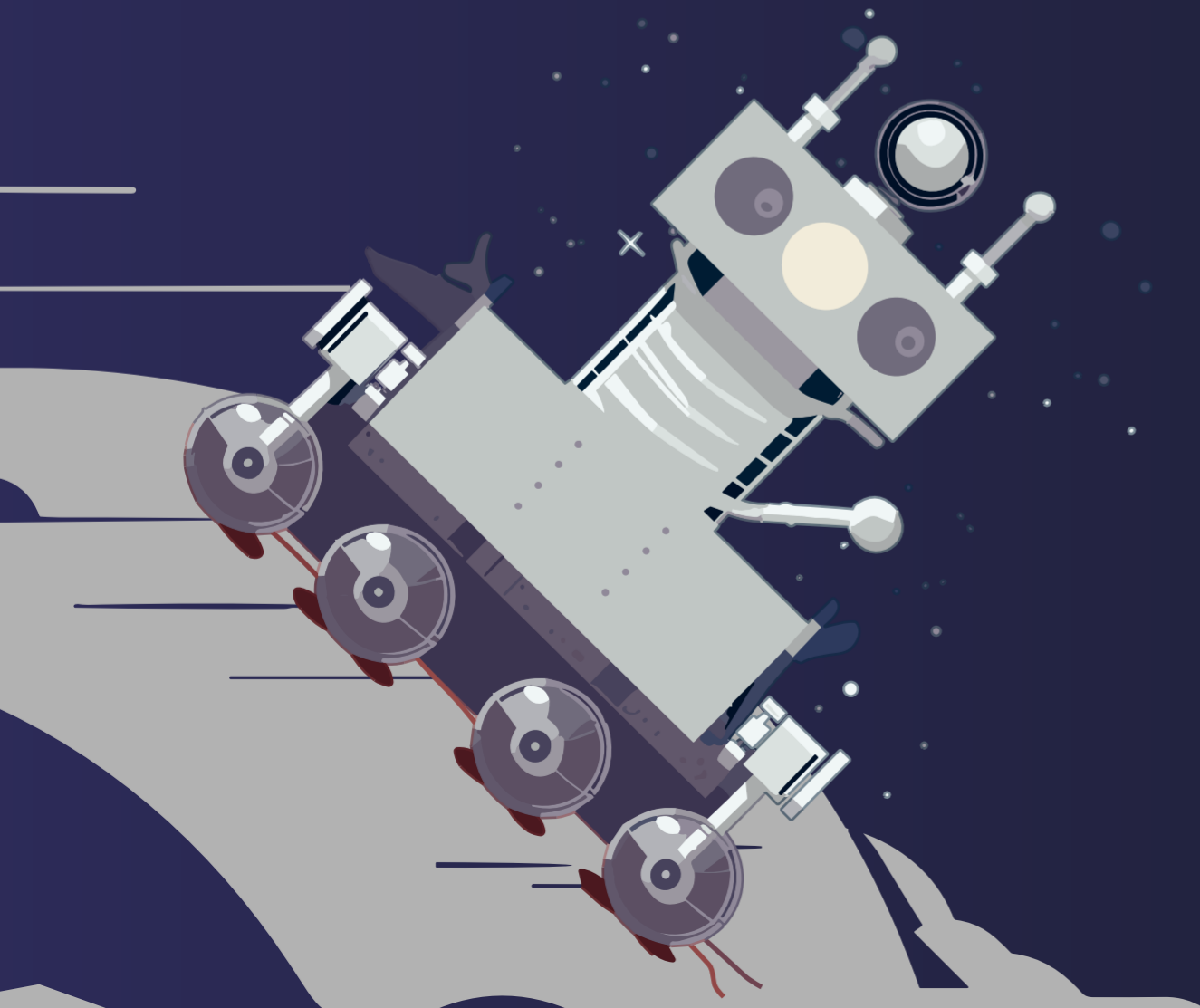Marco Morales 2023

"Will a team deliver better ideas if they collaborate in a shared 3D environment?

The Moon Village Association Hackathon is a global, online remote event for engineering students and young professionals to solve challenges in a future Moon base.

This year the theme was "AI and robots". Participants were required to design a robot with built-in AI functions for operations on the lunar surface. The event took place in a shared 3D environment.

In previous years we had seen brilliant 3D models being presented in flat slideshows, so we wondered if a better way was possible.

"The Meta-Moon", 2021 submission by "Spice Girls" team.

"Innovation is simply the act of taking a new and better path to our destination."

