AUSTRALIAN ROVER CHALLENGE

Founded by the
University of Adelaide

5 years of Growth : 2021 to 2024

The Australian Rover Challenge is organized and led by :

Andy Thomas Space Resources Centre

“Enabling long term human presence in deep space”

Lunar civil construction & architecture, robotics
space medicines, psychology, law, agriculture

Overview

- Who am I?
- What is the Australian Rover Challenge?
- Why are we doing it?
- Why the Moon?
- What exactly do the rovers do?
- What have we achieved so far?
- What are we planning for the future?

Who am I?

- Daniel Ricardo ≠ Daniel Ricciardo
    - Not a Formula 1 Racer
- Co-Founder & Events manager for the Australian Rover Challenge
- T-3 months to submitting PhD


THE BARR SMITH LIBRARY
15:30
26 Mar
THE UNIVERSITY of ADELAIDE
SUB CRUCE LUMEN

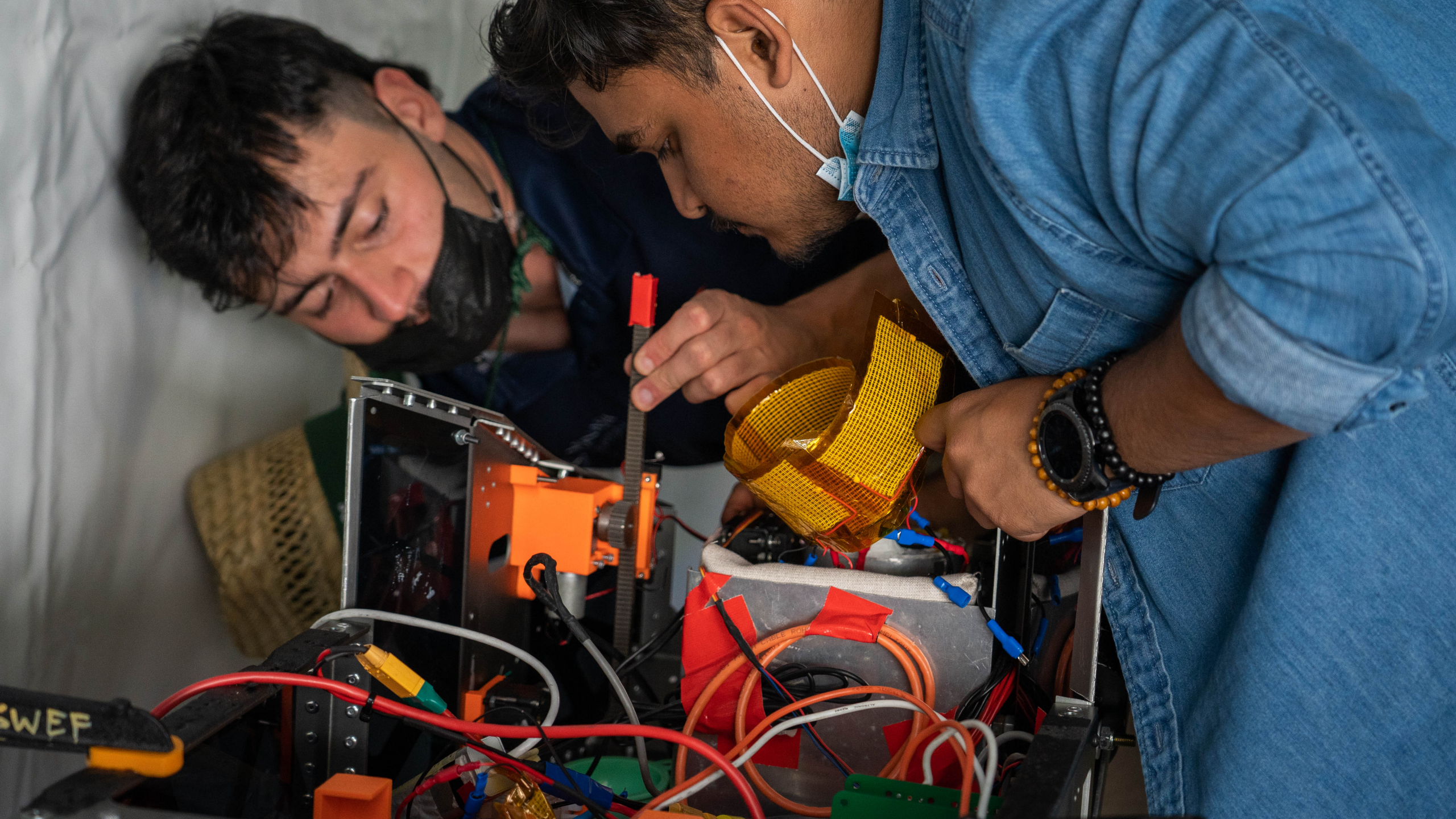
What is it?


AUSTRALIAN
ROVER
CHALLENGE
2024
make history.
BOEING
CATERPILLAR
Department of
Mechanical Engineering
SCORPIO

Why are we doing it?

Why are we doing it?

- **Increase STEM engagement and cross-discipline collaboration**



Why are we doing it?

- Increase STEM engagement

- **Reduce financial barriers for student participation**


MARS SOCIETY DESERT RESEARCH STATION
University Rover Challenge


raptors
MONASH University
MECHANICAL ENGINEERING
VIT

Why are we doing it?

- Increase STEM engagement
- Reduce financial barriers for students
- **Connect students with industry (and a job!)**
- **Inspire the next generation and grow the future space workforce**


ARC 2023
Fourier Dynamics
KPMG
ROVER TEAM
BOEING
STEM

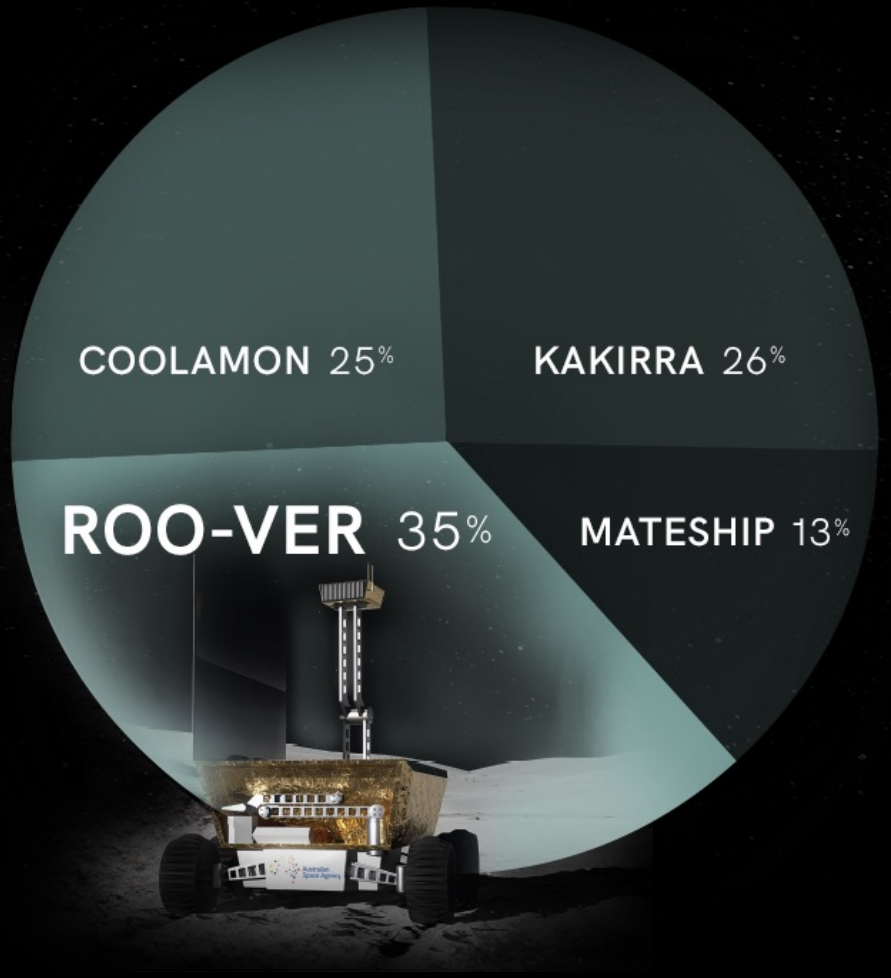
Sponsors get hand-on experience!

Why the Moon?

Why the Moon?

- Demonstrate technology on Moon first, before Mars
- All university rover challenges (except Lunabotics) are Mars-focused
  - URC, ERC, IRC, ARC, Intl-RC
- Australia's first mission to the Moon is a **foundation services rover**


G'DAY
M N
Our boldest
adventure yet.
Australian Government
Australian
Space Agency
G'DAY
M N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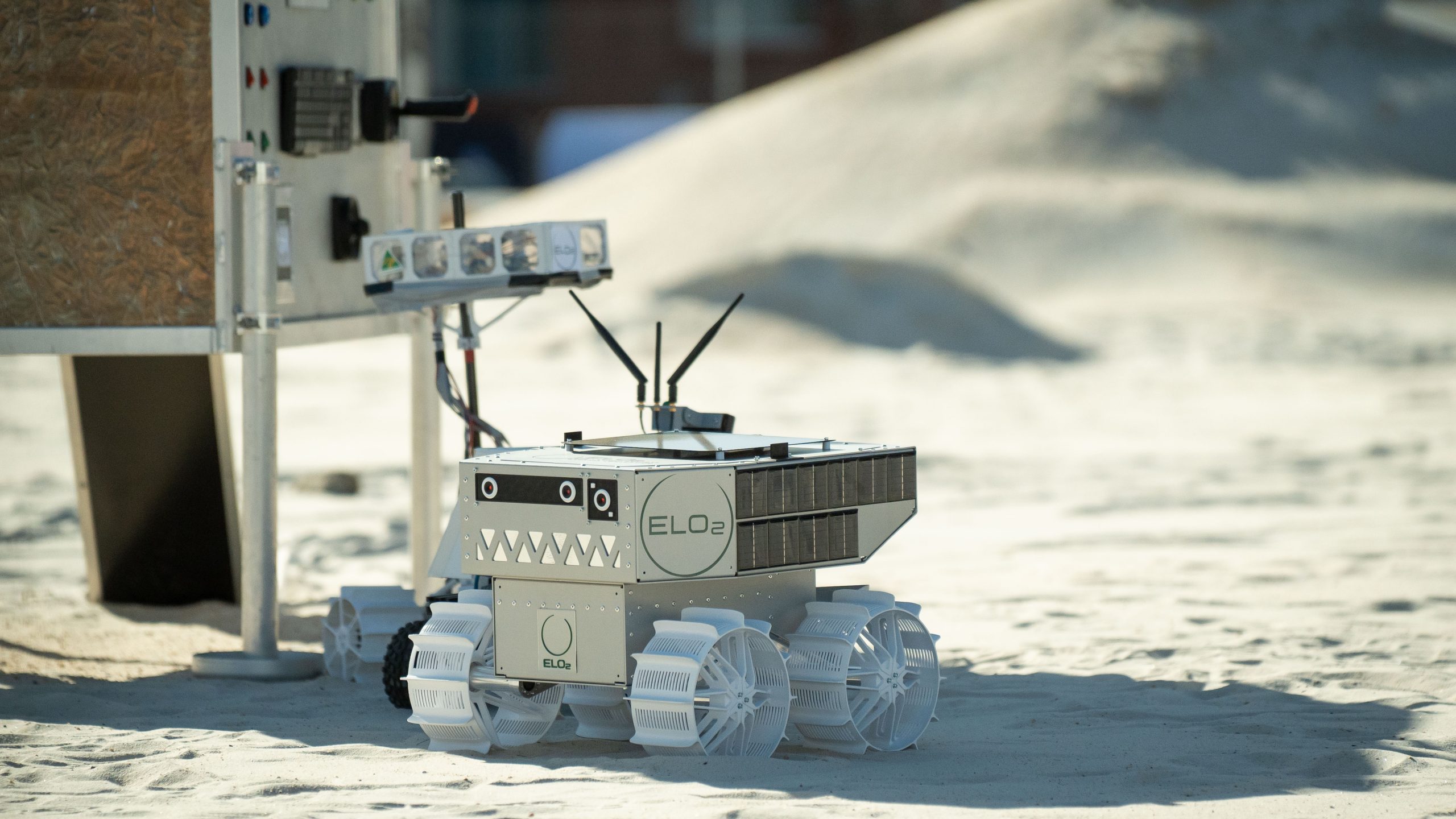
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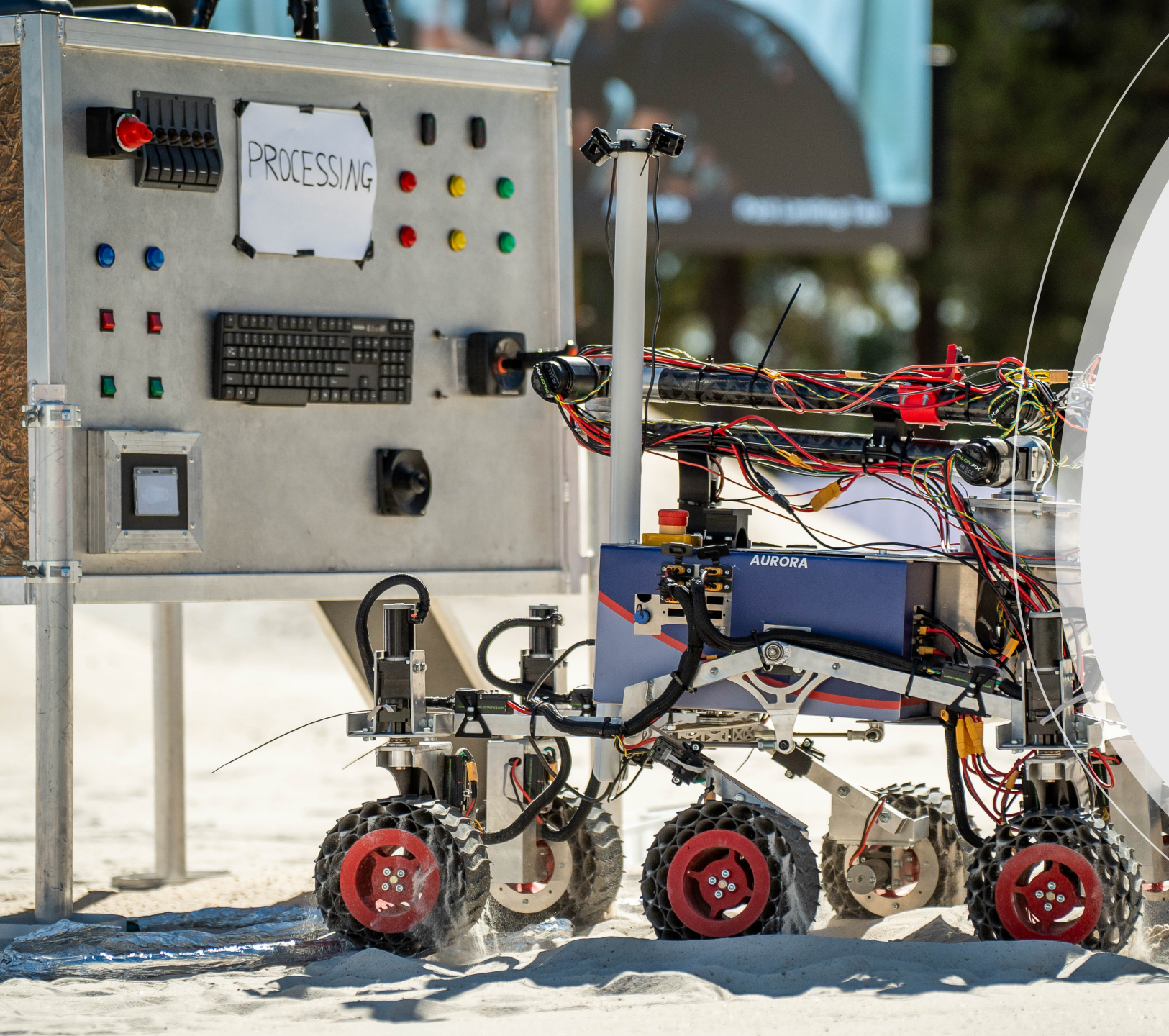

So what exactly do the rovers do?

