



## Introduction

The Australian Virtual Astronaut (AVA) Challenge is a 9 step STEM design sprint based on challenges facing NASA's Artemis and the Australian space industry. AVA teams will choose from a set of five scenarios and design a solution presented in the form of either a 90-second video pitch or poster. A number of teams will then be selected to pitch their ideas at the Young Space Explorers event in Sydney. The goal of the AVA Challenge is to engage young people in a real space challenge and to inspire them to address the emerging challenges in space and on Earth.

## Scenario 2: Robotics - Trailblazer



### Australian Space Agency

The Australian Space Agency is an Australian Government agency responsible for the development of Australia's commercial space industry, coordinating domestic activities, identifying opportunities and facilitating international space engagement that include Australian stakeholders. Its headquarters, opened in February 2020, are located in Lot Fourteen in Adelaide.

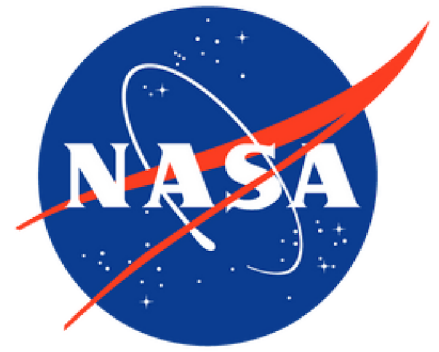
## The Mission Overview

On 13th October 2021, the Australian Space Agency reached an agreement with NASA for an Australian-made, semi-autonomous rover to be part of a future mission to the Moon.

The mission will demonstrate Australia's world leading skills and experience in remote operations and autonomous systems. This draws on our expertise from the resources and mining sectors.

Through our flagship \$150 million Moon to Mars initiative's, the Australian Space Agency will support the mission through initiative's Trailblazer program.

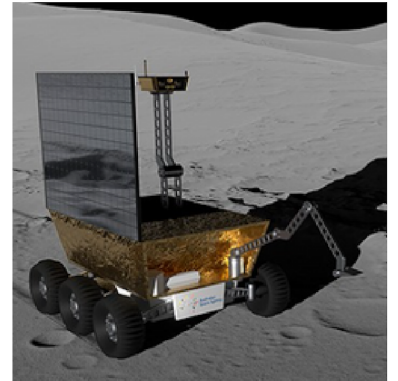




# Trailblazer Program

The Trailblazer Program will develop and build a lunar rover. Controlled from Earth, the rover will collect lunar soil (regolith), which contains oxygen (in the form of oxides). NASA will then aim to extract oxygen from the regolith, using separate equipment that will be sent to the Moon with the rover. This is a key step towards establishing a sustainable human presence on the Moon, as well supporting future missions to Mars.

Australia's ability to develop and operate a rover like this is supported by our skills and experience in remote operations and autonomous systems here on Earth.



# Team Deliverables

Teams will develop a 90-second video or poster that will include;

- A rover design concept (graphical or prototype). Must be capable of executing the Trailblazer mission to collect lunar soil (regolith) for the purposes of extracting oxygen;
- A proposed mission plan, including the location of which would be best site to land the rover;
- Outline any additional science experiments that could be added to the mission.



# Age Divisions

The Australian Virtual Astronaut (AVA) Challenge is open to all students from Year 5 to Year 10. There are three age divisions for judging:

- Stage 3 – Years 5 and 6
- Stage 4 – Years 7 and 8
- Stage 5 – Years 9 and 10 (Eligible for Phase 2)







# Mission Schedule

The Australian Virtual Astronaut (AVA) Challenge missions will be delivered by subject matter experts and will provide relevant information for the team to complete the challenge in a systematic way using the iSTEM Engineering Design Process as a guide.

## Step-by-Step Schedule

Run these missions at your own pace. use as little or as much of the AVA resources as needed.

**Mission 1: Introduction and Webinar**

**Mission 2: Define**

**Mission 3: Identify**

**Mission 4: Brainstorm**

**Mission 5: Design**

**Mission 6: Prototype**

**Mission 7: Evaluate**

**Mission 8: Iterate**

**Mission 9: Communicate**

The culmination is submitting your pitch to be judged. Finalists will be invited to pitch at the Youn Space Explorers event in Sydney



## Phase 2: - Pitch Session

Teams in Year 9 or 10 will be eligible to be selected for Phase 2. In this phase, teams will be given 3 minutes to pitch their idea to an expert panel at the Young Space Explorers event. If you cannot attend the face-to-face event, teams will pitch to leaders from the space industry and venture capitalists virtually in order to be crowned the overall winners.

### Team Deliverables

The team is to prepare a slide deck that will be presented to a panel of experts. The slide deck should:

- Identify the primary science objective of the Trailblazer mission;
- Show a graphical representation of the design solution;
- Outline any additional science experiments or features;
- Identify the resource(s);
- Identify the team and why it is the best design for the mission;
- Outline why this rover should be chosen.