Marco Morales, EMBA

Innovation Strategy,
Transformation Management
and Futurism

Sometimes the world just needs a nudge to step out of the comfort zone into the open space of possibility.

In 2021 I mentored at the MVA Hackathon on the business of innovation, as I was knee-deep in metaverse and integrated reality projects.

Combining my love for space and engineering with shared virtual environments seemed a natural fit, so this year 2023 I pushed for hosting the hackathon in a virtual 3D environment.

Here is a summary.

AI and Robotics show up in autonomous navigation of spacecraft, real-time analysis of satellite data and robotic maintenance in harsh space environments, and - closer to home - from AI-driven medical diagnoses to smart homes. Running parallel, the industrial metaverse is making strides.

Given the immense potential of both, we set out to nudge young participants towards thinking solutions that combine AI and Robotics, and present them in a 3D metaverse environment.

The design must address the following use cases on the lunar surface:

- Surface Power Systems
- Lunar Net Communications Systems
- Terrain Vehicle
- Habitable Mobile Platform
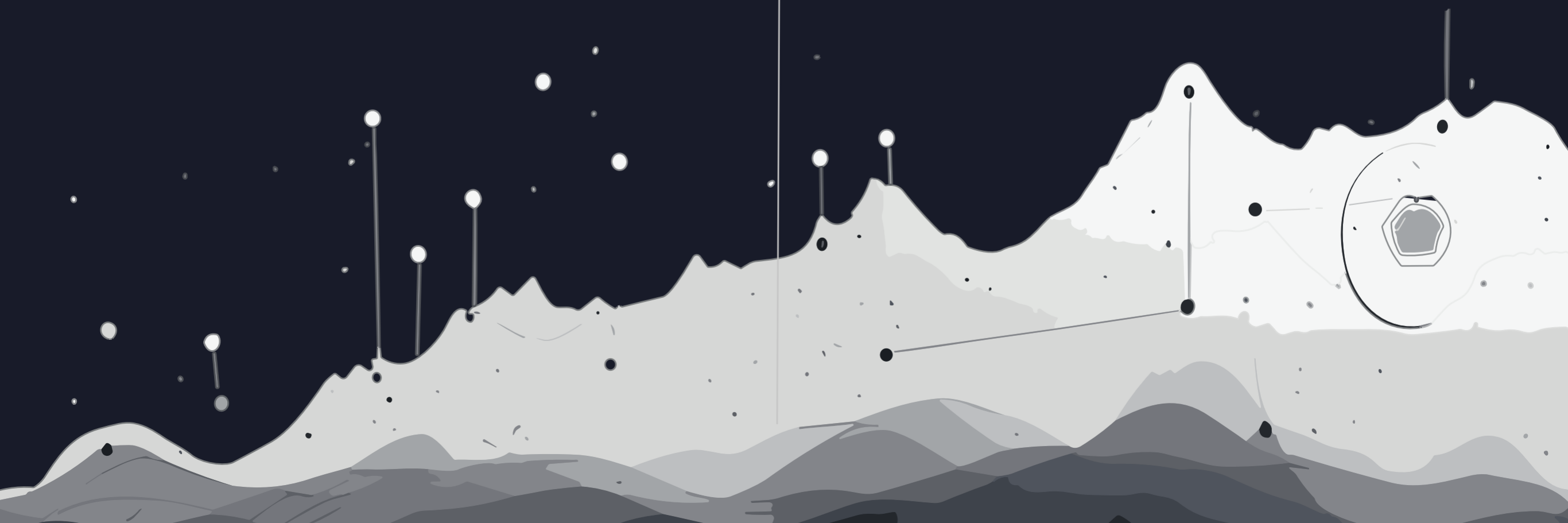- Habitat
- In-Situ Resource Utilization (ISRU)