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- 500 points
  - Critical Design Review (T-3 months) 25 pts
  - System Acceptance Review (T-1 months) 75 pts

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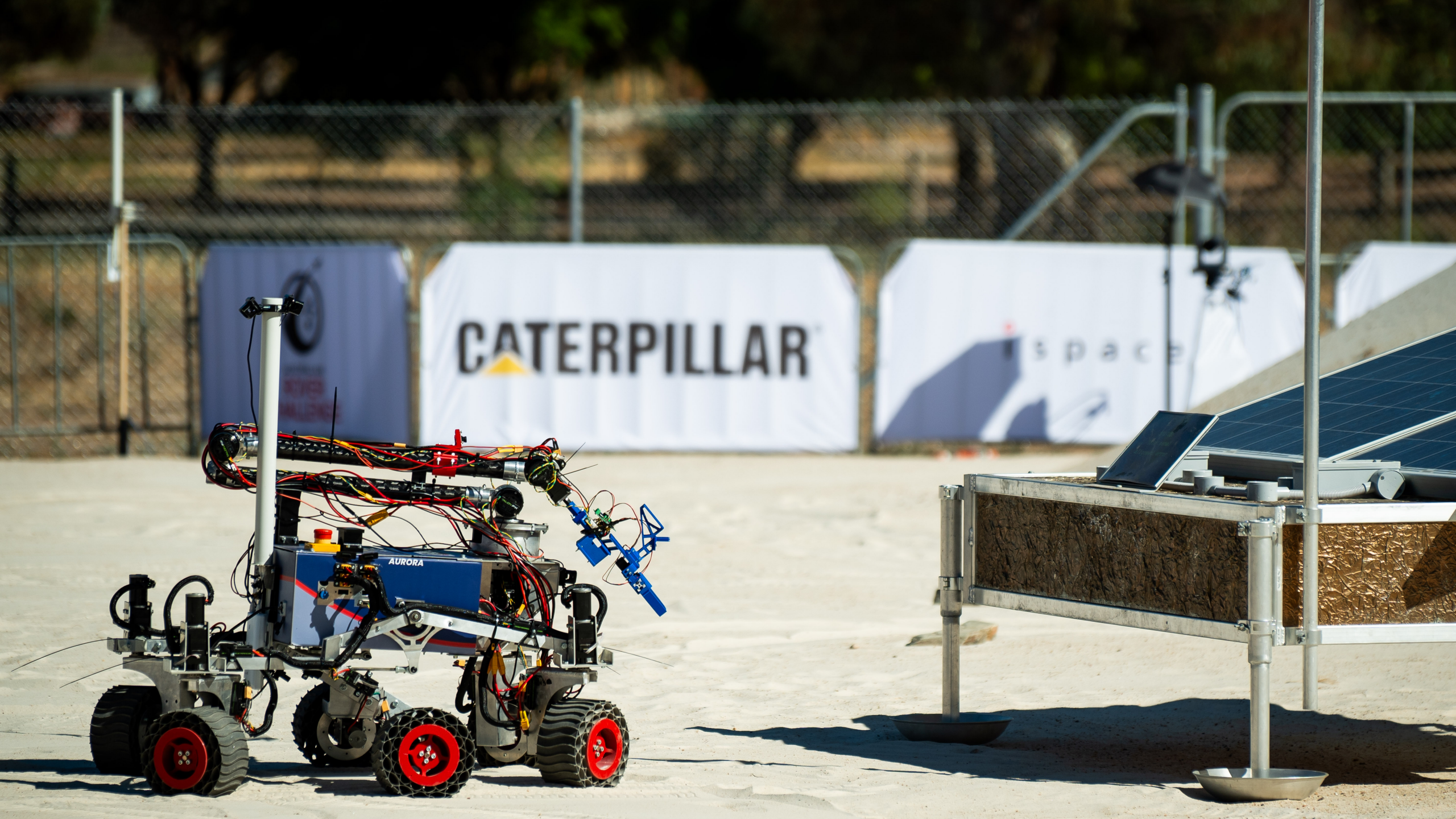
  - System Acceptance Review (T-1 months) 75 pts

  - **Post Landing Task** **100 pts**

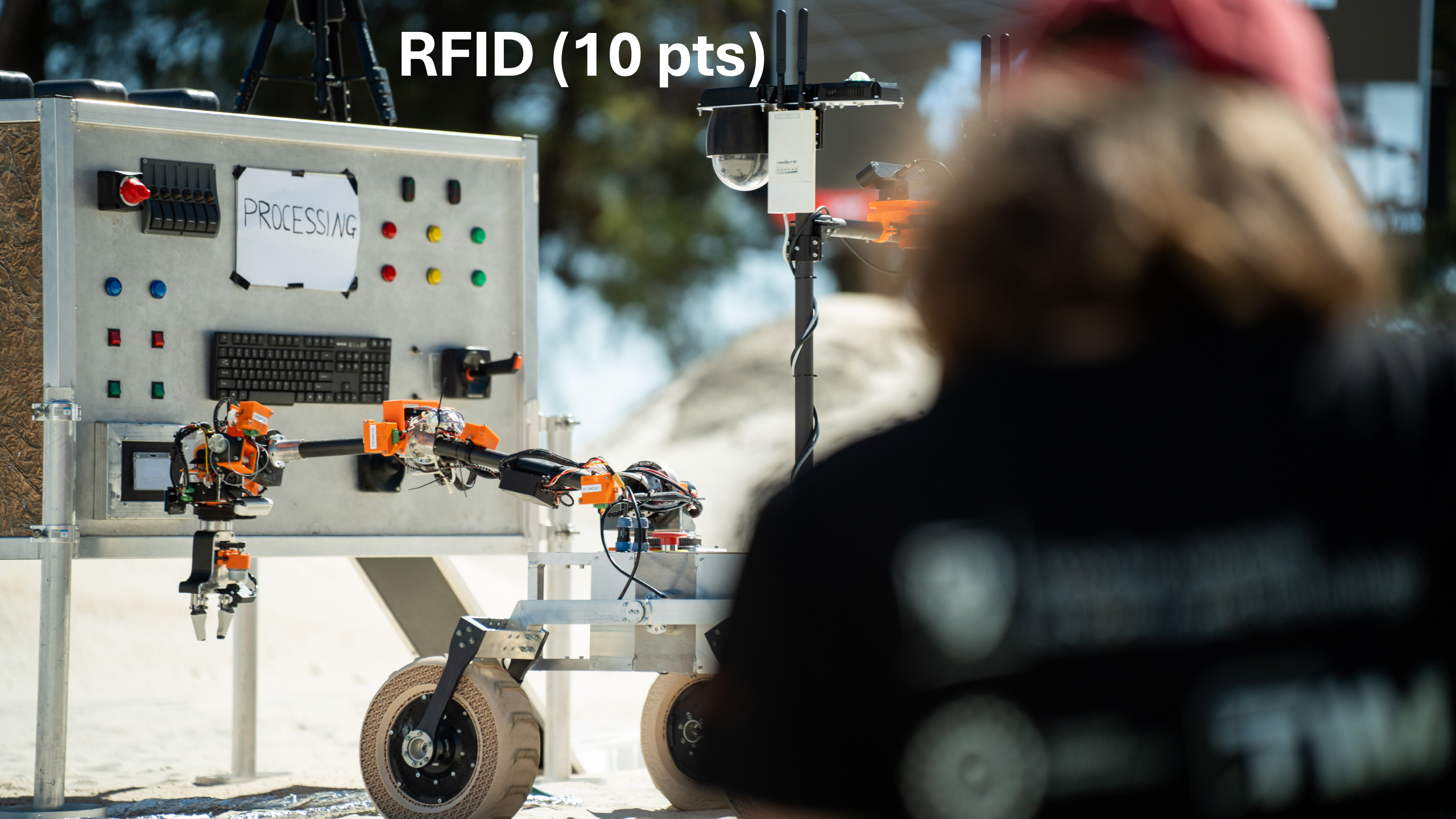
Descend Ramp (5pts)

Circumnavigate lander (15 pts)

Site evaluation (30 pts)

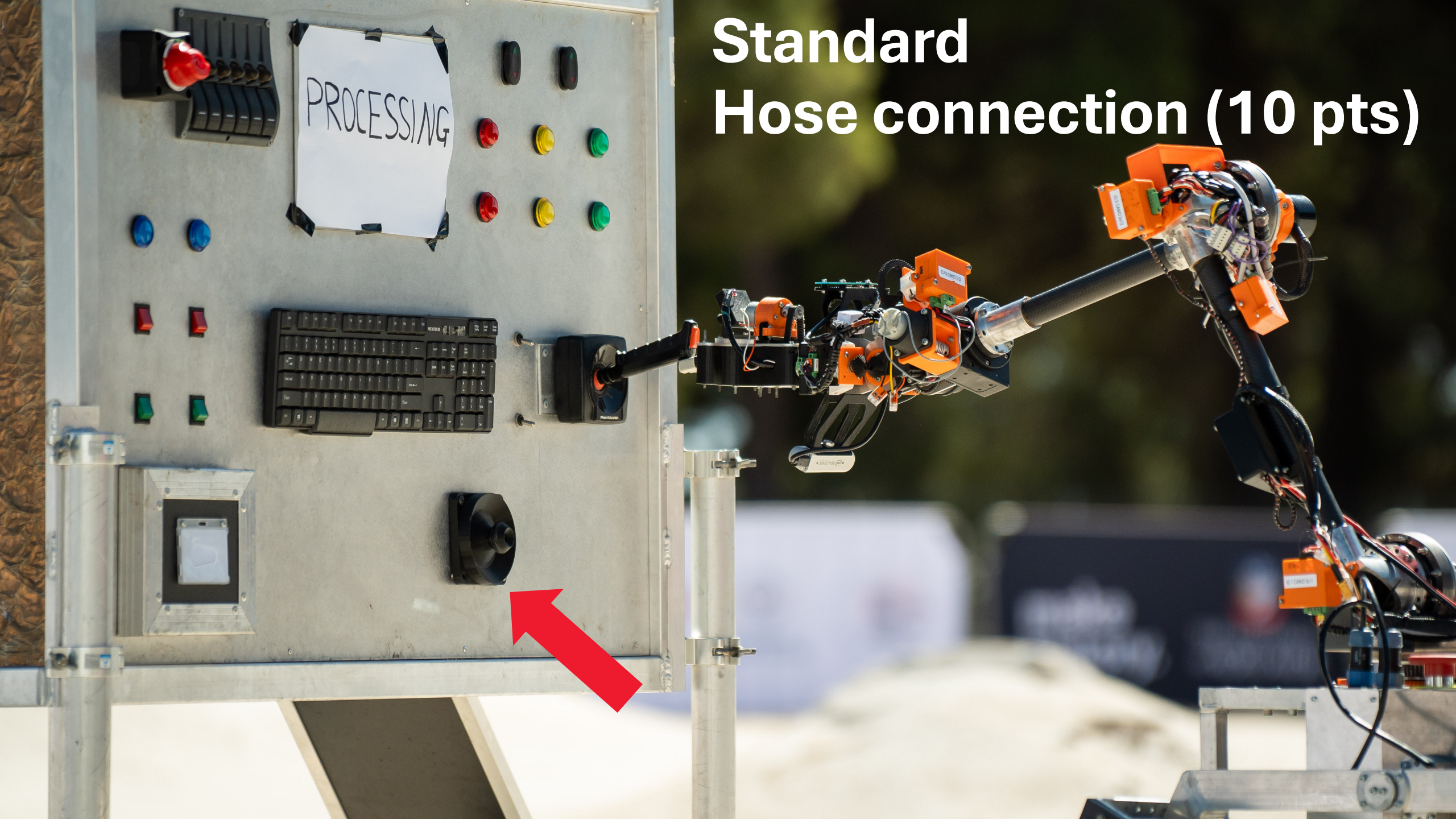

CATERPILLAR
AURORA

RFID (10 pts)

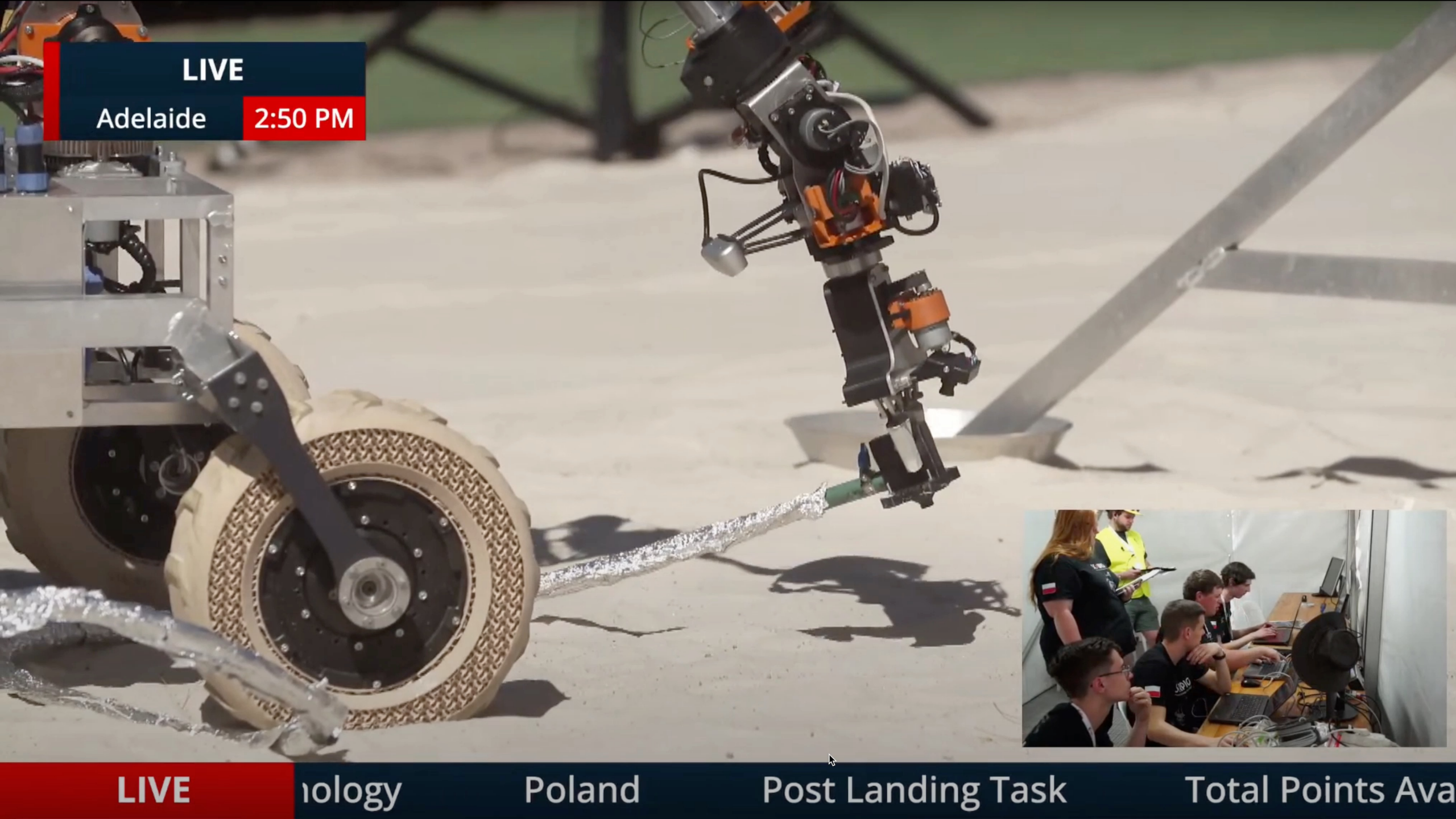


Maintenance (20 pts)

Standard
Hose connection (10 pts)



