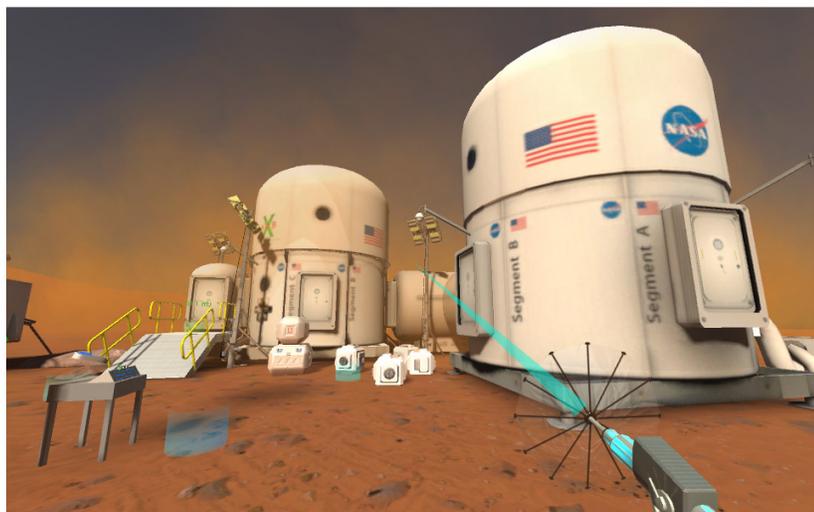# FUTURE U.

Introductory Guide for the Mars Experience

Welcome to Mars! This 360-experience guides students through three space-based scenarios with a focus on various aspects and considerations with respect to travelling to Mars. This experience is set in a future, when humans are able to travel between Earth and Mars, and perform experiments to learn about different aspects of adapting to the Red Planet.

This document will cover each of the three experiences, along with instructions on how to use the application online or with a virtual reality setting.

The application opens on the landscape of Mars. After playing the tutorial which launches on start, the user can teleport freely on the surface of Mars, or head to one of three experiment locations (The Laboratory, The Rover, or The Museum).

Web-Based Functions

When opening the experience, there is the option to go full-screen. In order to take control of the laser pointer in the experience, click the screen. In order to leave the experience, press the escape key. This will allow the user to use other windows on the computer.
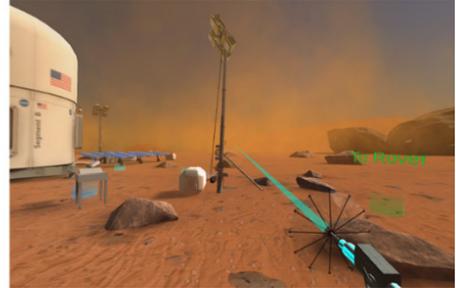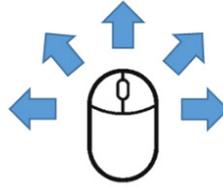

Browser view of the application

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To navigate around the Mars environment, there are two main abilities that the user will need. The first, is teleporting, which is useful to help the user move around the environment.
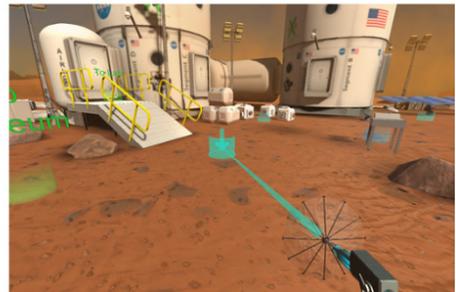
Without clicking, use the mouse to point your laser to navigate around the environment

To Teleport, point your laser at a teleport hotspot, once the arrow appears, left click to teleport to that location.

To be Transported to a different location, point your laser at the green hotspots and left click.


The teleport locations are three different colors to distinguish their unique capabilities.

Bright blue teleport: hotspot allows the user to move to that particular location.

Green teleport: change the current scene or experience. These hotspots are generally labeled with the destination.