30 Initial registrations

10 Participating countries

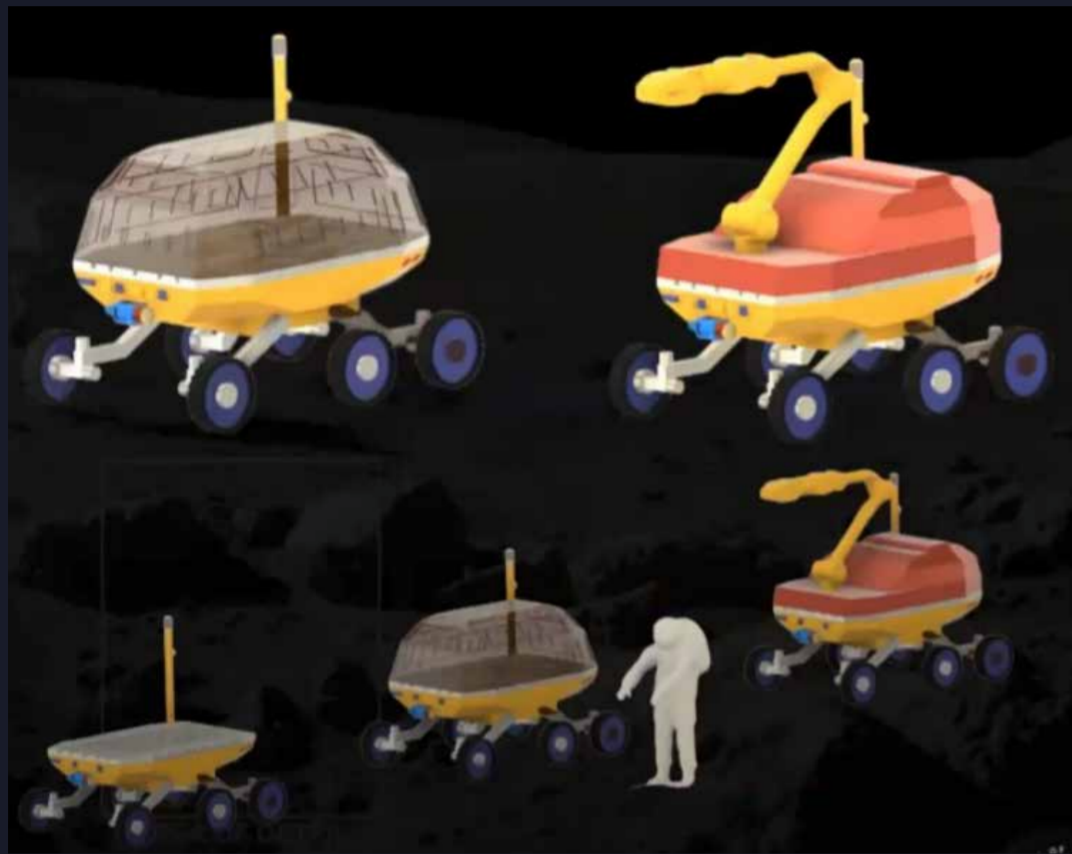**46.7** Percent interested in: "Exploration and Mapping"

4 + 2 Teams and individuals met to discuss tech requirements

1 Completed submission

LEXAMUS

Biospatial Team Submission

Nicholas A Florio
Abhinav Krishnan
Jim J Seelan
Roxy Williams
Professional advisor Dr Mohan Muvvala

Virtual space

https://oncyber.io/mva-team-1?coords=1
7.20x-0.87x3.33x-0.98

Video presentation

https://youtu.be/FS7sQqiyRdE?si=oyO-Z
M6hAz0lrdQ5

A lunar surface robot with built-in AI functionality paralleling the current Artemis timeline and designed for exploratory interests.

The current lunar operations are not effective for large scale, there are no adaptable EVA and robotic surface activity and there is no human-machine (rover) interdependency to ensure cohesive multi-objective missions and enhanced experience for lunar crews,

The LEXAMUS is designed to benefit and have direct applications on Earth and on the Moon. It includes environmental sensor suits with proximity sensors, rechargeable batteries, positioning navigation and communications to both surface and orbit local, as well as AI powered avionics, a rocker bogey suspension and terrain-friendly.