Custom
Hose connection (10 pts)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ıology
Poland
Post Landing Task
Total Points Ava


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SCORPIO
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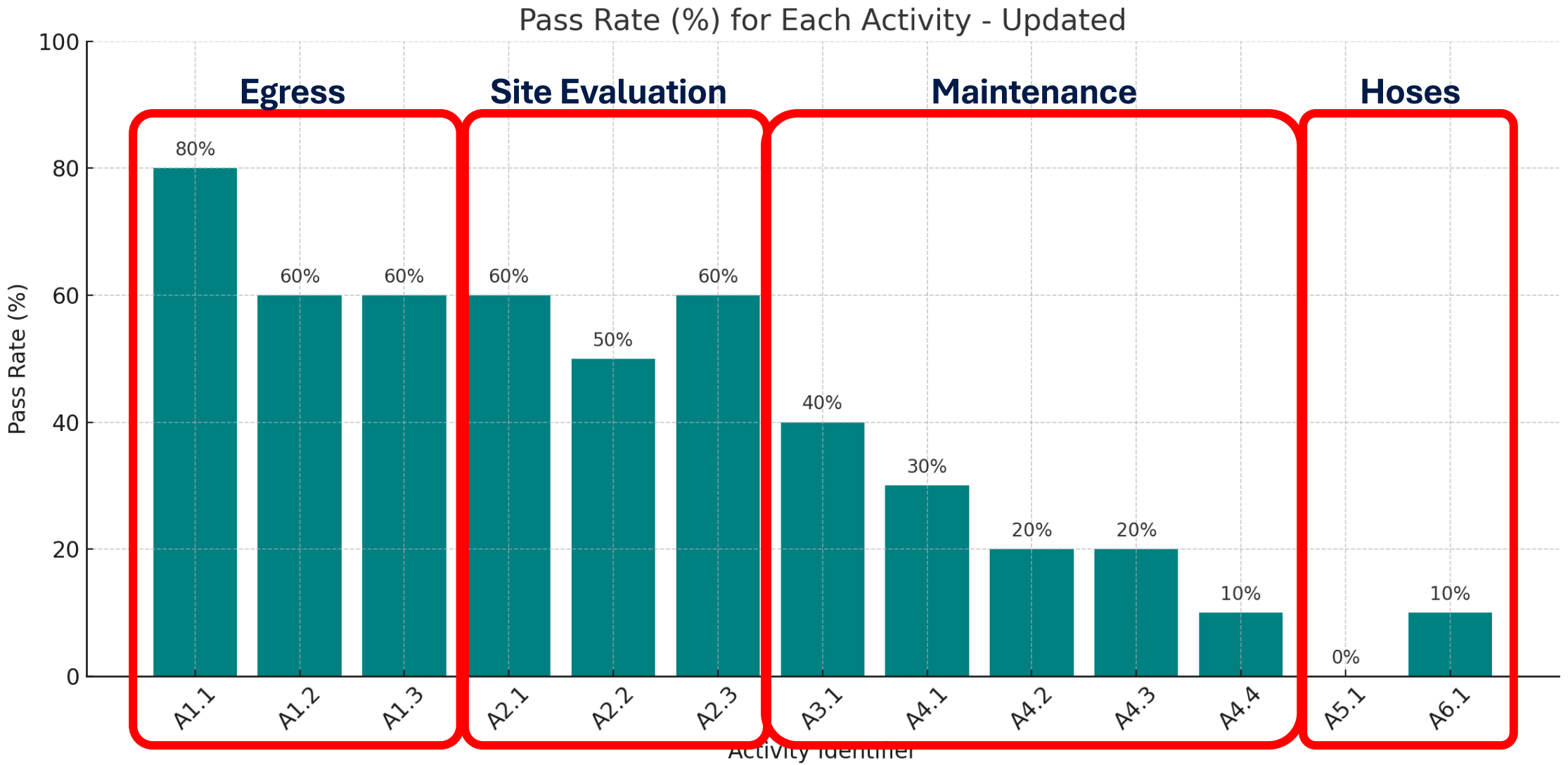
oints Available for this Task: 100
Project Scorpio
Wrocław

Post Landing Task
2024 Performance Review



So what exactly do the rovers do?

- 500 points
  - Critical Design Review (T-3 months) 25 pts
  - System Acceptance Review (T-1 months) 75 pts

  - Post Landing Task 100 pts
  - **Excavation & Construction Task** **100 pts**

Descend Ramp (5pts)

Rock Clearing (30 pts)

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Adelaide 10:16 AM

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Adelaide 2:53 PM

LIVE sk Total Points Available for this Task: 100 RMIT Rover T

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Adelaide 11:53 AM

TIME REMAINING
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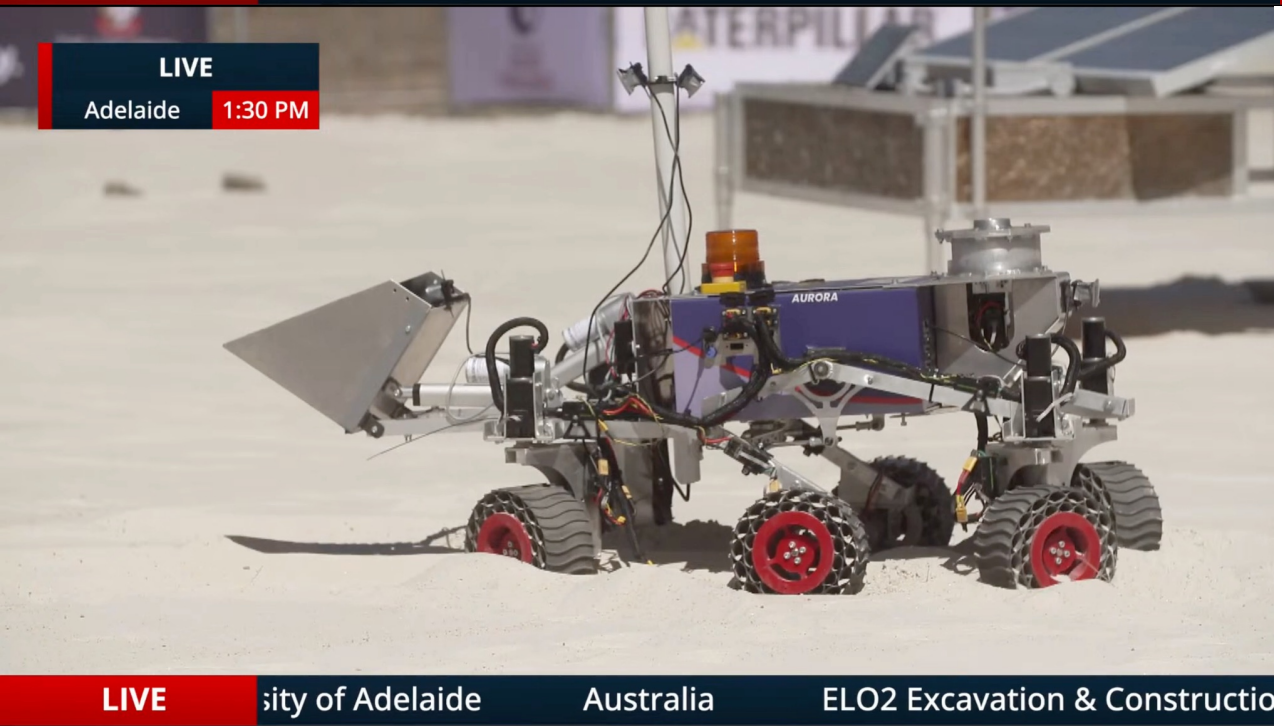
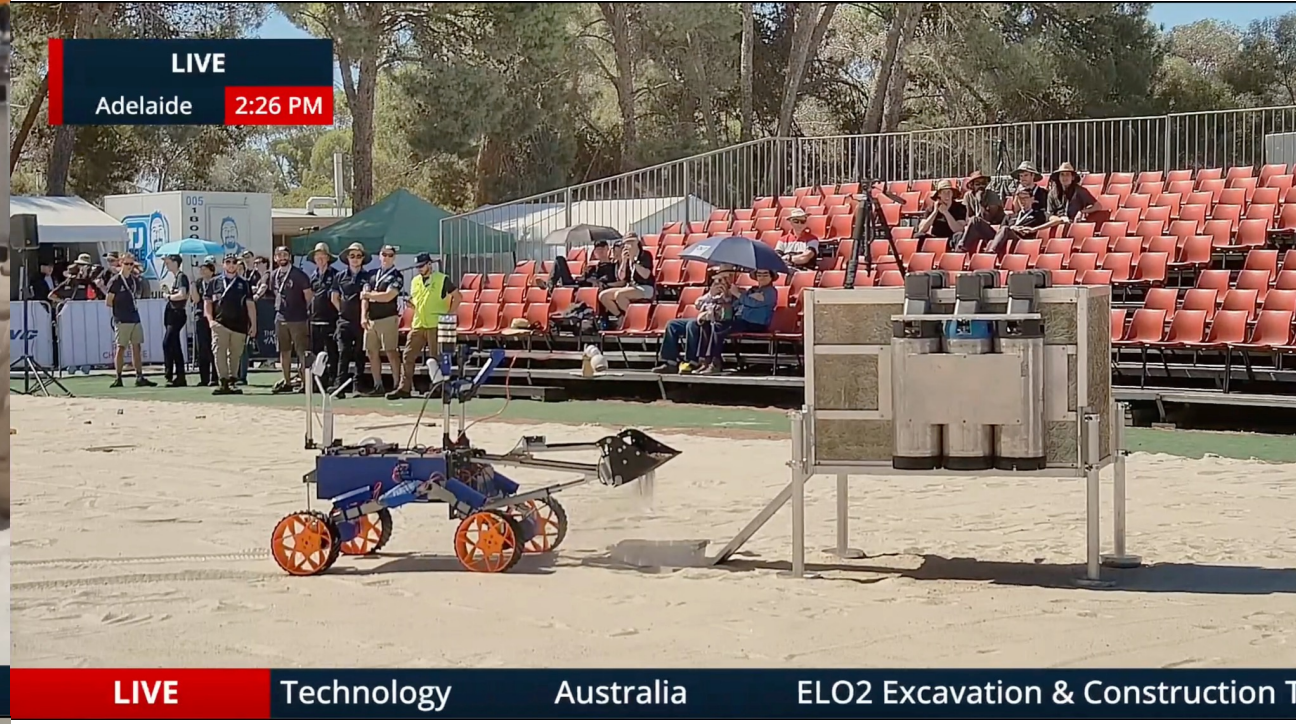
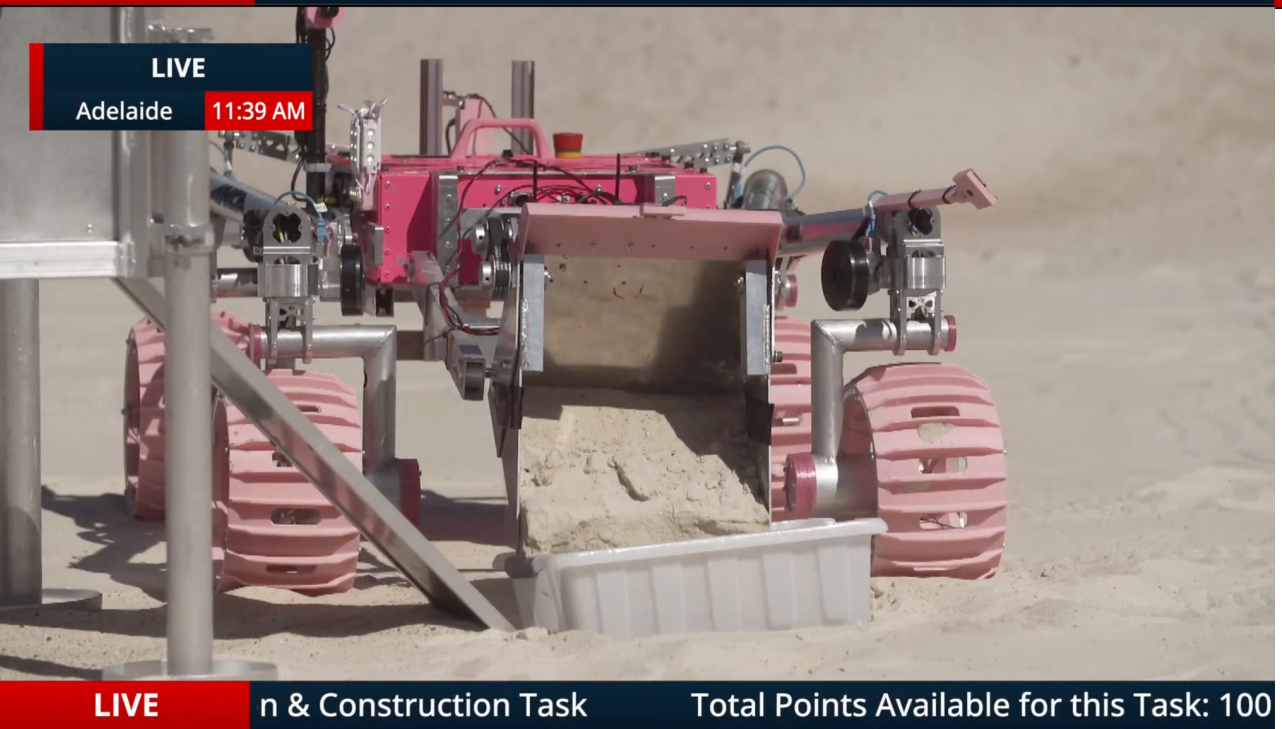
LIVE Australia ELO2 Excavation & Construction Task Total Poi



Mobility is tricky...





Excavation & Deposition (25 pts)

