

Welcome to the Psyche Sampling Lander Simulator project User Manual!

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Mission Overview:

Welcome to your mission to land on Psyche!

This user manual will guide you through the necessary procedures and best practices to ensure a safe and successful landing on Psyche. Whether you're on a scientific exploration or a mining mission, this guide will cover all critical aspects of the process from approach to surface operations.

1. Game Interface Overview

- **Simulation Console:** Displays the critical parameters for controlling your spacecraft and rover.
 - **On-Screen Controls:**
 - **Start:** Begin or reset the Simulation
 - **Exit:** Quit the Simulation
 - **Pause:** Stop the Simulation in motion to be restarted
 - **Resume:** Restart the simulation after Pause
 - **Variable Parameters:**
 - Orbital Speed: The speed of the lander rotating around the asteroid.
 - Fall Velocity: Speed of descent.
 - Fuel Remaining: Induction of remaining fuel.
 - Lander Damage: Damage the lander has incurred.
 - Lander Altitude: Distance from the lander to the surface of the asteroid
 - Simulation time: How long the simulation has been running
 - Up Thruster: If the thruster is on or off.
 - Lwr Thruster: If the thruster is on or off.
 - **Constant Parameters:**
 - Surface Gravity: Gravity in Newtons on the surface of the asteroid.
 - Average Diameter: Average diameter of the asteroid.
 - Rotational Speed: Rotational speed of the asteroid.

- Lander Mass: Mass of the lander.
- Max Fuel: Max fuel the lander can carry.
- Max Impact: Impact Maximum
- Landing Feet Size: Size of the lander's feet in centimeters.
- Starting Altitude: Altitude of the lander at starting point
- Max Thrust: Maximum thrust of the thrusters
- Lander Angle: Angle in comparison to the asteroid
- Up Thrust Angle: Angle in comparison to the lander
- Lwr Thrust Angle: Angle in comparison to the lander
- **Spaceship Controls:**
 - **Fuel Gauge:** Shows how much fuel you have left. Adjust your movement to manage fuel. If fuel is low and you're close to the asteroid, a crash will occur. If you are far from the asteroid, you will float away from your course.
 - **Speed and Distance Indicators:** Display your speed and distance from the asteroid in real-time.
- **(In Development)Rover Controls:**
 - **Arrow Keys:** Control rover movement (Up for straight, Down for backwards, Left/Right for side to side).
 - **Spacebar:** Used to pick up samples from the asteroid.
 - **On-Screen Buttons:** For easy control during rover movement (to be added later).
- **Damage Indicator:** Shows if your spacecraft has crashed (Text displaying "You Lost").

2. Spaceship Operation

- **Speed and Descent Control:**
 - **Up Arrow:** Activates lower thrusters and moves the spacecraft upwards (away from the asteroid).
 - **Down Arrow:** Activates upper thrusters and moves the spacecraft downwards (toward the asteroid).
 - Watch the **speed and distance readings** on the screen to keep track of your descent.
 - If you descend too quickly, you may crash, and if too slowly, you may drift off course.
- **Fuel Management:**
 - Your Fuel usage is determined by how you navigate the spacecraft

- As you use the thrusters, fuel consumption will change. Ensure you have enough fuel to safely land. If you're out of fuel close to the asteroid, you will crash. If you're far away, you'll float off-course.
- **Monitor fuel levels** carefully to avoid a crash.

3. (In Development)Retriever (Robot) Deployment

- After landing, you'll be prompted: **"Do you want to deploy the Retriever?"**
 - Click **"Yes"** to deploy the retriever and begin sample collection.
- **Retriever Controls:**
 - **Arrow Keys:**
 - **Up Arrow:** Move forward.
 - **Down Arrow:** Move backward.
 - **Left/Right Arrows:** Move left or right.
 - **Spacebar:** Press the spacebar to pick up samples from the asteroid.

4. Landing and Mission Completion

- **Landing Process:**
 - Use the up/down arrows to safely land on the asteroid. Keep an eye on the fuel gauge and distance readings to ensure a safe landing.
 - Once landed, you can deploy the rover to explore the asteroid's surface.
- **Mission End:**
 - After completing the sample collection, you'll be shown a list of all tasks completed. A prompt will appear: **"Do you want to continue the mission?"**
 - If you choose not to continue, the mission ends, and you can start over or exit the game.

5. Crashes and Restarting the Mission

- If the spacecraft crashes during landing (due to lack of fuel or high speed), the game will display an explosion graphic with **"You Lost"**.
 - Once the game ends after a crash, you will have the option to restart the mission