The design is incredibly flexible and modular, easy to add-on extra modules, and with an AI intelligence that would allow it to take corrective and supportive action to aid the astronauts.
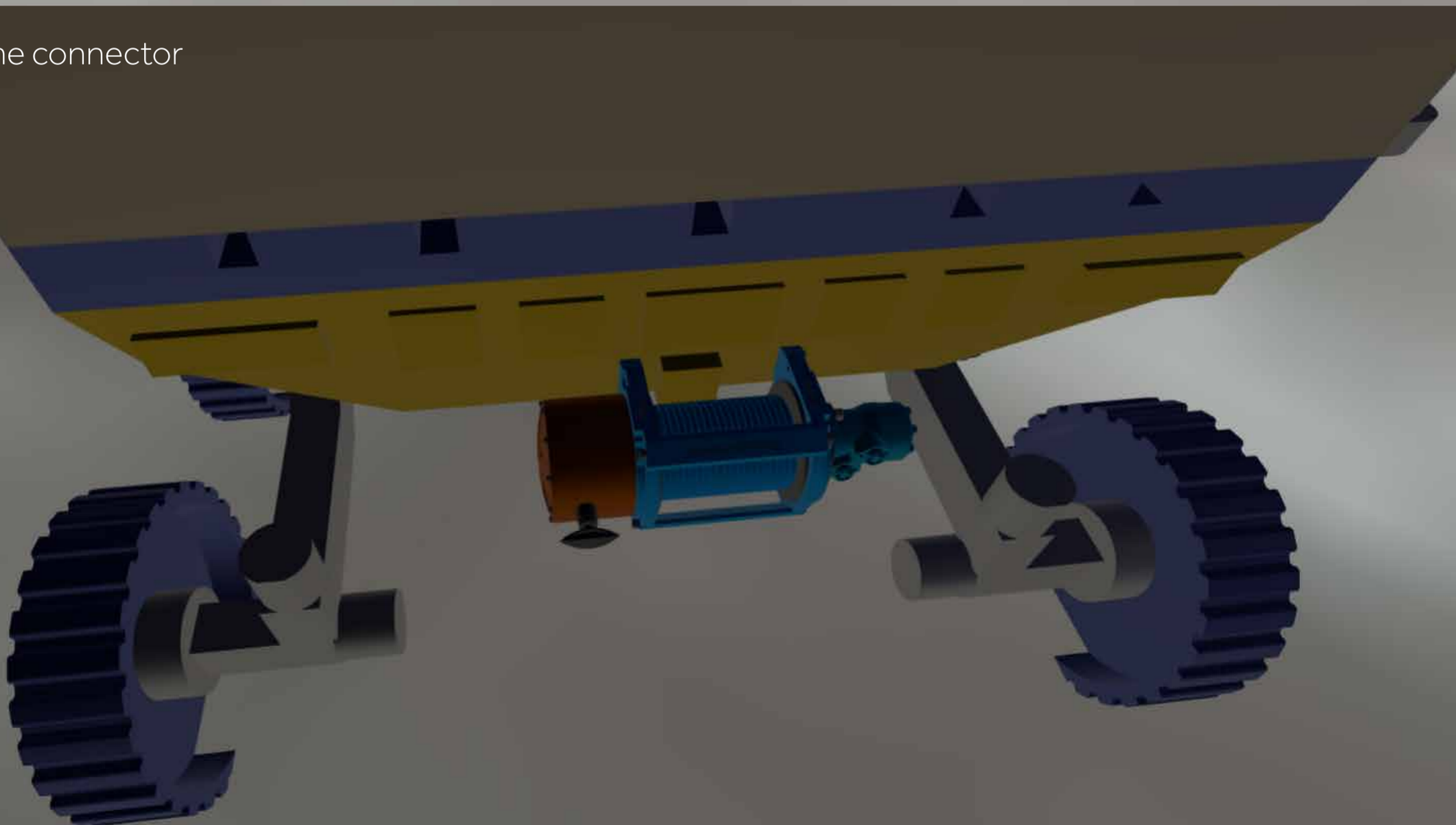
LEXAMUS