Grant Opportunity Guidelines

Moon to Mars Initiative: Trailblazer Stage 2

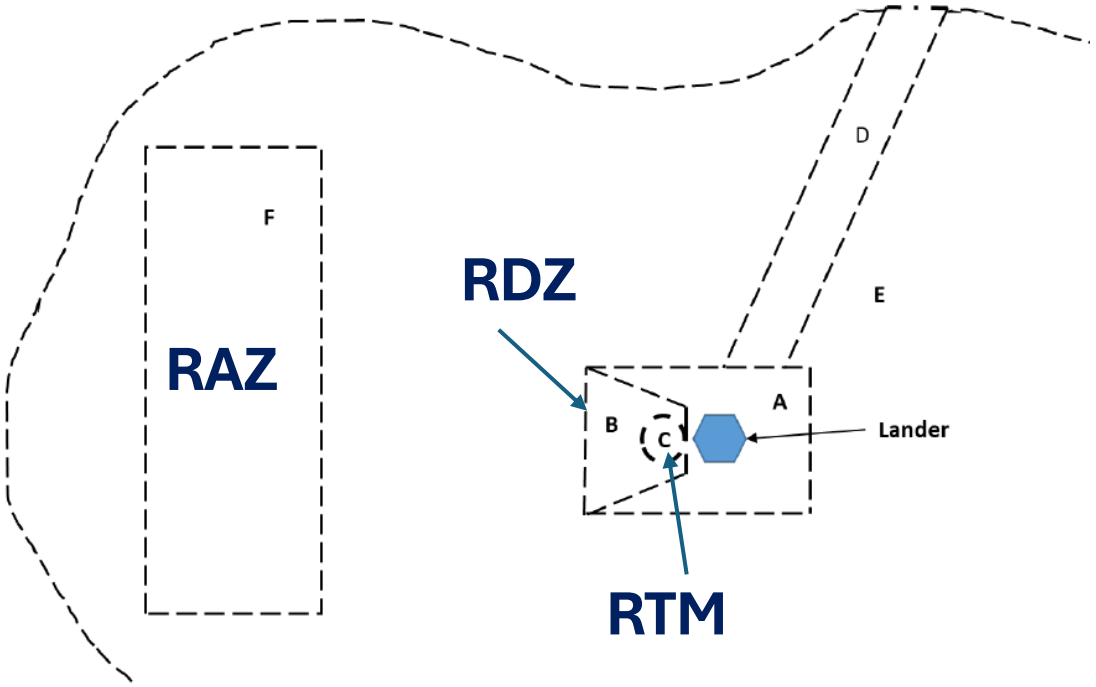
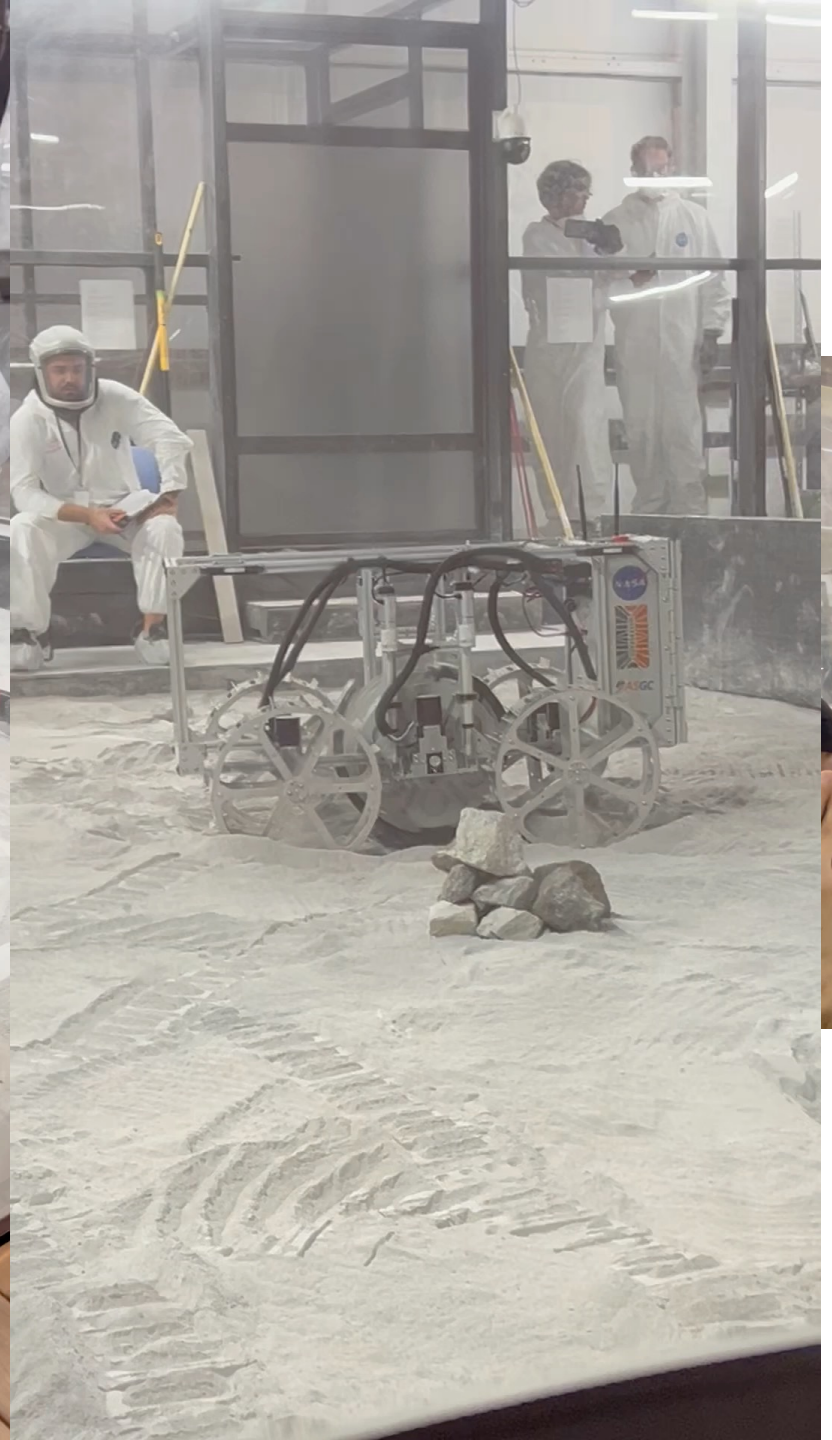
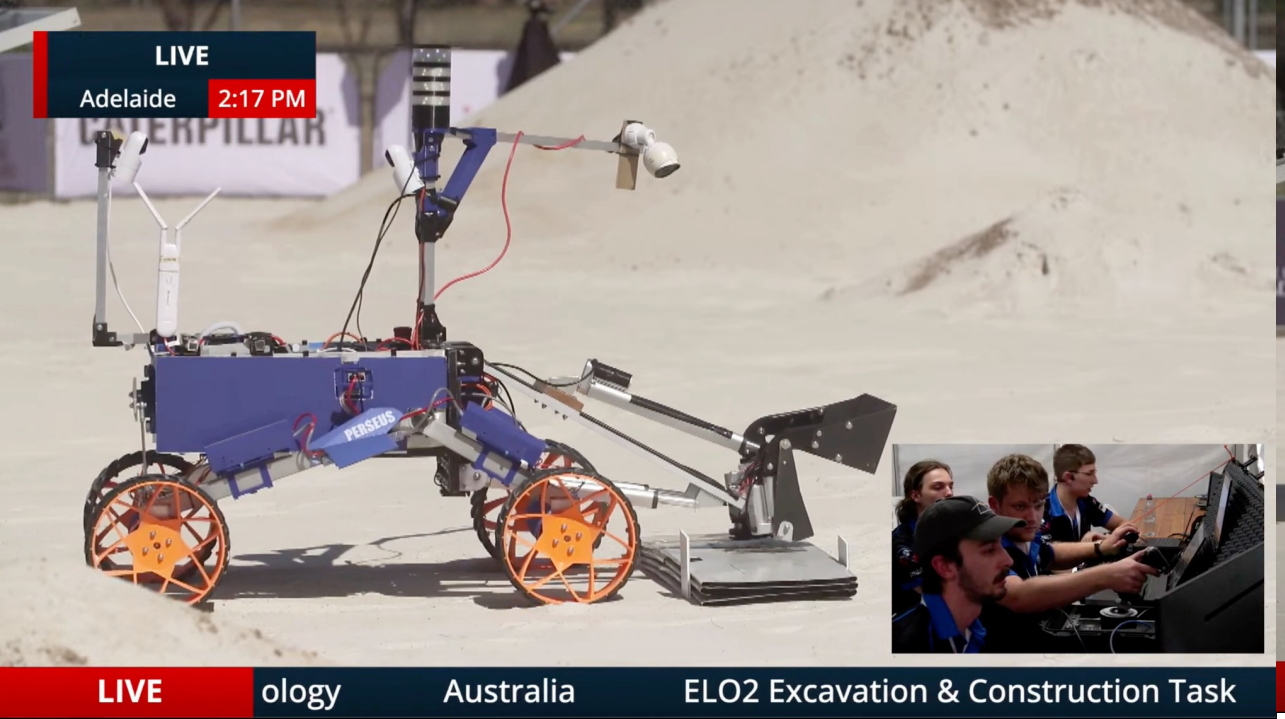


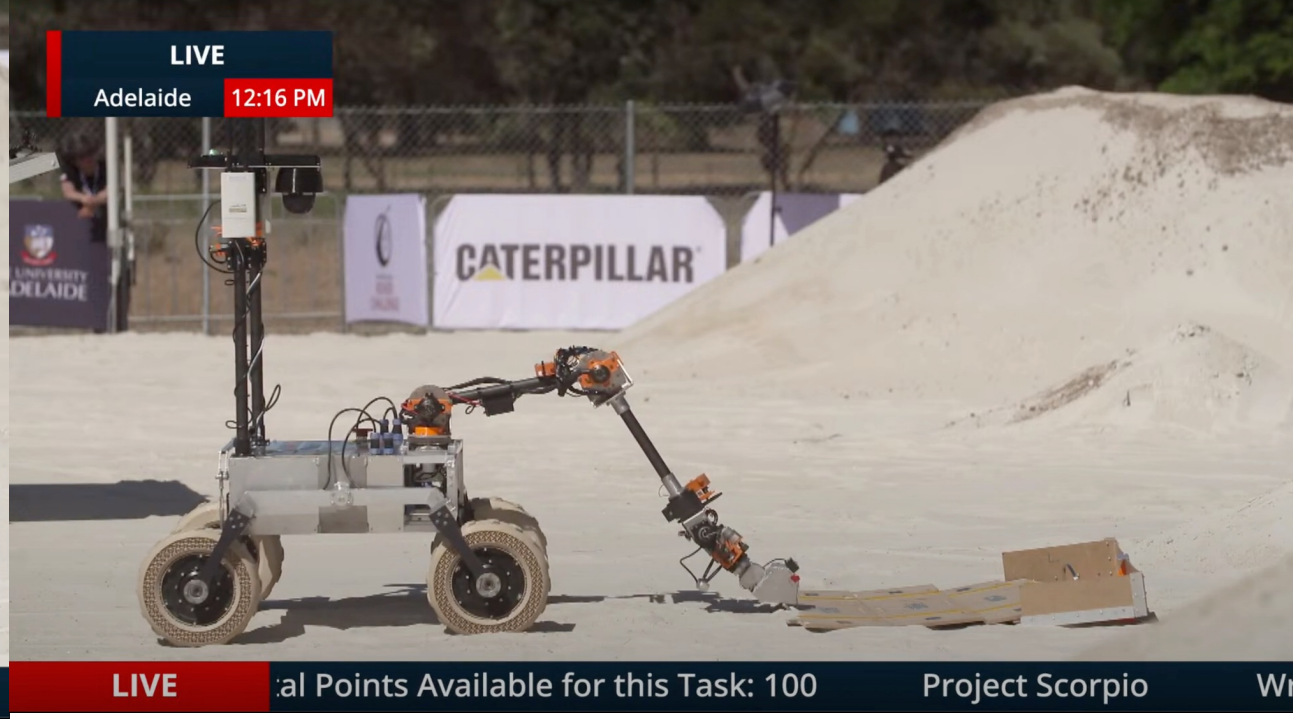
Figure 3: An example diagrammatic representation of Mission Operational Zones on the lunar surface.

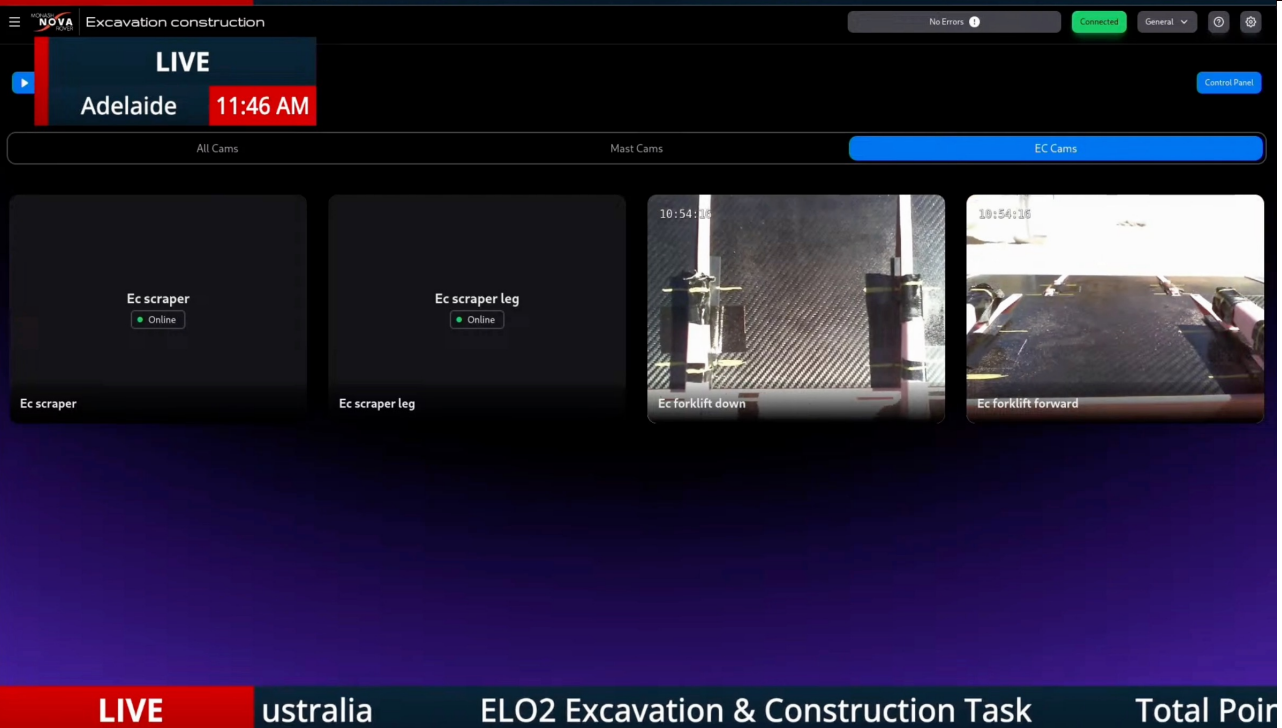
F	Regolith Acquisition Zone (RAZ)	Regions identified for regolith acquisition	Rover may acquire regolith.	Ensure rover does not generate dust from regolith
C	Regolith Deposit Zone (RDZ)	Location where the Rover deposits the acquired regolith. This zone is within the RIZ (TBC).	Rover will operate under constrained motion, orientation and approach path (TBD) within the RDZ.	Ensure safe and effective transfer of regolith from the Rover to ISRU facility

Req ID	TBR-FSR-ISR-GEN-1110
The Regolith Transfer Mechanism (RTM) shall be in the Regolith Deposit Zone (RDZ)	



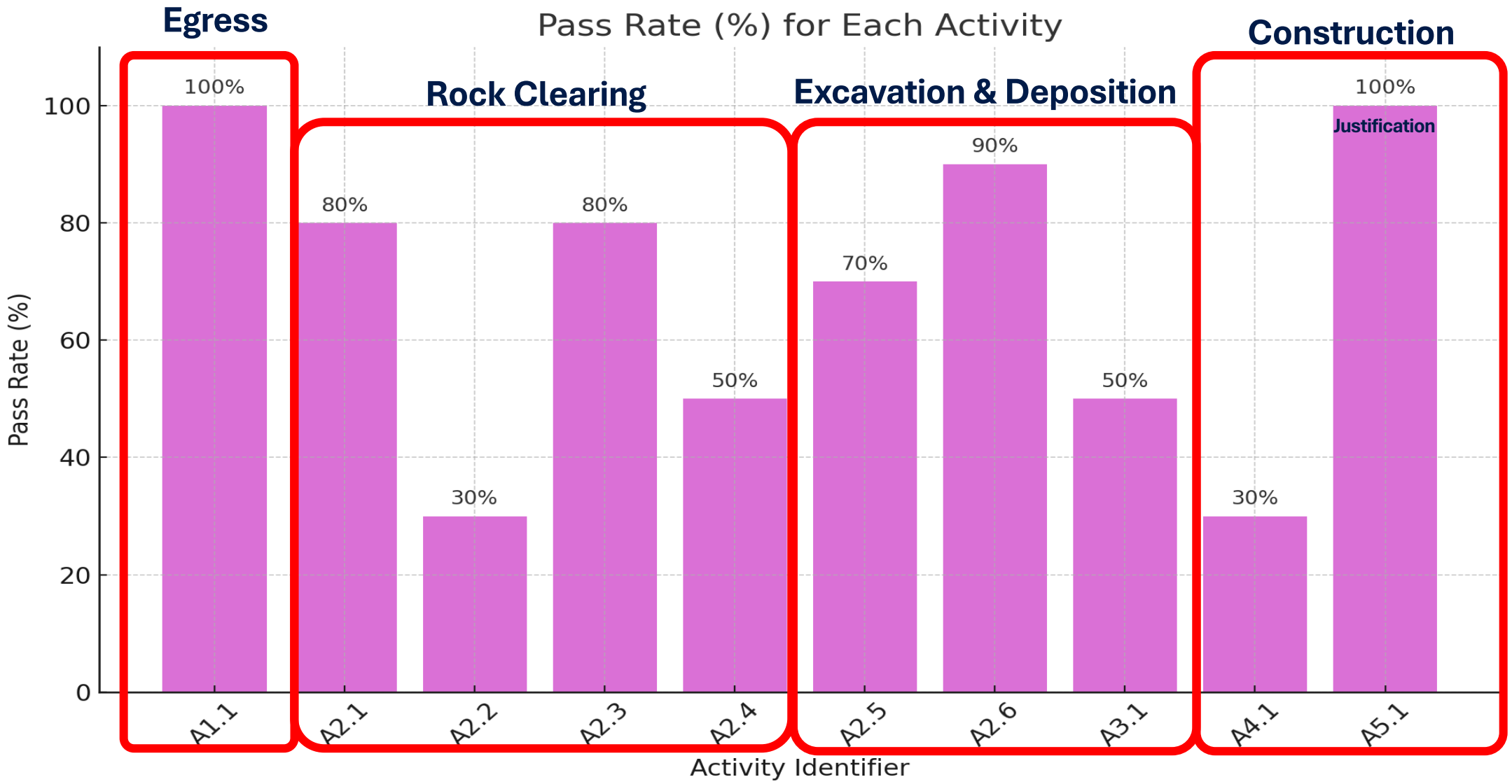






Paver Construction (25 pts)

