NASA Psyche Web-Based Game (21M)

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Abstract

This project proposes a web-based game designed to enhance public engagement with NASA's Psyche mission. While traditional outreach methods such as articles, journals, videos, and social media posts are valuable, they can fall short in capturing the prolonged interest of younger audiences. To address the gap, this game integrates educational content with entertaining minigames, making the mission's scientific goals and challenges more accessible and exciting to learn about. By blending education and entertainment, this initiative supports NASA's outreach objectives while fostering the curiosity of the next generation of scientists, engineers, and space explorers.

Introduction and Background

- **Mission Introduction:**

Launched in 2023, the Psyche spacecraft set out to investigate a unique asteroid that is metal-rich. Believed to be remains of an early planet, scientists from NASA embark on this journey in hopes of gaining a better understanding of how planets formed and what lies beneath their surfaces.

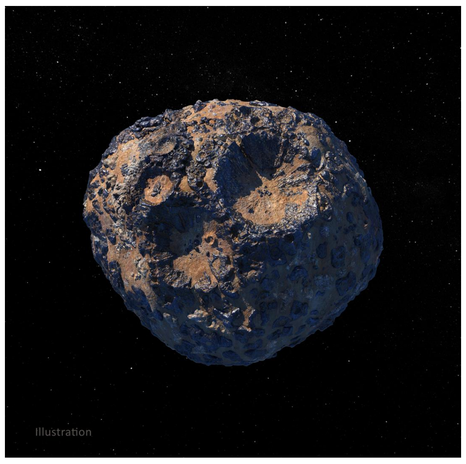

Fig 1: Image of the asteroid Psyche

- **Background on Psyche:**
  - Asteroid Name: 16 Psyche
  - Location: Main asteroid belt between Mars and Jupiter
  - Composition: Believed to be mostly metal (nickel and iron), where most asteroids are rocky.

Fig 2: The spacecraft being sent to Investigate Psyche

Game Design

- **Game Overview**
  - Implemented with C# using Unity.
  - The game will have the player walk through the phases of the Psyche mission timeline, where they will complete entertaining mini games while simultaneously learning about the mission itself. By presenting these details, the game aims to enhance the player's understanding of the mission.
- **Phase A: Concept Study**
  - The goal of this section is to introduce the players to what NASA's mission is. They will be given background and shown imagery with dialogue that leads them to the next phase and the first minigame.
- **Phase B: Preliminary Design**
  - The purpose of this section is to see what knowledge the players retained from the first phase. It will be a short quiz on the introductory materials.
- **Phase C: Critical Build & Design**
  - This design section allows the players to see what the Psyche spacecraft looks like and build it from a blueprint. The assembled spacecraft leads to the next phase.
- **Phase D: Instrument & Spacecraft Assembly, Test & Launch**
  - This section teaches the players about the different tests that Psyche must go through to ensure its safe arrival at the asteroid. There are three main levels to complete and a final level that simulates the launch.
- **Phase E: Cruise, Gravity Assist, Arrival & Orbit**
  - This phase shows what the spacecraft is going through while it is on its way to the Psyche asteroid. The player will be able to control the spacecraft while maneuvering through an asteroid field.
- **Phase F: Mission Closeout**
  - The final section of our game starts once the Psyche spacecraft has reached its destination. A closing animation showing the data being analyzed and other ending remarks will be shown.

Results

- **Gameplay and Features**
  - Players have developed a better understanding of each phase of the Psyche mission from a series of mini games and short cutscenes that provide key information instead of focusing on one phase and homing in on minor details.
  - A wide range of gameplay styles are present in each mini game, ensuring there is something enjoyable for everyone.

Phase A/F: Concept Study, Mission Closeout
- Players are introduced to/end the mission with an interactive cutscene. They control when the next dialogue segment is present.

Phase B: Preliminary Design
- Players partake in a quiz mini game where they are asked to test their knowledge on the information given from the first phase.

Phase C: Critical Build and Design
- Players interact with a drag and drop minigame where they assemble the spacecraft

Phase D: ISAT&L
- Players enjoy a point and click mini game where they conduct tests on the psyche spacecraft.

Phase E: CGAA&O
- Players engage with a side-scrolling mini-game where they guide the psyche spacecraft through asteroids to reach its final destination.

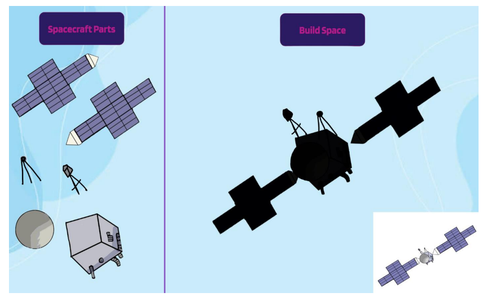

Fig 3: Phase C minigame.

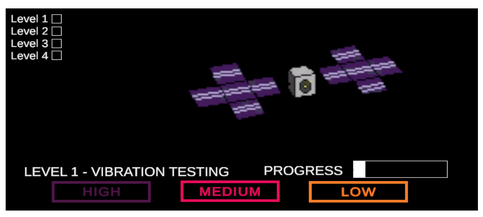

Fig 4: One of the levels from Phase D minigame.

Fig 5: Phase E minigame.

Conclusion and Future Recommendations

The NASA Psyche Mission offers a unique opportunity to engage the public in exploring a metal-rich asteroid, but its complexity and long timeline challenge interest, especially among younger audiences. This web-based game will educate, entertain, and spark curiosity about space exploration. By aligning the mission's six phases with interactive mini-games, the project successfully transformed educational material into an engaging experience. A key limitation was the lack of feedback from the target audience during development, which could have helped refine the user experience.

Overall, the project's objectives were met by creating a web-based game that educates and entertains. To improve the experience, future iterations could include animations and adaptive feedback based on player performance.

Disclaimer

This work was created in partial fulfillment of Cleveland State University Capstone Course "CIS 494". The work is a result of the Psyche Student Collaborations component of NASA's Psyche Mission (https://psyche.asu.edu). "Psyche: A Journey to a Metal World" [Contract number NNM16AA09C] is part of the NASA Discovery Program mission to solar system targets. Trade names and trademarks of ASU and NASA are used in this work for identification only. Their usage does not constitute an official endorsement, either expressed or implied, by Arizona State University or National Aeronautics and Space Administration. The content is solely the responsibility of the authors and does not necessarily represent the official views of ASU or NASA.