Pale blue teleport locations: allow the user to view the exhibit and read the text clearly.
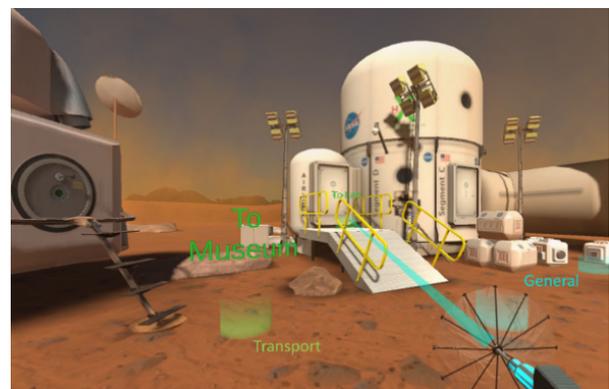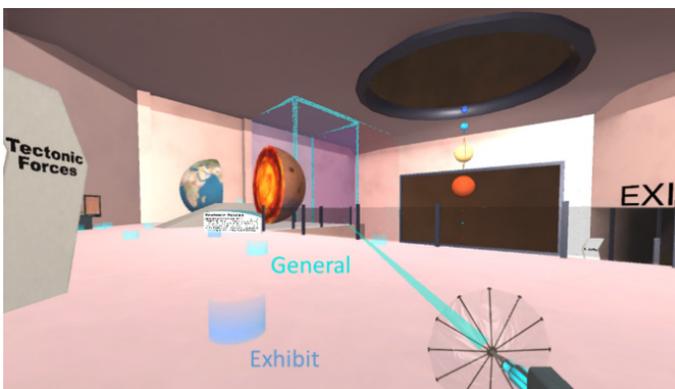
In order to pick up objects, you can right-click and use the scroll wheel to move objects closer or farther away from you. When you click on the object, you can use the movement of the mouse to move it around the area. When the object is picked up, there is a blue glow around it, so the user knows that they have successfully picked up the object.

To pick things up, left click and hold while using the scroll wheel to move the object farther and closer to you.
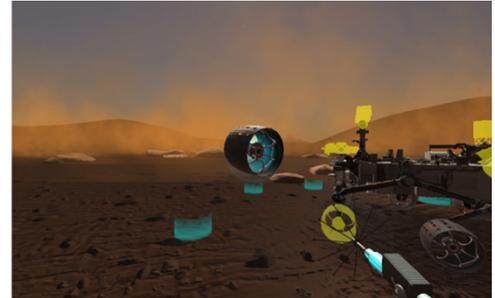
## Experiments within the Mars Experience

The Laboratory

The lab is used for growing plants on Mars. The user will follow a set of procedures (highlighted on the white board) to grow a plant. The lab features a growing enclosure, seed splicer, and posters to help the user choose the correct values to successfully grow a plant.

Additionally, the seed splicer allows the user to choose characteristics of the seeds that they will grow by taking account drought tolerance, cold tolerance, and photoprotection level.

The Laboratory Environment
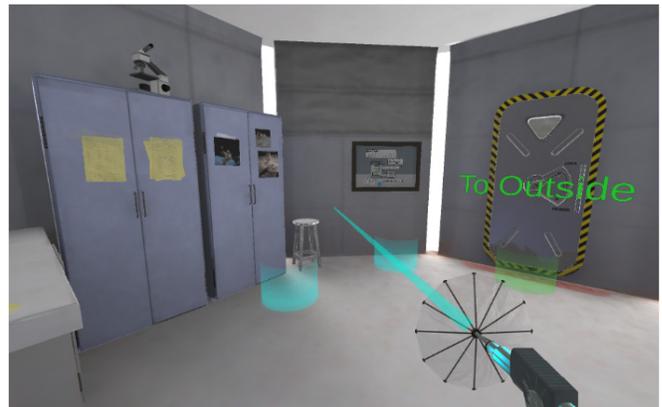
The Rover

This experiment is a two-step component that involves first assembling, then programming the Curiosity Rover, to investigate some curious purple-hued rocks.

Part I: Assembly

At the start, in the assembly phase, there are 6 parts (the 2 wheels are considered one part, shown later) that are surrounding the rover that the user can pick up and place on the yellow highlights. The highlights help guide the user to where the parts should be placed on the rover. As the user places each part onto the Curiosity rover, the narrator briefly explains the function of each component. Remember, in order to pick up objects, you can right-click and use the scroll wheel to move objects closer or farther away from you. This is helpful when building your rover!

Weighing in at about 2000 pounds, or 900 kilograms, o
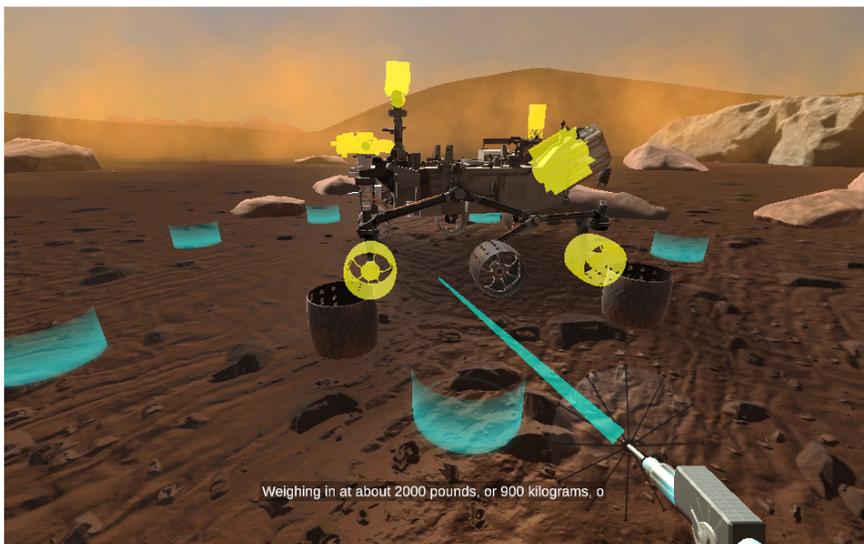
The Curiosity Rover shown at the start of the experiment. Light-blue teleportation pads allowing the user to move around the rover. The different rover parts are located around the main body. The yellow highlighted areas indicate where the parts are supposed to go.