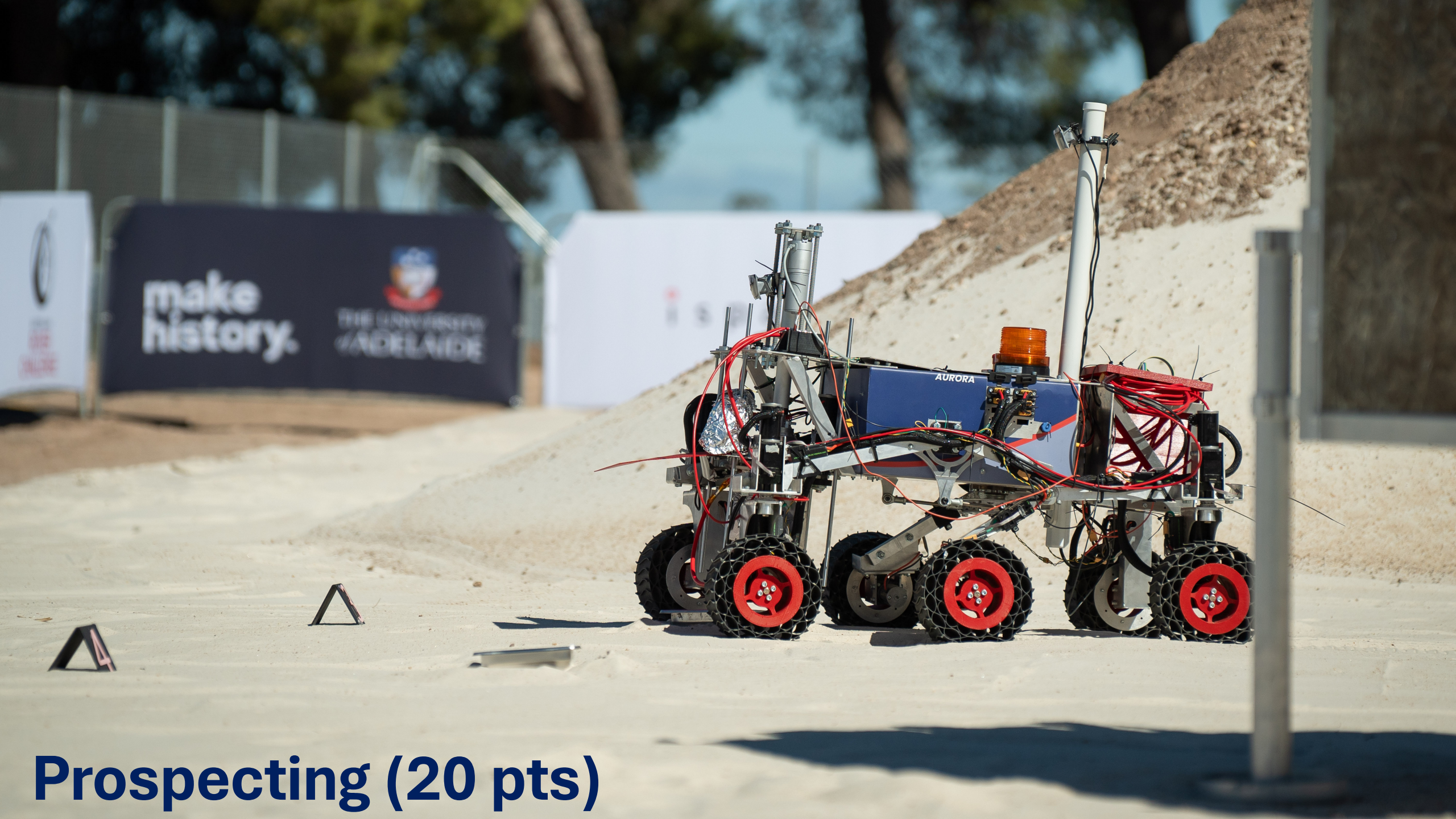
Excavation & Construction Task
2024 Performance Review



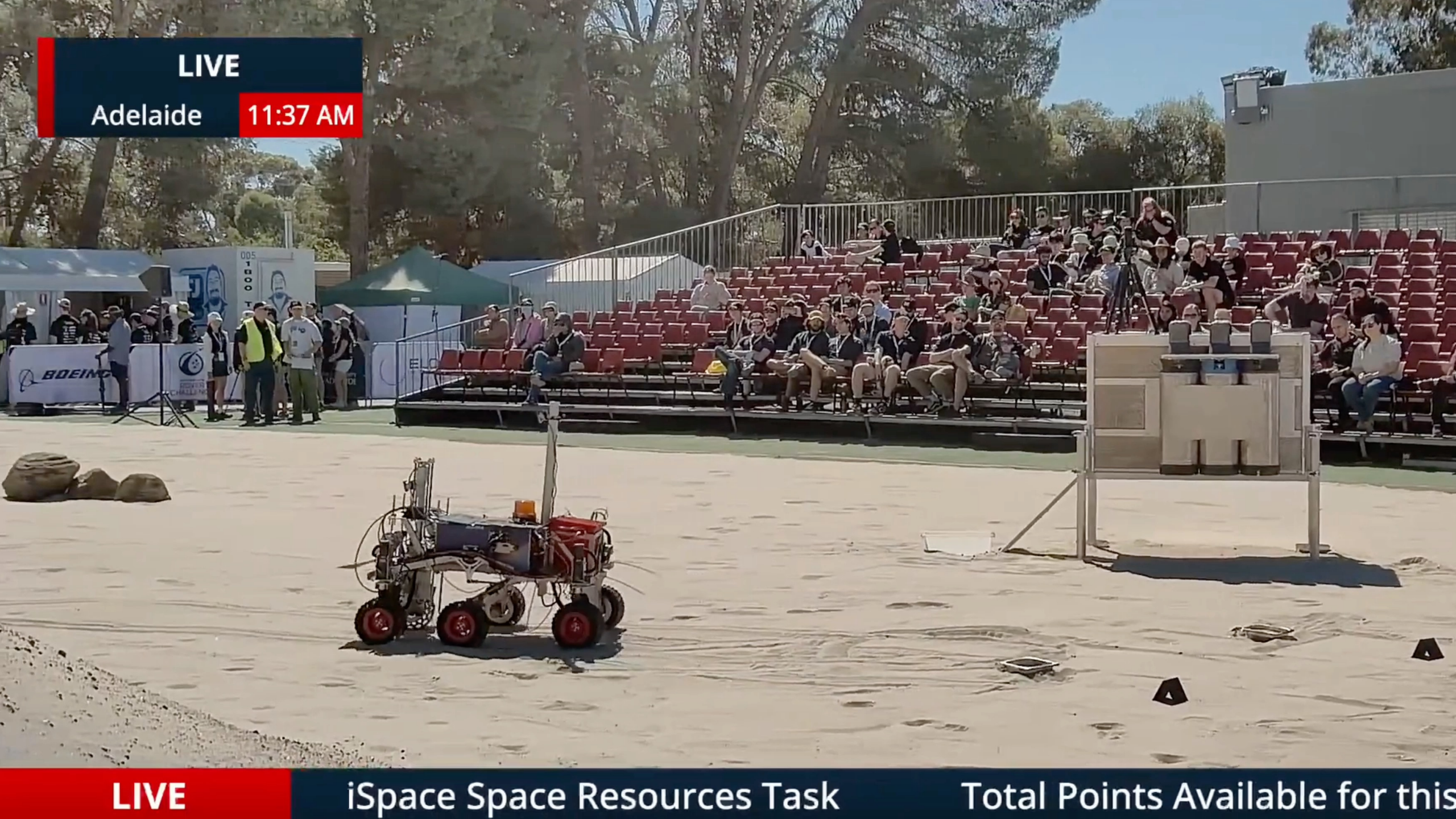
So what exactly do the rovers do?

- 500 points
  - Critical Design Review (T-6 months) 25 pts
  - System Acceptance Review (T-3 months) 75 pts

  - Post Landing Task 100 pts
  - Excavation & Construction Task 100 pts
  - **Space Resources Task** **100 pts**



Prospecting (20 pts)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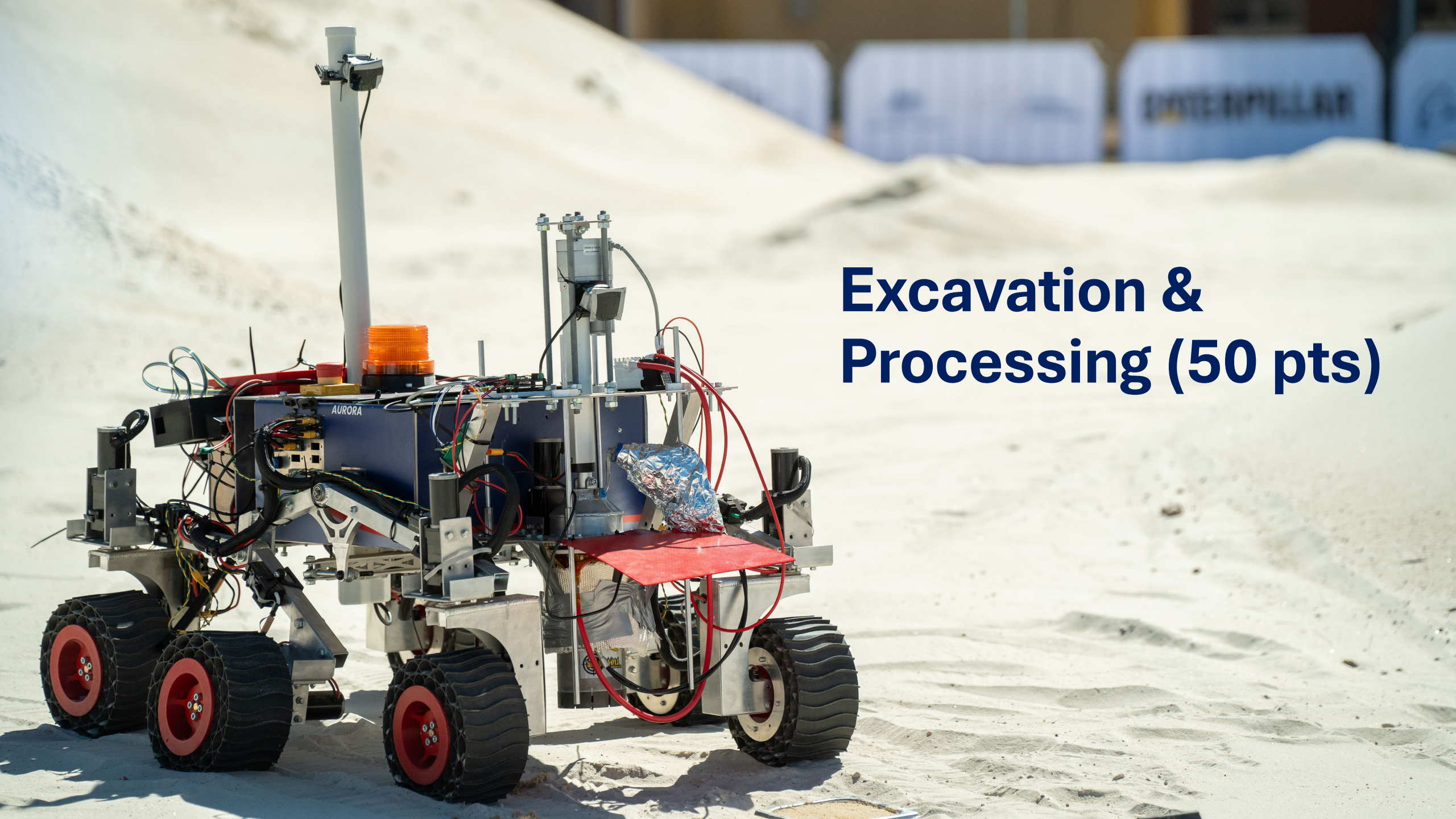
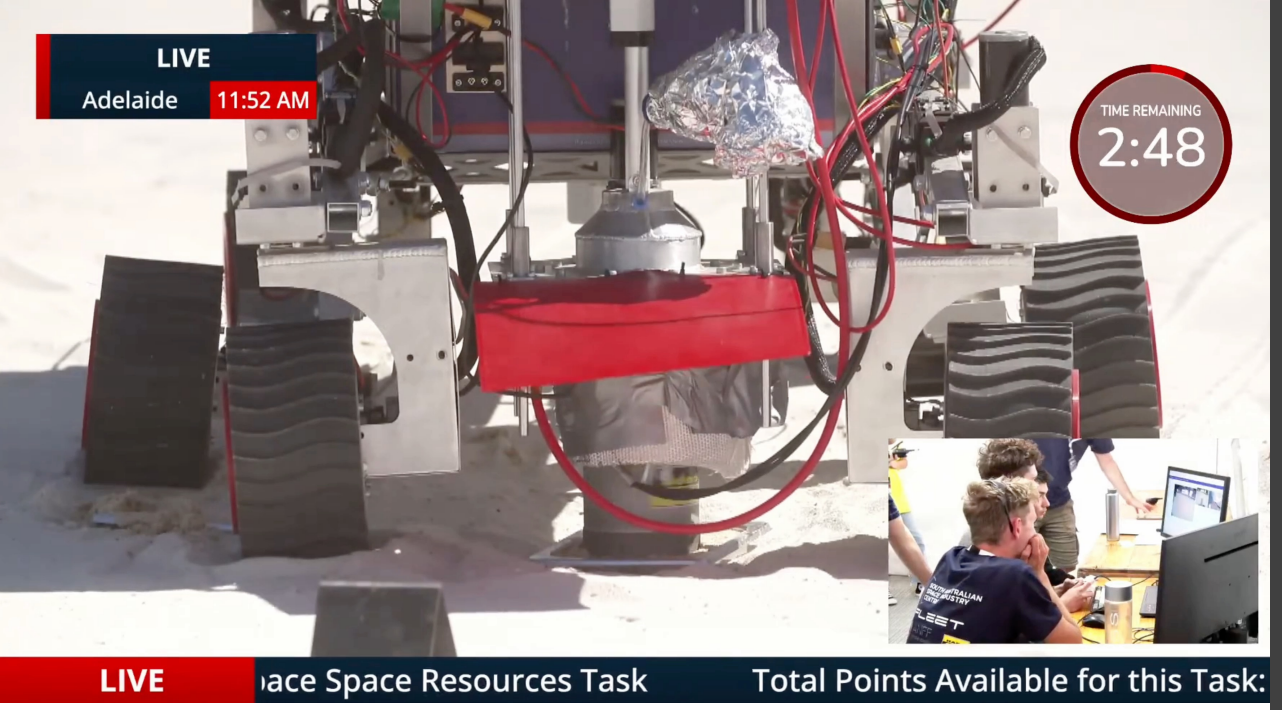
iSpace Space Resources Task
Total Points Available for this