Modular designs of the Lexamus rover
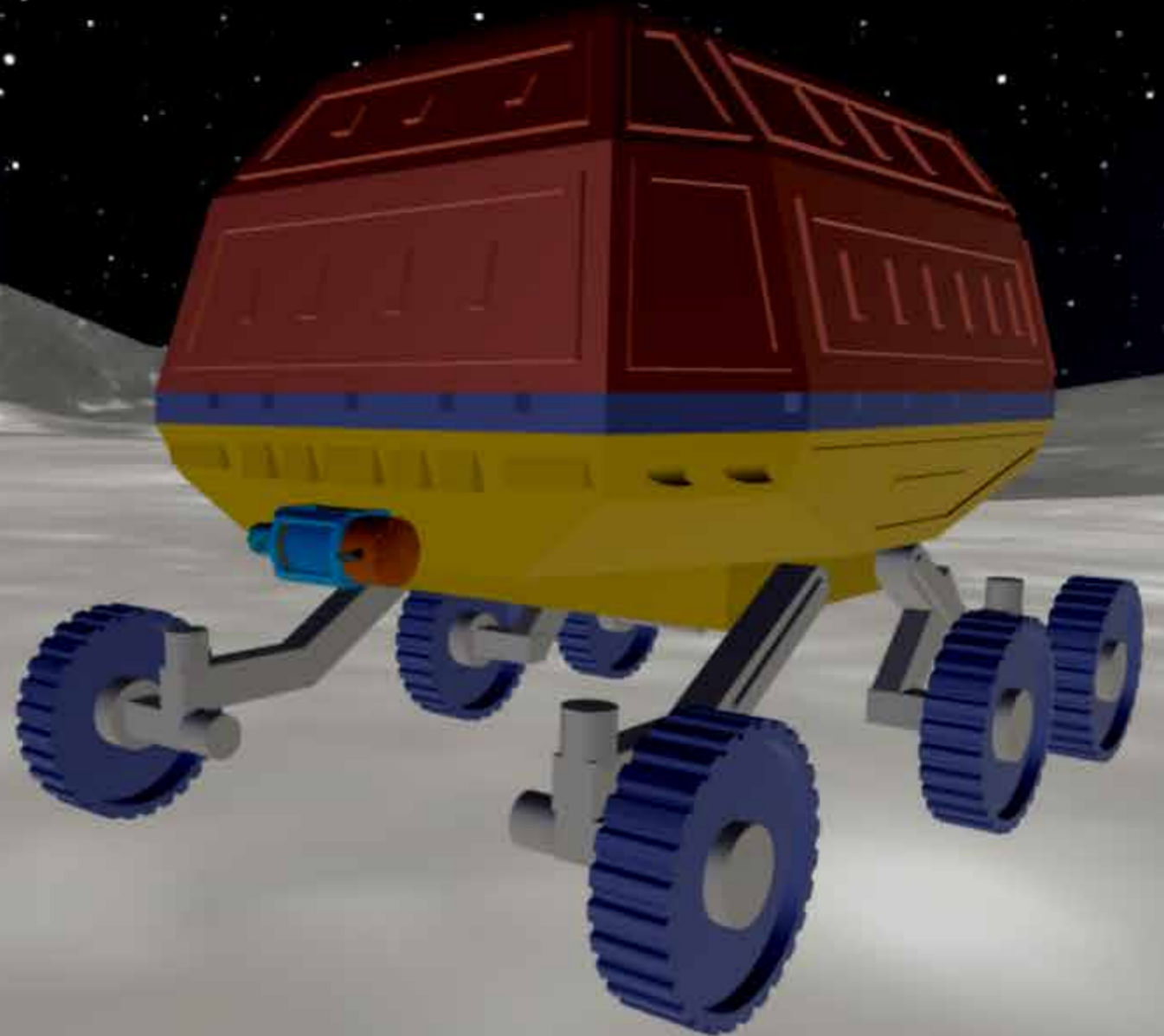
Below: detail of the connector

What worked?
The foundation of a Digital Moon Village metaverse space.

What didn't?
Only one team submitted their proposal, which extended past the initial hackathon time.

What were the biggest challenges?

- Limited experience with creating business cases and financial models and a lack of insight on why they were important

- Limited experience with 3D modeling

- Limited time that conflicted with work/exam schedules