After the rover is fully assembled, the user can program the rover on a mission to analyze Martian sediment. On the console, located near the rover, there is a check list that will tell the user what parts are missing from the assembly phase. If every box is checked, the user can simply press the "GO" button on the console to continue to the difficulty selection screen. If every box **IS NOT** checked, the user must return to, and finish, assembling the Curiosity Rover.

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Part II: Programming

The rover console displaying the list of parts required to be attached before the rover can be activated. An 'X' indicating the part has been attached. There are 6 parts (5 unique as there are 2 wheels that need to be attached).

When the rover is fully assembled and the user has selected "GO" they will be asked to pick a difficulty for the programming phase. The user can select a difficulty by pressing one of the arrow buttons located under the display, then continuing by pressing "GO".
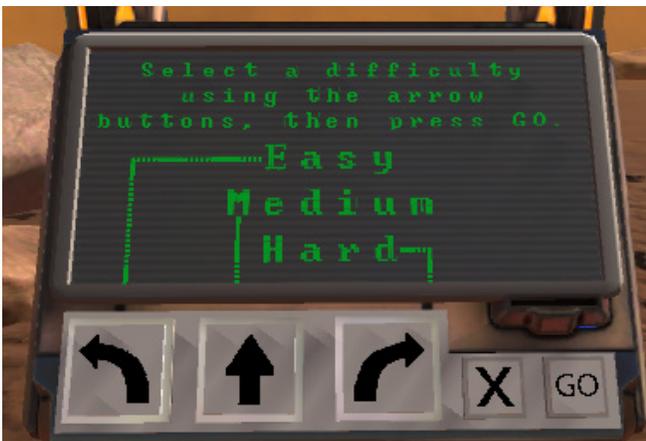
The rover console displaying the list of difficulties the user can select for the programming phase. Each button under the display represents a difficulty (The lines pointing to which button is associated to which difficulty).

After a difficulty is selected and the user presses "GO," the console displays instructions on the left of what each button does. There is also a grid on the right displaying a blue rover, red rock, and green flag. The user will press the large arrow buttons to navigate the blue rover to the green flag. If the user would like to restart, they can press the "X" button to clear the console, bringing back the instruction screen on the left side of the console. If the user is satisfied that the rover will reach its destination with no obstacles, they can press the "GO" button to execute the code. The rover will then take off in motion to the target following the programming set into the console. The console will display a live feed viewpoint of the Curiosity Rover's perspective. If the rover runs into a rock (not all are shown on the grid map), the programming phase will restart allowing the user to program another path, this time with the problematic rock being represented on the console grid as a red rock.
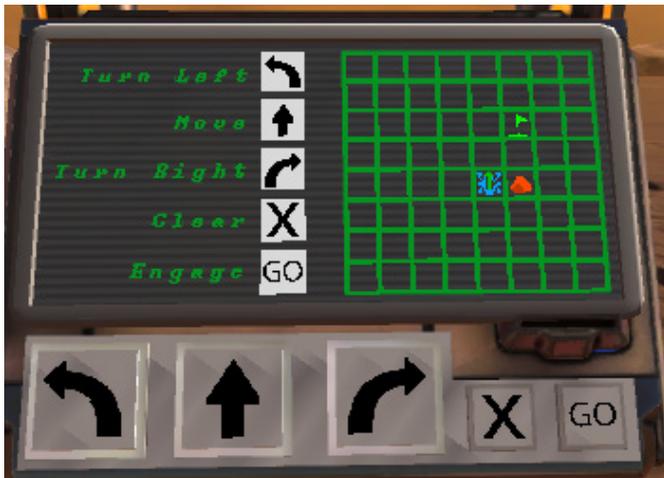
The rover console displaying the programming screen. The left shows what console button does what action. When the first action is put in the Left side is replaced with a list of those actions. The right shows a grid containing a blue rover (with a green arrow depicting what direction it's facing), a green flag, and a red rock.

