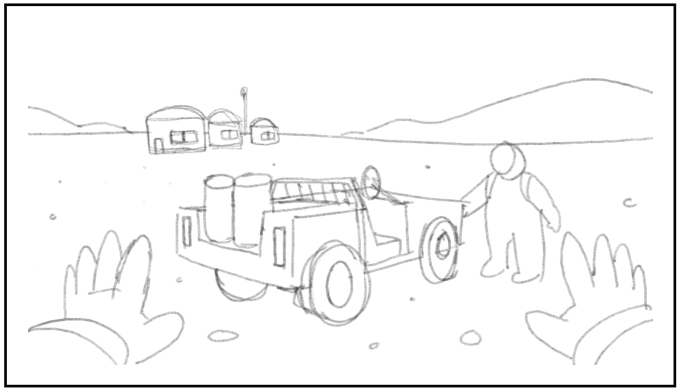
Title: Mars Emergency Response Scenario **Team:** Haptix Studio

Scene Description: In this VR simulation, the commander and one astronaut are outside the habitat on Mars when they hear alarms indicating a fire inside. Users will be able to practice their firefighting skills. The commander delegates tasks to their colleague, identifies the source of the fire, and extinguishes it. This simulation helps them prepare for a potential real-life emergency on Mars.

Assets: Rover, Base, Shovel, Astro, EVA Suit, Miscellaneous Tools

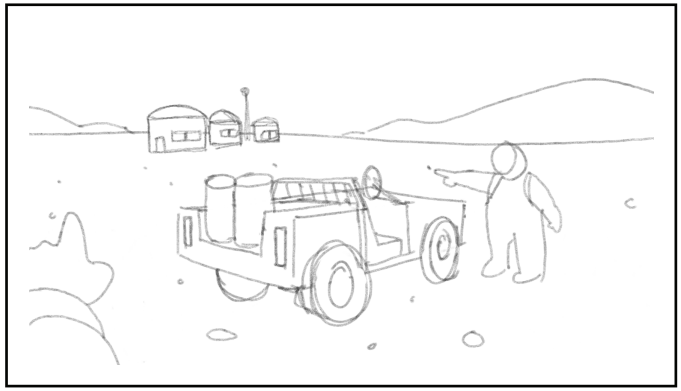
Actions Executable: Recognize alarms indicating a fire and efficiently communicate with other astronauts, identify the source of the fire using knowledge of firefighting procedures on Mars, delegate tasks to the other astronauts to help extinguish the fire, and communicate emergency with MCC.

Scene 1



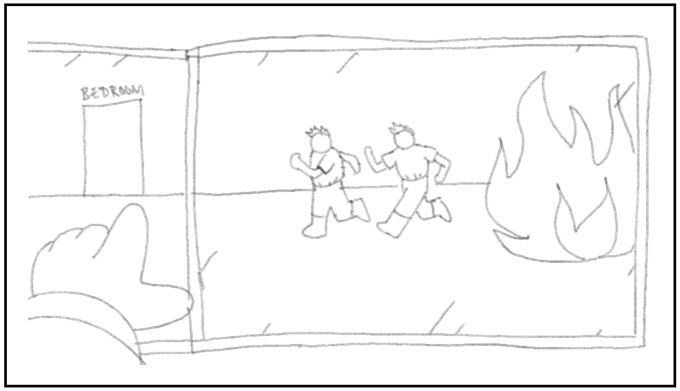
Base Commander and another astronaut are on an EVA working on the waste management system.

Scene 2



They get an alert on their EVA suits of an issue inside the base.

Scene 3

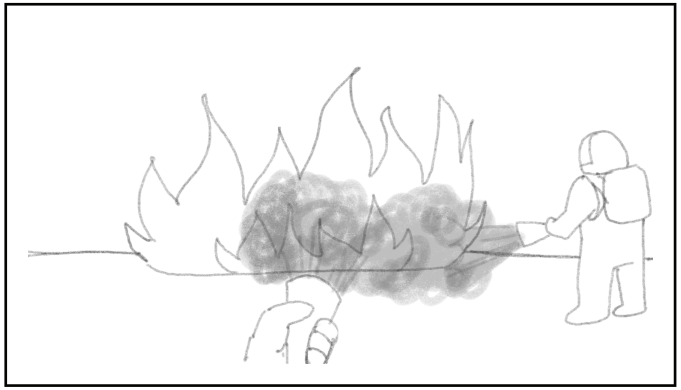


The astronaut commander runs over to the window while the other astronaut continues trying to regain contact with the crew inside. The commander sees the fire in the main living area. The commander motions at the crew inside to go into the bedroom and activate the pressure seal.