Moving forward
We learned that it is possible to cocreate mechanical engineering projects on a virtual space, and that the hackathon winners' ideas can live and grow in the Digital Moon Village.

Future support for 3D asset creation and guidance in the business of space will be provided, to increase successful entries.

An area to explore in the future will be the new AI tools, specially those which simplify the sketch-to-3D process.
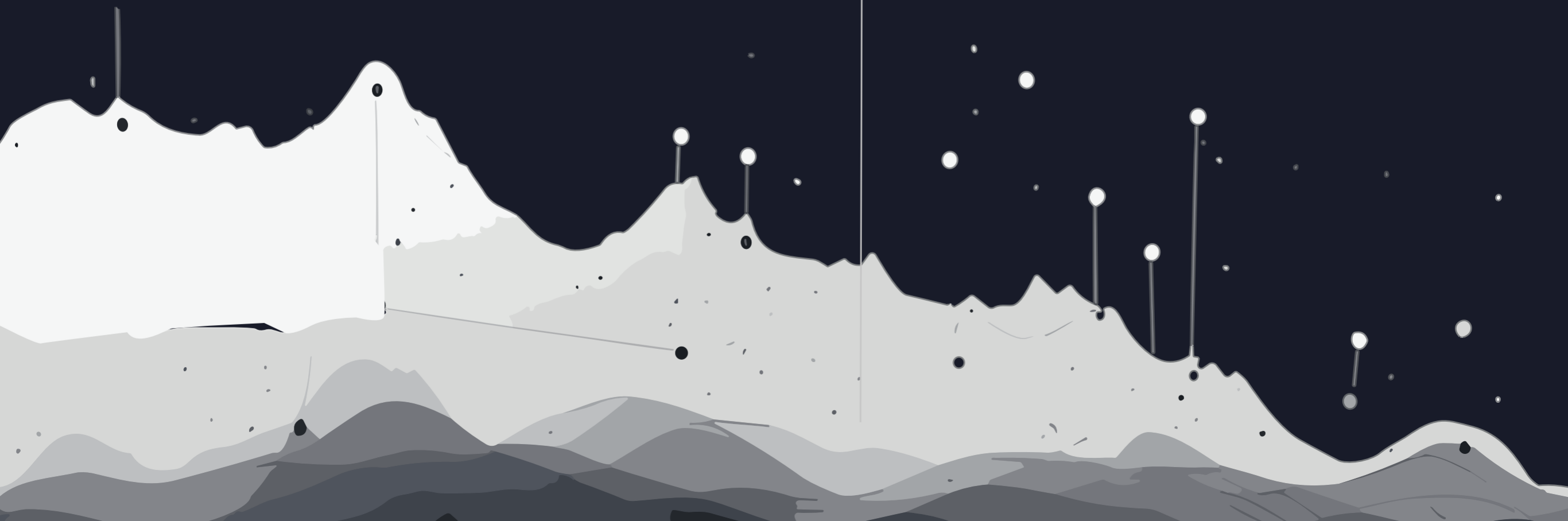
ORGANIZERS