Excavation & Processing (50 pts)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ace Space Resources Task
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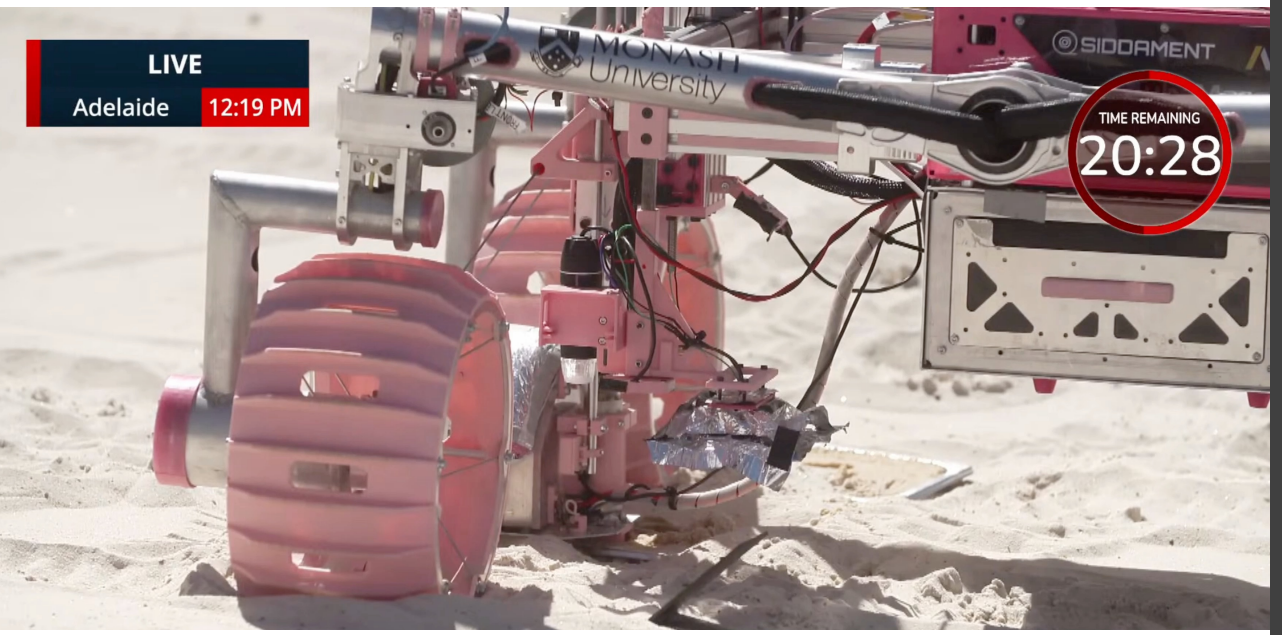
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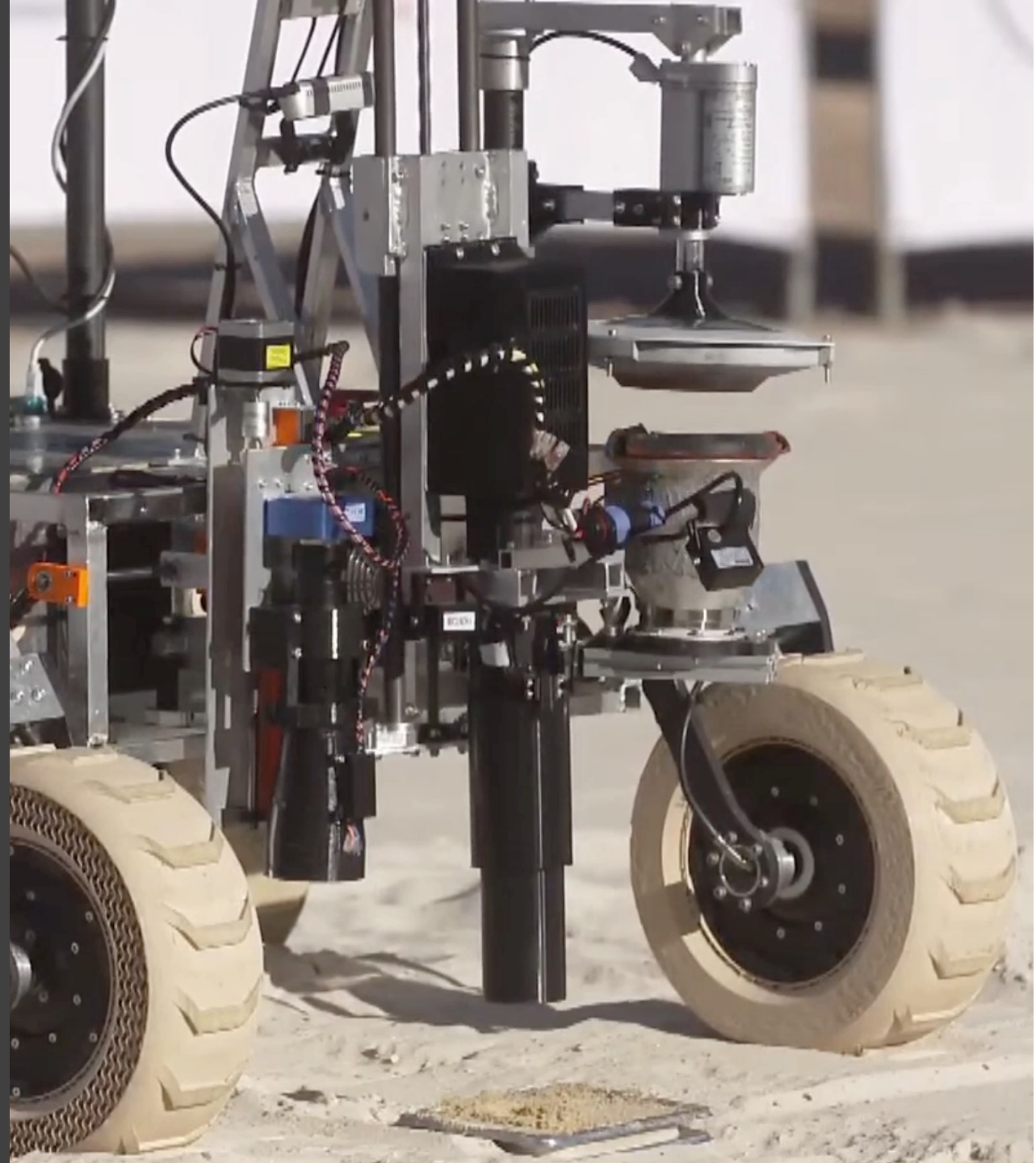


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ispace
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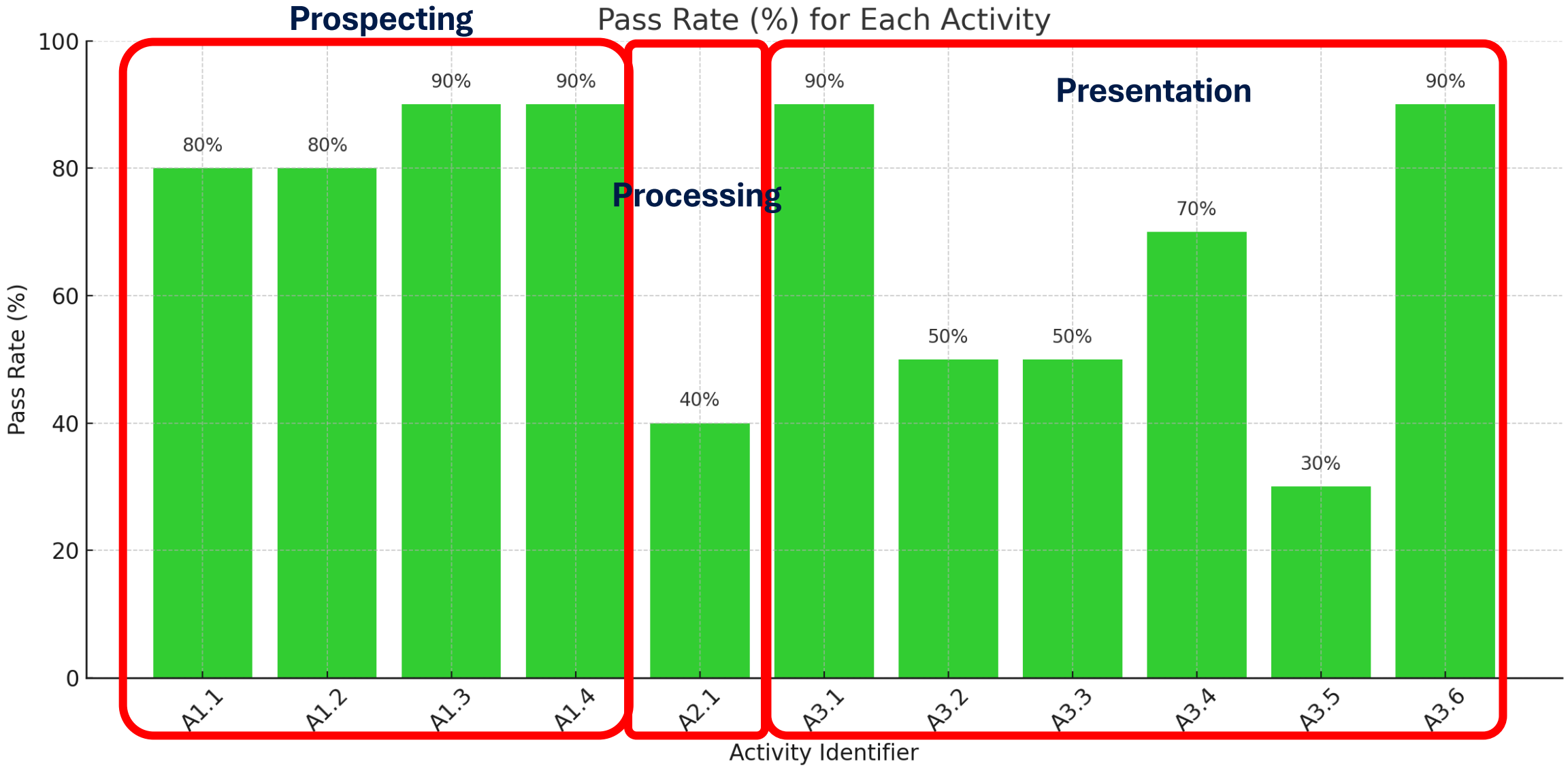
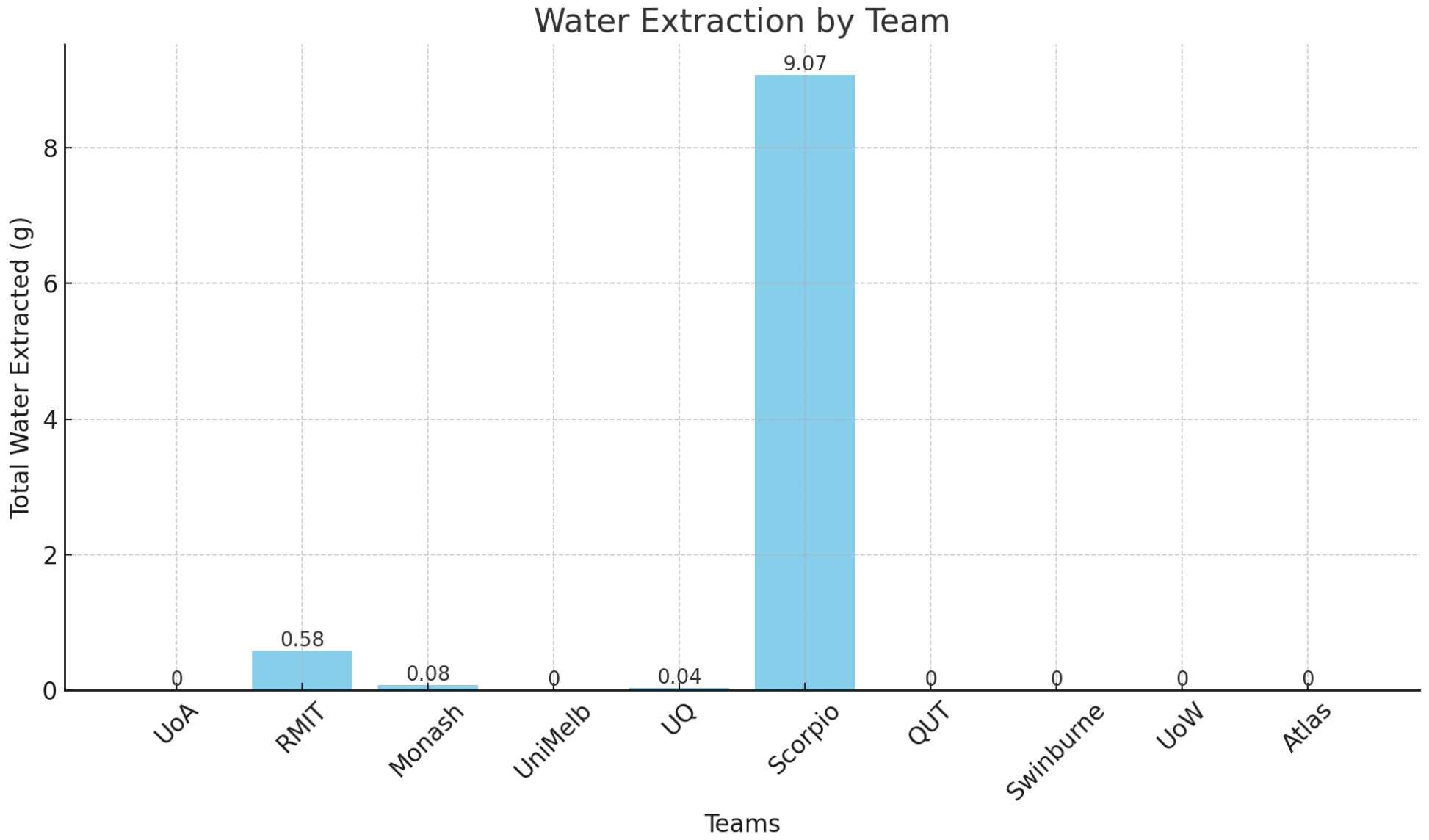
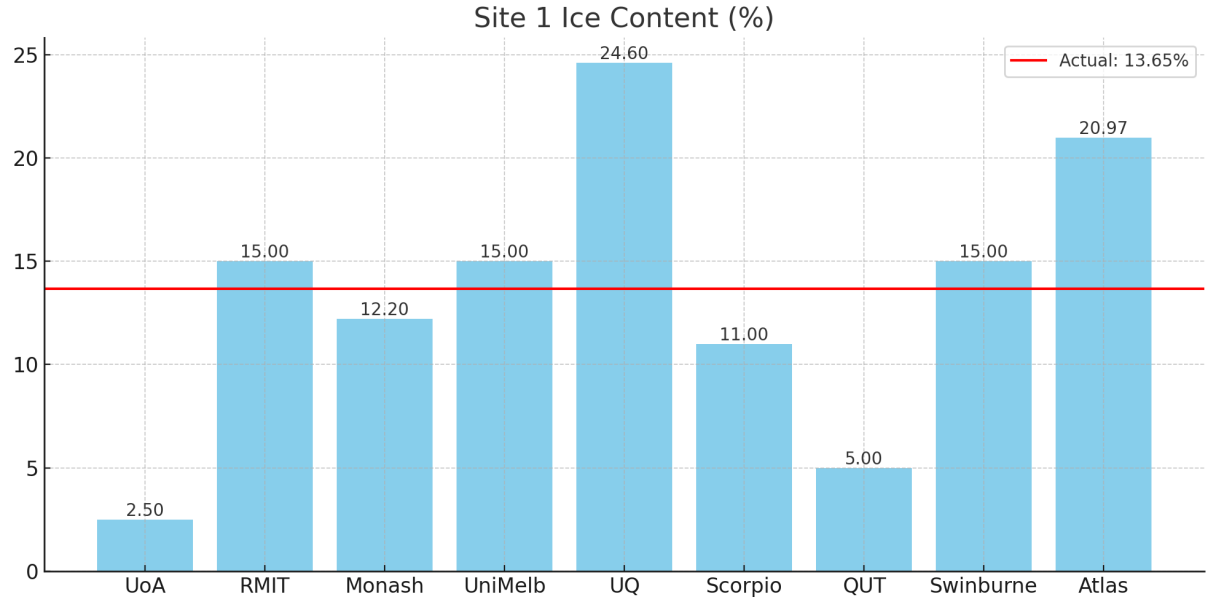
Presentation (30 pts)