Scene 4

The commander and the other astronaut rush to get inside of the base and keep their suits on when they get into the airlock and into the main living area.

Scene 5



The commander and other astronaut use fire extinguishers to put out the fire, aiming at the base to avoid spreading the fire.

Mars Emergency Response Scenario: Base Fire Design Document

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About Haptix Studio

Haptix Studio, based in Lansing, Michigan, is a premier motion capture and media production facility. Boasting the largest publicly accessible motion capture space in the state, our 1,800-square-foot capture area can capture over 10 performers at once. At Haptix, we specialize in producing high-quality motion capture animations, offering pre-visualization services for games and films, and providing photogrammetry solutions for avatar and digital twin creation. In addition, we are dedicated to fostering educational outreach by hosting interactive learning experiences for students ranging from middle school to college levels.

Dedicated to innovation and excellence, Haptix Studio aims to be a frontrunner in the industry, seamlessly combining state-of-the-art technology with creative talent to transform captivating digital experiences into reality.

To learn more about Haptix Studio, please visit our website at https://haptixstudio.com/.

Project Description

The Mars Emergency Response Scenario project is a series of virtual reality (VR) training scenarios designed to simulate various emergency situations during a Mars mission. In this simulation, the player takes on the role of the base Commander on an extra-vehicular activity (EVA) mission, with another astronaut, outside the base. They receive an alert of an ongoing fire emergency in the base, but are unable to communicate with the other crew members, and they must quickly respond to the situation to minimize damage and ensure the safety of the crew.

Characters

Base Commander

The player assumes the role of the base Commander. The Commander is a skilled astronaut with extensive training and experience in space missions. They also possess strong leadership qualities and can remain calm under pressure.

As the Commander, the player is responsible for leading the crew and making critical decisions to ensure the safety of everyone in the base camp. They must use their expertise and quick decision-making skills to respond to the fire and overcome the communication issues to minimize any potential damage to the base camp and its crew.

Non-Playable Characters

Astronaut 2

The second astronaut (called “Astronaut 2”) will help the Commander to fight the fire. As the Commander delegates tasks and makes critical decisions, the Astronaut 2 will work to regain contact with the rest of the crew inside the base and provide updates on the situation. Once the Commander and Astronaut 2 are inside the base, they will work together to isolate the fire and prevent it from spreading.

Base Astronauts

Depending on the number of astronauts required for the mission, the number of crew members (called “Base Astronauts”) inside the base can be adjusted. The Base Astronauts will need to get inside the crew quarters, as instructed by the Commander, and activate the pressure seals to prevent smoke and fire from entering other parts of the base.

Story

This project will simulate a high-pressure emergency situation where the Commander must respond to a fire outbreak in the base camp. The scenario will be broken down into several events that the player must navigate to successfully contain the fire and ensure the safety of the crew:

1. EVA Task
2. Contain Fire

Please review the attached storyboard for more details on the scenario progression.

Events

EVA Task

The first event will involve the Commander and Astronaut 2 performing an EVA task when they receive an alert of an issue inside the base. In this radio transmission, they hear the words, "fire" and "spreading", but communication issues prevent them from hearing the entire message clearly. The Commander must quickly assess the situation, delegate tasks between themselves, Astronaut 2, and the other Base Astronauts while overcoming communication issues and following emergency protocols.

Contain Fire

The second event will involve the Commander and Astronaut 2 returning to the base and making their way through the airlock and into the main living area. The Commander must contain the fire (using fire extinguishers) and instruct the other crew members to activate the pressure seal. After the fire is extinguished, the Commander must make sure that the crew is safe and accounted for. At the end of the scenario, the Commander will report on the emergency to the mission control center (MCC) on Earth.