Moon Village Association
Pavithra (Pavi) Manghaipathy
Bernadette Joy Detera

SPEAKERS

TCS PACE Europe
Marco Morales
Rinu Michael

Stellar Space Industries
Maneesh Kumar Verma

PARTNER

 MetaArchitects HUB

PLATFORM

 Oncyber

SPECIAL MENTION

 alakazam

Participating countries:
Bolivia, Egypt, Canada, India, Jordan, Philippines, Spain, Indonesia, Nepal and Ukraine

LINKS

MVA page
https://moonvillageassociation.org/

Virtual Moon Village | Moon scene by MetaArchitects HUB on OnCyber platform
https://oncyber.io/mva-hackathon-2023

Tutorial for building on OnCyber by MetaArchitects HUB
https://www.youtube.com/watch?v=Rme6sDIbHSQ&ab_channel=MetaArchitectsHub


Demo built by alakazam
https://akzm.io/worlds/demo/

LUNAR ROBOTICS MASTERCLASS

"Space systems engineering, critical questions and getting Machines and Humans to get along."

Maneesh Kumar Verma

Lead Robotics at
Stellar Space Industries

Maneesh Kumar delivered an insightful lecture on the current landscape, Lunar challenges, roadmap, use cases, types of robots, design constraints, NASA's STMD priorities, requirements and technologies.
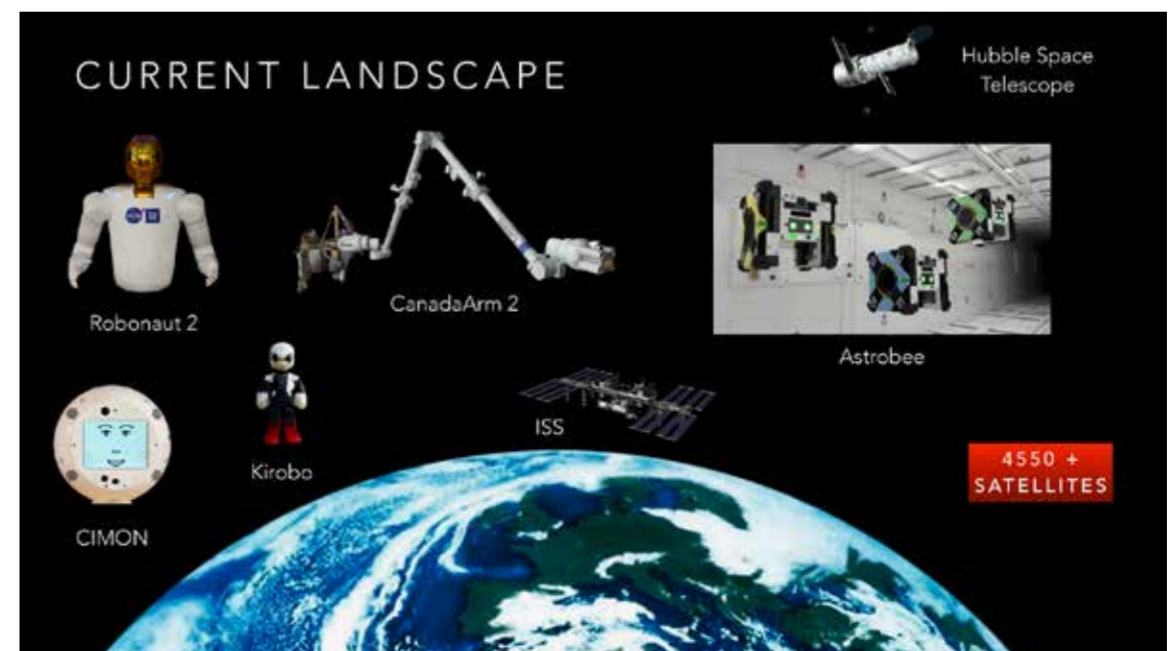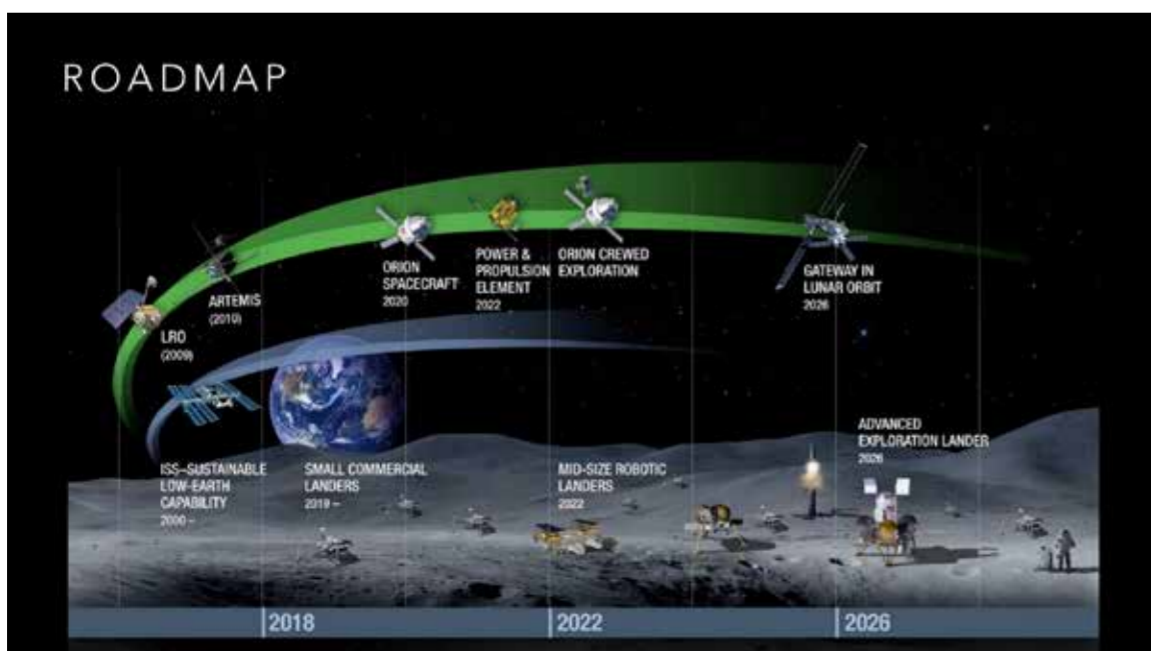
AI AND ROBOTICS MASTERCLASS

"Sparking innovation and inspiration for navigating the cosmos."

Rinu Michael delivered a riveting lecture on Understanding AI, AI and Robotics, Sparking Innovation and Inspiration and Navigating the Cosmos, along with Considerations, Tips, and Launching Forward Do's and Don'ts.