Excavation & Construction Task 2024 Performance Review




Water Extraction by Team
Total Water Extracted (g)
0
2
4
6
8
0
0.58
0.08
0
0.04
9.07
0
0
0
0
UoA
RMIT
Monash
UniMelb
UQ
Scorpio
QUT
Swinburne
UoW
Atlas
Teams


Site 1 Ice Content (%)
Actual: 13.65%
2.50
15.00
12.20
15.00
24.60
11.00
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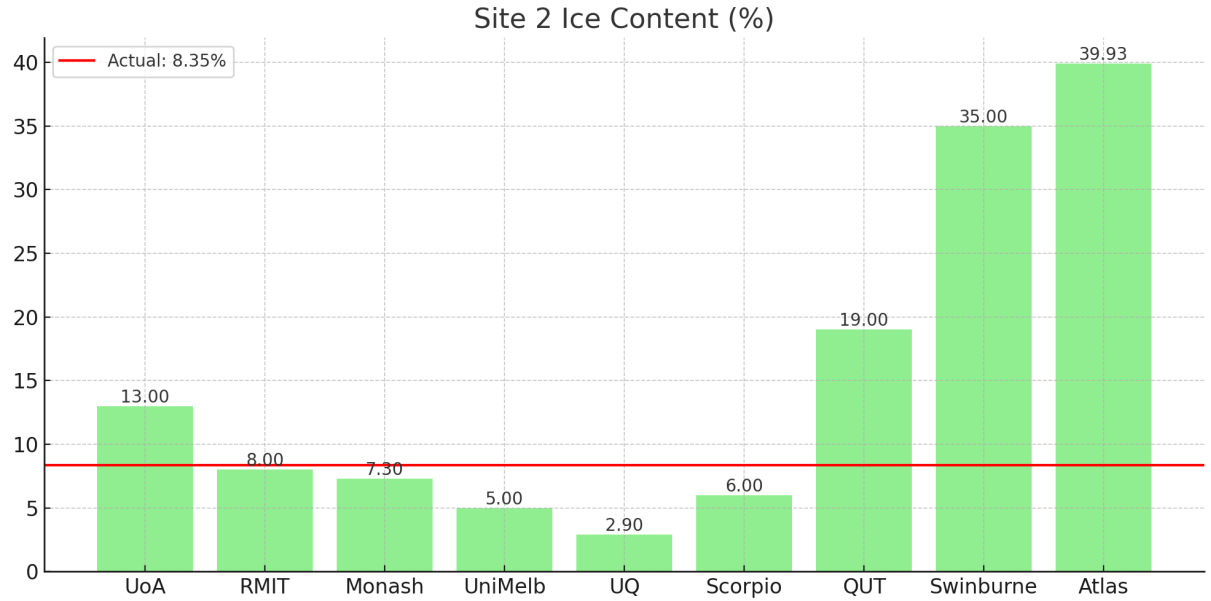
Site 2 Ice Content (%)
Actual: 8.35%
13.00
8.00
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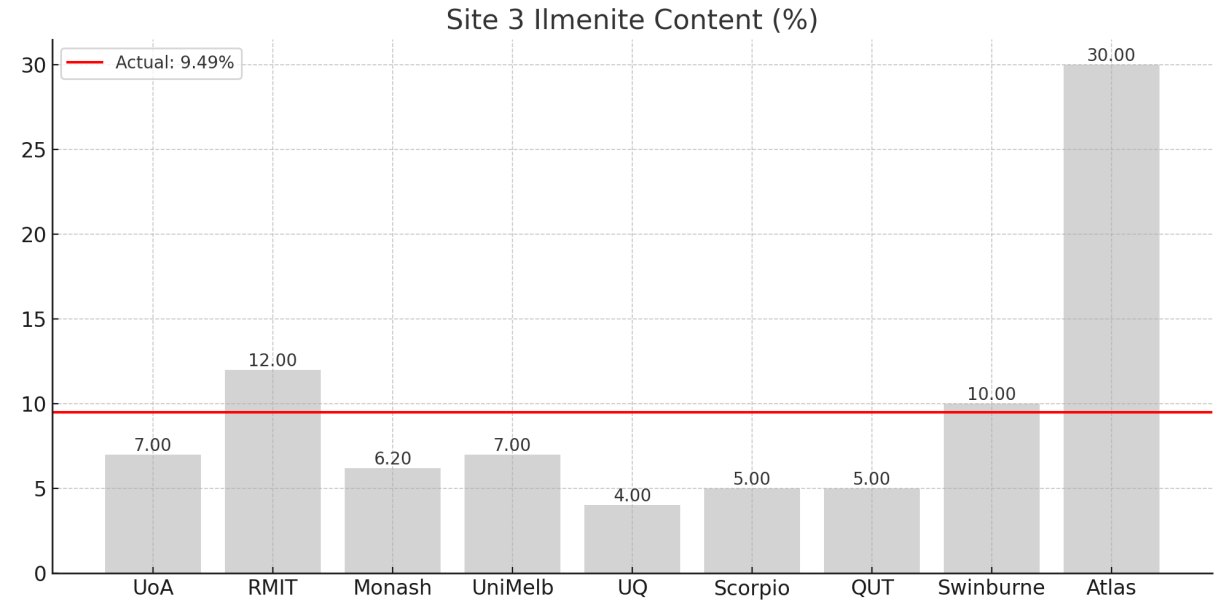
Site 3 Ilmenite Content (%)
Actual: 9.49%
7.00
12.00
6.20
7.00
4.00
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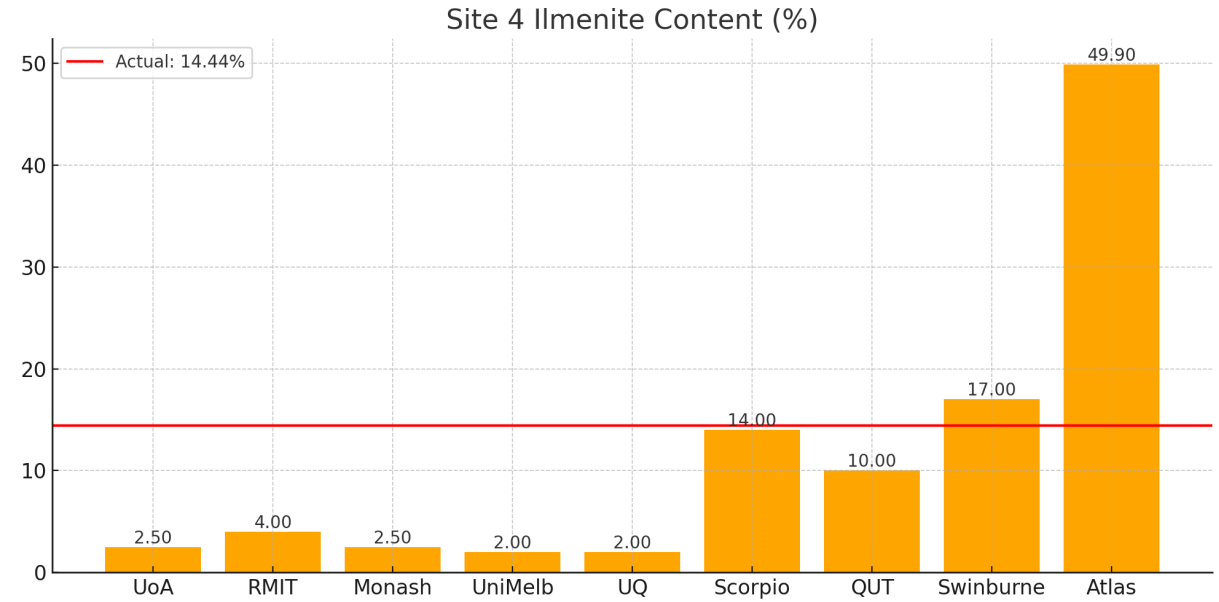
Site 4 Ilmenite Content (%)
Actual: 14.44%
2.50
4.00
2.50
2.00
2.00
14.00
10.00
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49.90
UoA
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Monash
UniMelb
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Scorpio
QUT
Swinburne
Atlas

So what exactly do the rovers do?

- 500 points
  - Critical Design Review (T-6 months) 25 pts
  - System Acceptance Review (T-3 months) 75 pts

  - Post Landing Task 100 pts
  - Excavation & Construction Task 100 pts
  - Space Resources Task 100 pts
  - **Mapping & Autonomous Task** **100 pts**