Theme

This scenario will explore themes of leadership, decision-making, and teamwork. The player will be put into a high-pressure situation where they must make important decisions to ensure the safety of the crew. The scenario will challenge the player's ability to communicate effectively, delegate tasks, and prioritize objectives under pressure as well as remembering procedures and order of operations. By navigating the scenario successfully, the player will learn the importance of strong leadership and teamwork, as well as the significance of quick decision-making in emergency situations.

Gameplay

Goals

The player is playing the fire training scenario to experience what it would be like to respond to an emergency situation on Mars. The scenario will provide a realistic representation of the challenges and dangers that astronauts could face during a mission to Mars. By putting the player in the role of the Commander, the scenario will provide a unique perspective on the critical decision-making skills, effective communication, and teamwork required to successfully navigate emergency situations in space.

This scenario will also serve as a tool to train astronauts for a possible future mission to Mars. By simulating a realistic emergency scenario, NASA will be able to assess the preparedness of astronauts for responding to emergencies in space. The simulation will also provide insights into the effectiveness of emergency protocols and procedures and help identify areas that require improvement. At the end of the scenario, the player will be graded on how well they responded to the scenario and what they can do to improve their response next time.

Game Mechanics

Player Movement

The player will have a first-person VR movement system.

Communication System

The player will have a communication system (controlled via the user interface) to communicate with Astronaut 2. The system will have different predefined commands and responses for the player to choose from, such as "Go left", "Stay there", or "Come back to the airlock”.

Hand Signals

To communicate with the Base Astronauts, the player will have a set of visual hand signals. These will include common signals like "Thumbs up", "Thumbs down", and "Pointing", to indicate different commands and responses.

Fire Extinguisher

The player will need to use the fire extinguisher to put out the fire. The extinguisher will have limited capacity, and the player will need to aim and spray the extinguisher in the right area to put out the fire.

Terminal Communication

Once the scenario is over, the player will need to operate a terminal inside the base to communicate the emergency to MCC. The terminal will have predefined responses and commands, and the player will need to choose the appropriate responses to accurately communicate the emergency.

Progression and Challenge

The scenario difficulty can be adjusted to make it more challenging. This can be done by increasing the number of fires or by decreasing the time available to complete tasks. We can also add more tasks for the player to do simultaneously. These changes can be made on the fly, depending on how the player is performing. This will ensure that the scenario is challenging and engaging for players of all skill levels.

Win Condition

In order for the player to successfully complete the scenario (the “win condition”), the player needs to quickly contain the fire outbreak and ensure the safety of the crew. The player must assess the situation, delegate tasks, and communicate effectively with the crew to use the base's emergency protocols and equipment. Time is of the essence, and the player must act decisively and work effectively as a team to overcome the challenges presented in the scenario. If the player successfully completes these objectives within the allotted time, they will win the scenario.

Lose Condition

The player can fail the scenario (the “lose condition”) by failing to contain the fire outbreak. If the player does not act quickly enough to isolate the fire, it can spread and cause irreparable damage to the base, equipment, and crew. In addition, if the player does not communicate effectively with the rest of the crew or make the right decisions, they can worsen the situation and put themselves and the crew in danger.

Art Style

Based on the art style of the assets provided by NASA/Epic Games, the fire scenario will feature a realistic and immersive visual style that accurately portrays the environment of a Mars base camp. The art style will include realistic textures, lighting, and animations, creating an engaging and immersive experience for the player.

Music and Sounds

Sound effects will play a crucial role in creating a realistic and immersive experience for the player. The simulation will aim to accurately represent the types of sounds that the Commander would encounter in a real-life emergency situation on a Mars base camp. This includes sounds for the airlock, different alarms, and communication devices. By using accurate and realistic sound effects, the player can better process the critical information needed to make decisions quickly and efficiently, just like in a real-life emergency situation. The sound design will play a significant role in creating a sense of urgency and tension, adding to the immersive experience of this scenario.

Technical Description

Platform

This game will be developed for PCVR on Windows PCs.

This game will support the following headsets:

- HTC VIVE
- VIVE Pro
- VIVE Pro eye
- VIVE Pro 2
- Valve Index
- Oculus (using Quest Link)

Localization

This game will support the following languages:

- English
- Other languages NASA deems necessary