Rinu Michael

Rapid Labs Lead, TCS PACE Europe
AI Architect and Author
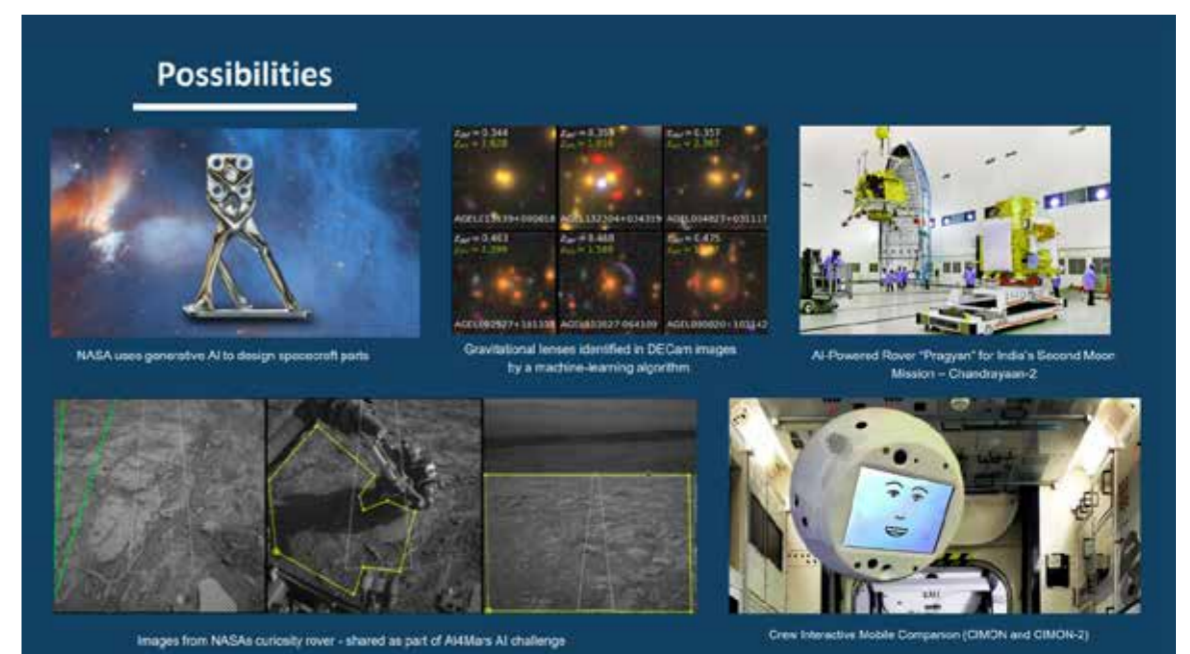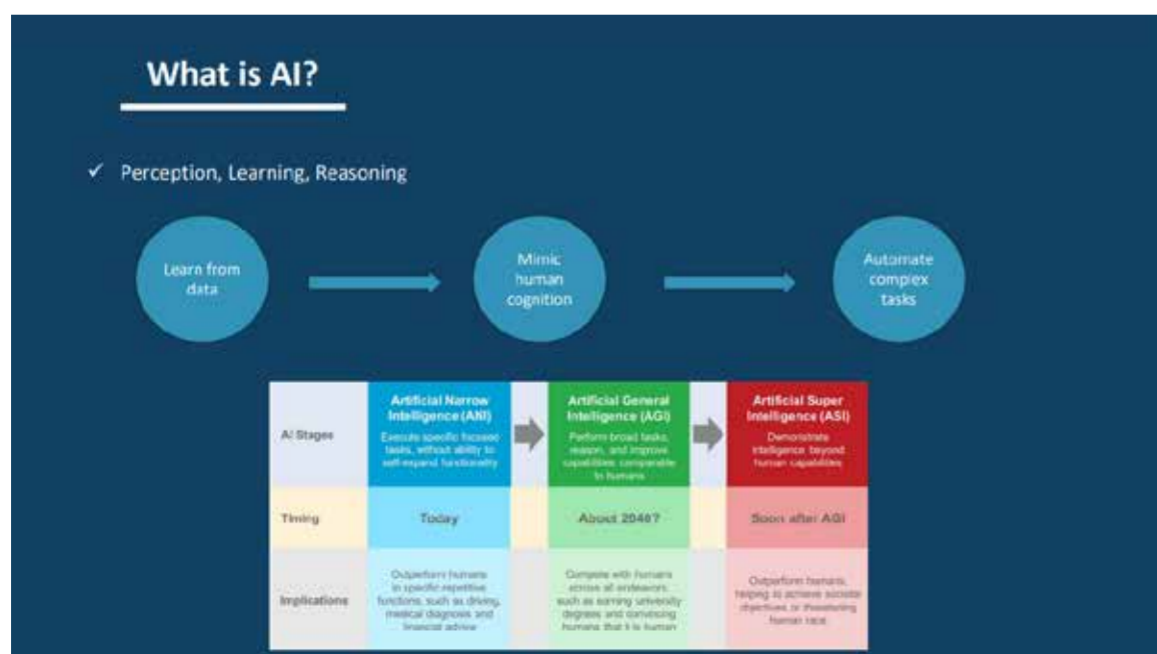
METAVERSE-BUILD TRAINING

"We are building a holistic knowledge of what is the metaverse."

A rapidly growing pool of global talent, spread across an increasing number of platforms, skill sets, and disciplines, managing a community of creators and developers building custom projects for the metaverse.

MetaArchitects HUB