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CATERPILLAR
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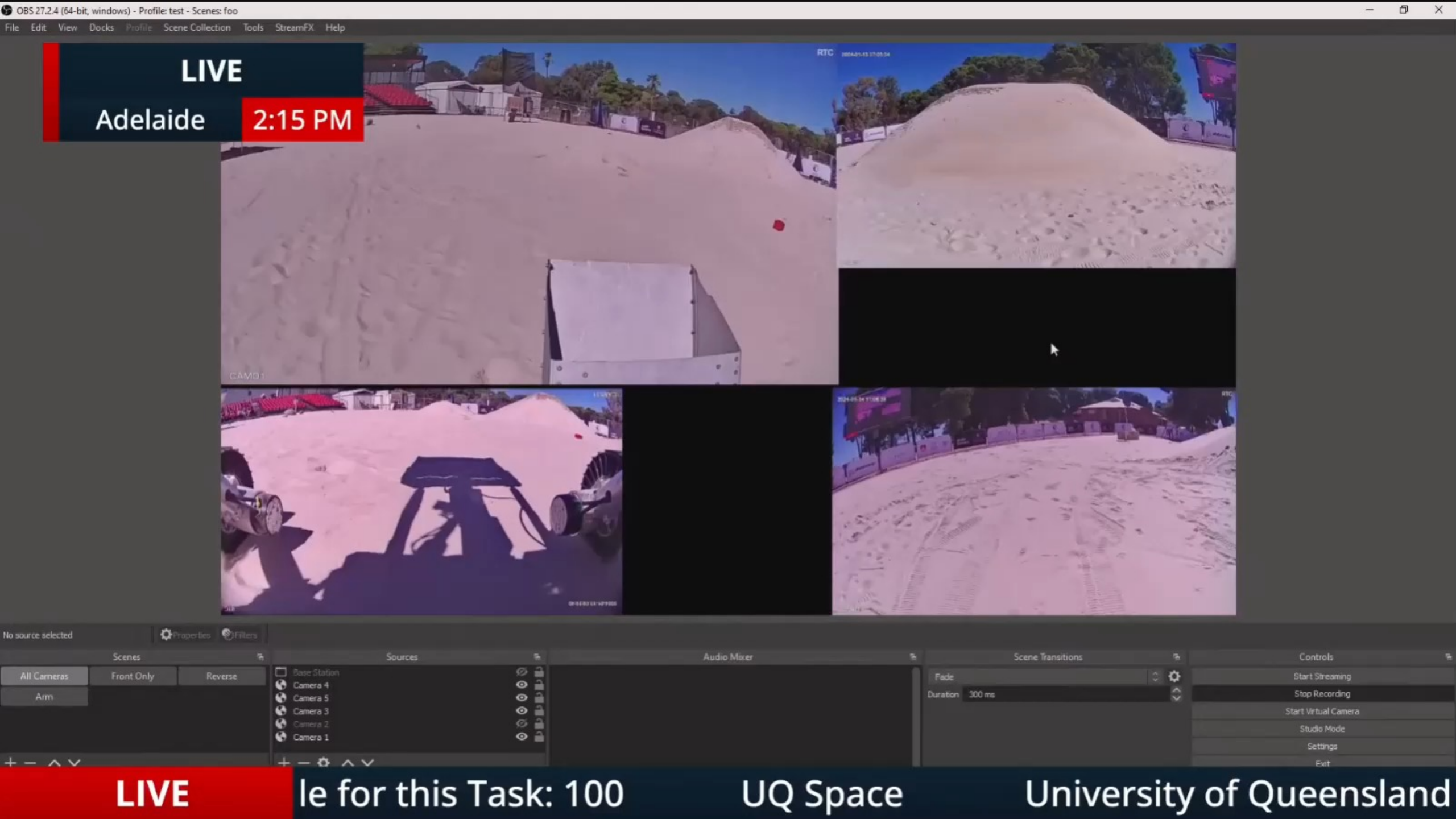
ct Scorpio
Wrocław University of Science and Technology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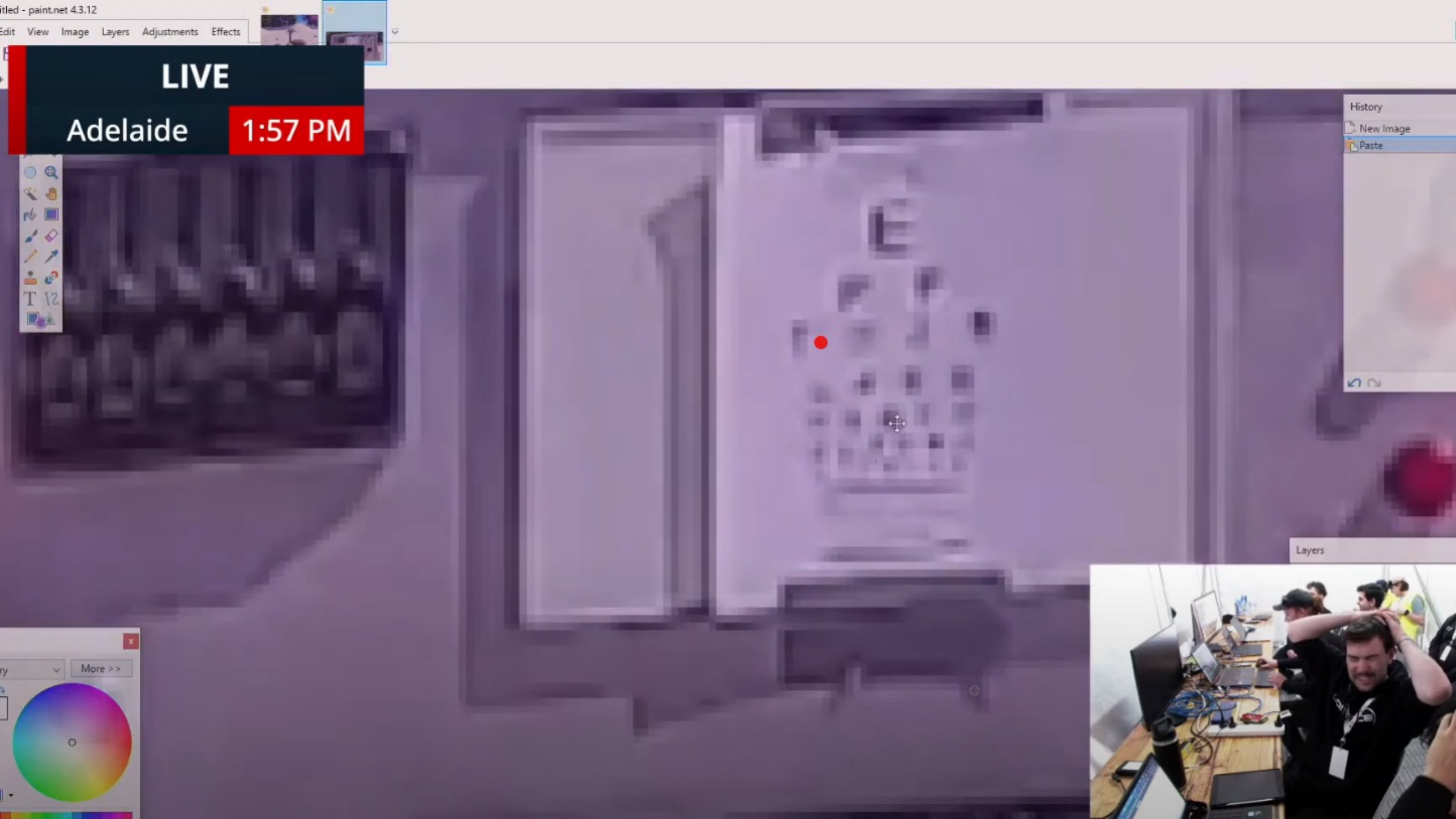
University of Queensland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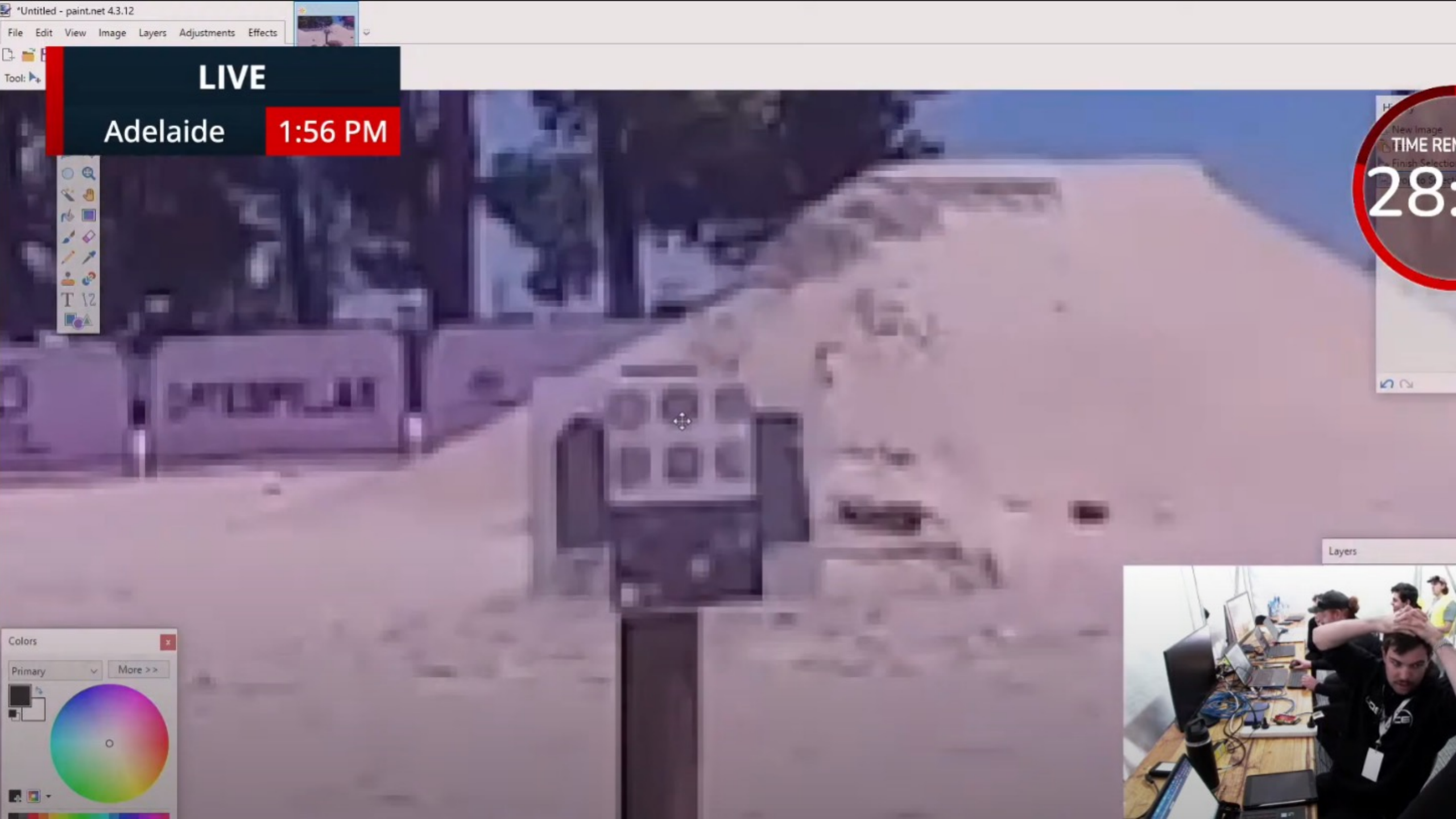
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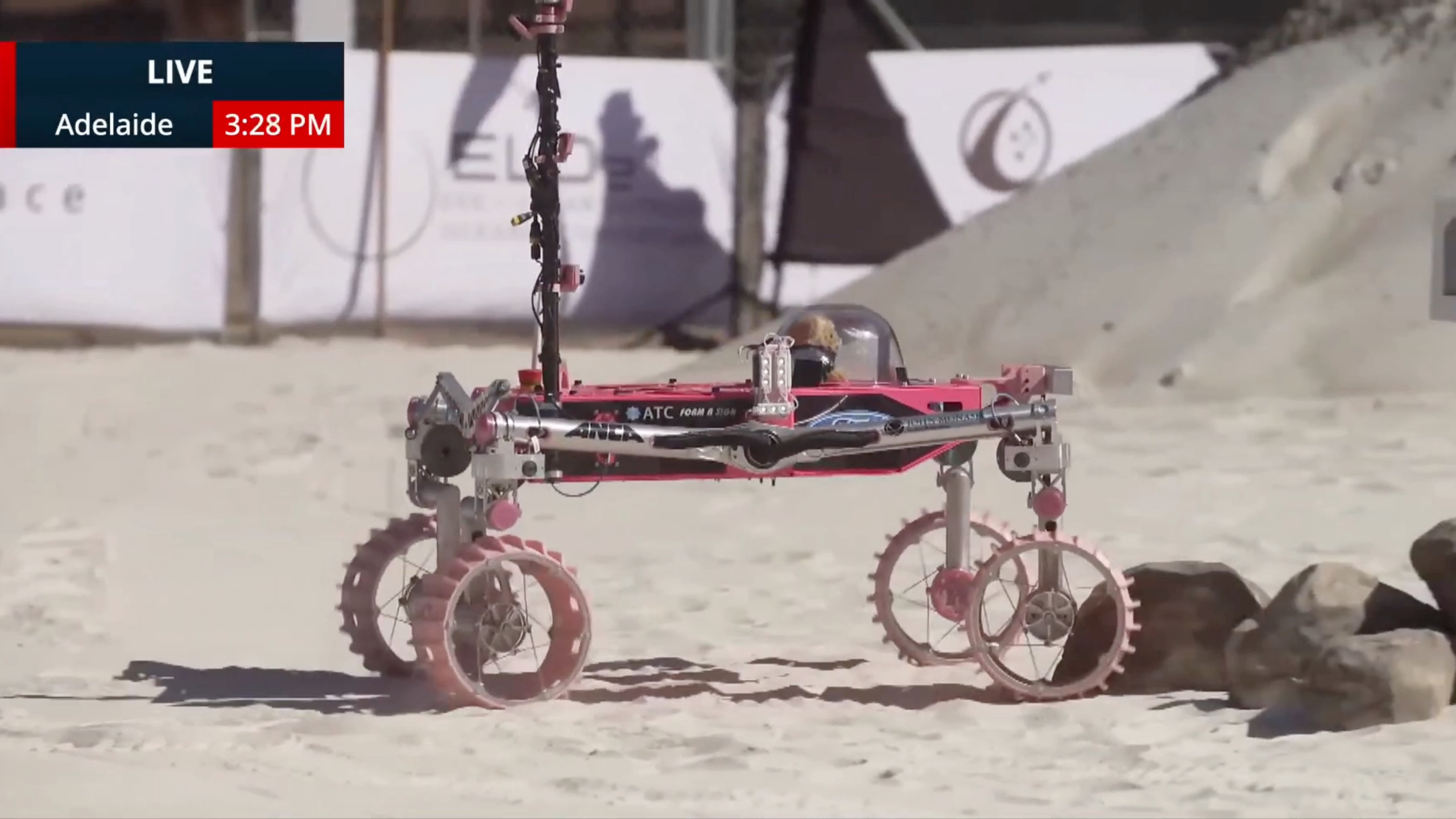
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Exploratory mapping (40pts)
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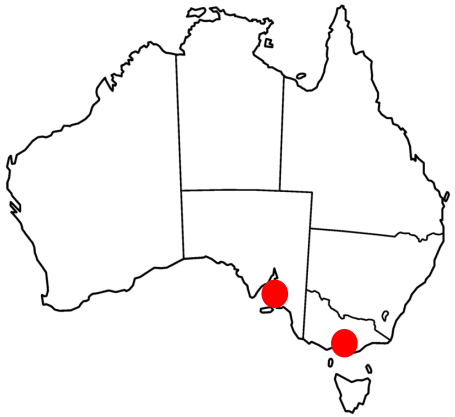
nts Available for this Task: 100
RMIT Rover Team
Royal

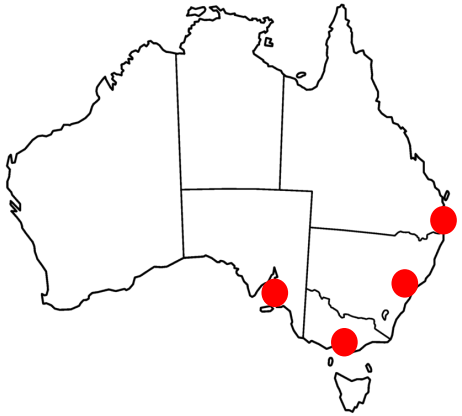
What have we achieved so far?

2021



- 3 Australian Teams (2 new)
- 120 Participants

2022

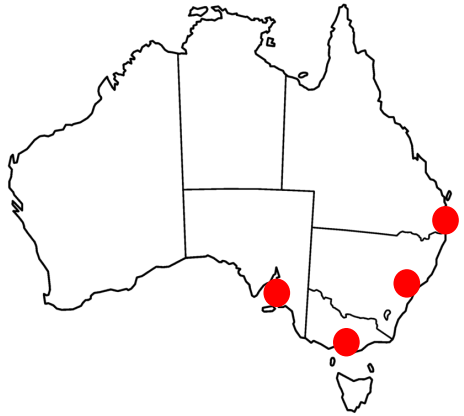


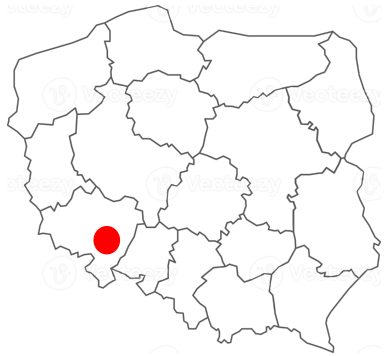
- 5 Australian Teams (2 new)
- 150 Participants

2023

- 7 Australian Teams (2 new)
- 1 Poland Team
- 189 Participants

2024





- 8 Australian Teams (1 new)
- 1 Poland Team
- 1 Bangladeshi Team
- 210 Participants

2024

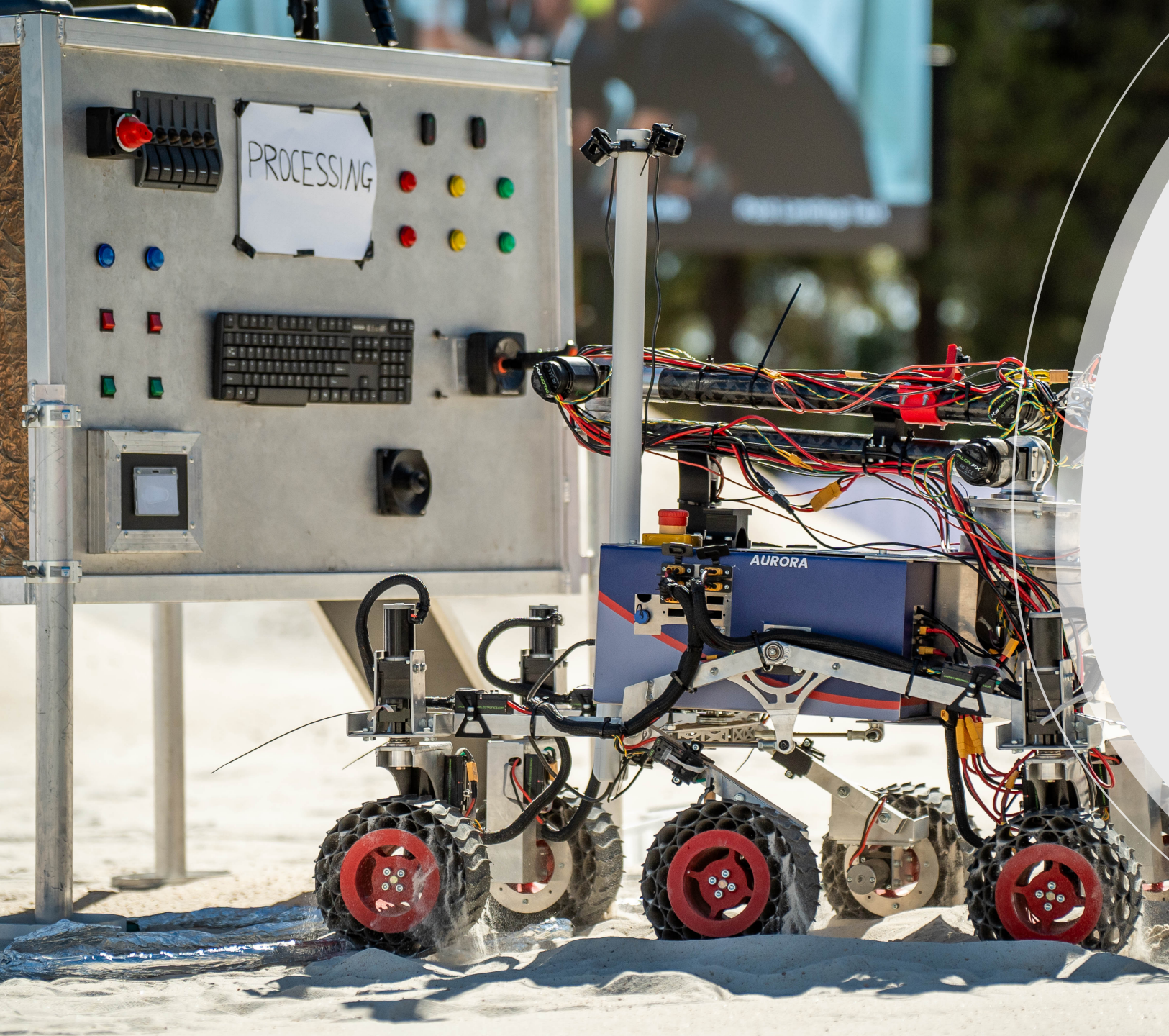
Day 1 Livestream

Total daily streams

Day 1	1,991
Day 2	1,878
Day 3	1,319
Day 4	1,274
	6,462

Streams by country per day

Day 1		Day 2		Day 3		Day 4	
Australia	77.9%	Australia	70.2%	Australia	76.7%	Australia	73.9%
Poland	9.5%	Poland	12.1%	Poland	7.1%	Poland	7.8%
Bangladesh	2.0%	USA	2.4%	India	2.2%	Bangladesh	1.1%
USA	1.7%	Bangladesh	2.0%	Bangladesh	1.2%	India	0.7%
		India	1.0%			Pakistan	0.5%



What are we planning for the future?

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Foster existing culture of teamwork, fun, innovation

- Trophy building
- Tug of war
- Best team Culture
- Interaction with Australian Animals!
- **First rule : Have fun**


UTS
URT
MONASH NOVA ROVER


3RD
AUSTRALIAN
ROVER
CHALLENGE
2ND
AUSTRALIAN
ROVER
CHALLENGE
1ST
AUSTRALIAN
ROVER
CHALLENGE


Ford
ORICA
MARAND


MONASH University
MECHANICAL AEROSPACE ENGINEERING


MONASH
University
THE DEPARTMENT OF
MECHANICAL
+AEROSPACE
ENGINEERING


ANIMALS
ANONYMOUS


Questions?

Extra Slides