Once the rover has reached the goal (shown as a green flag on both the console and the Martian surface.) the rover will begin to harvest, and finally analyze the sediment on the Martian surface. The narrator will inform the user of the other 2 experiments that can be done, and the console will display information regarding the hematite found in the sediment analysis. The user can view additional information by using the buttons to go to the next page on the console.

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The Museum

The museum is home to many exhibits which help the user learn about some of the differences between Earth and Mars. The museum is an open layout and can be explored non-linearly.

First Floor

Gravity Exhibit

The museum contains a gravity exhibit which compares the strength of gravity on both planets. Users can watch balls fall from the ceiling of the museum and compare the difference in acceleration.
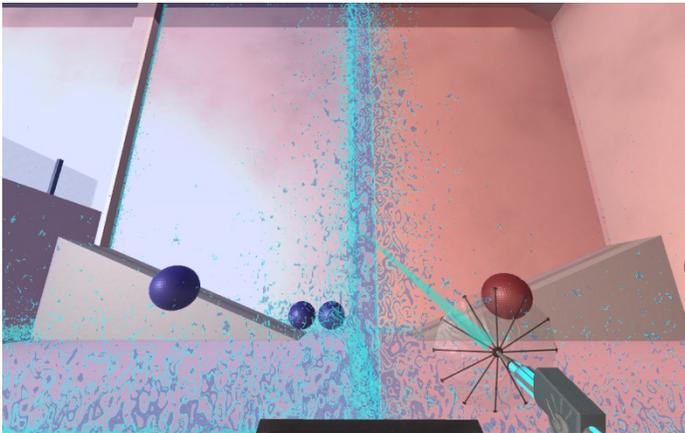
The Gravity exhibit shows the Earth's gravity (blue) in comparison to the Mar's gravity (red). The user can grab objects from either side to see the change between the two.

Magnetism Exhibit

Another station is magnetism, which allows the user to compare magnetic fields between the two planets. Users can move the compass along the planets to watch the behavior of the compass aligning with magnetic fields. There is also a button in front of each planet to turn on a visual display of the magnetic fields.
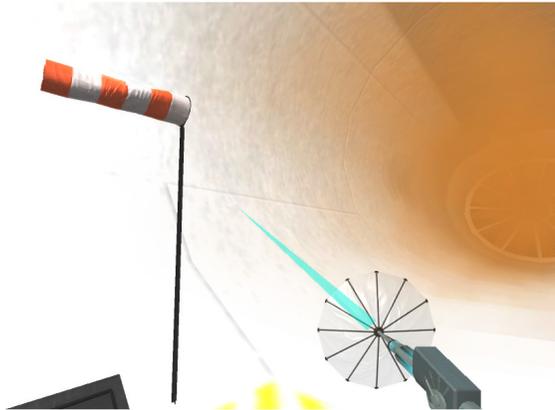

The Magnetism exhibit

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Second Floor
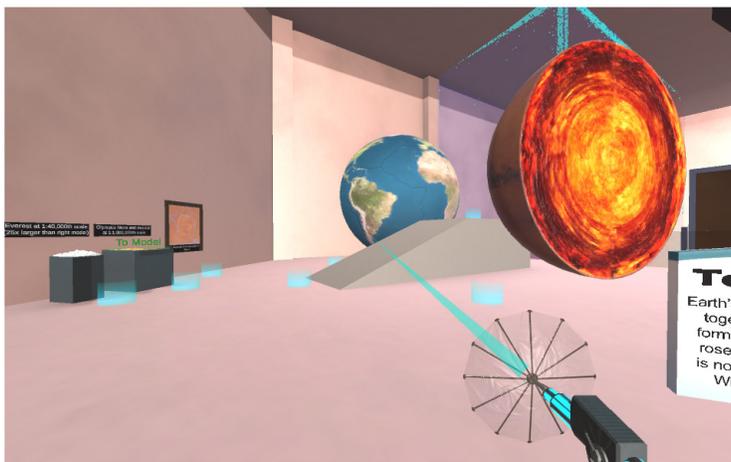
Natural Hazards Exhibit

This exhibit allows the user to go inside a wind tunnel and experience maximum wind speeds on both planets. The user can click "Earth" or "Mars" respectively to experience the wind speed in the wind tunnel.

The windsock in the Natural Hazards exhibit

Tectonics Exhibit

This exhibit compares the tectonic plates for both planets and their interiors. The user can also visit Mount Everest and Olympus Mons and "teleport" to the summit of each peak to observe a stark difference in height.

The windsock in the Natural Hazards exhibit