

**Game LINK: <https://github.com/otawfik/CosmicGame/blob/main/README.md>**

As someone deeply invested in using technology to improve learning, my arts project lies in the intersection of code and cosmos. For this arts project, I have engineered and designed a space exploration game focusing on rigid science and fun. With *Cosmic Explorer*, my objective was to gamify our solar system by turning it into an interactive experience that is both artistically engaging but also teaches facts about our planets. I wanted the user to experience mini games that were tailored to each of the planets. To make it more immersive, the game is designed to be a sort of mission, where the user is tasked to complete a mission to save the planet. To build this arts project, I used React for the interface and HTML Canvas API for the game engine. Its design is made to seem retro-futuristic, with arcade style gameplay mechanics.

**Artistic Vision:**

The creative process with the idea of wanting to gamify planets, keeping it engaging and educative for the users. Aesthetically, it is a deliberate arcade-style that is reminiscent of a 1980s arcade game. This choice attempts to evoke the nostalgia of classic arcade games.

The main menu shows all the planets in order closest to the Sun. Clicking on one of the planets starts its respective minigame.

**Mercury:** For Mercury, the game follows a solar flare survival. Artistically, the game is colored to convey the sheer overwhelming intensity of Mercury. Projectiles meant to be solar flares converge on the player, who needs to dodge them to win this game. The lore behind this was to teach our user the danger of being in a region where solar radiation is inevitable.

**Venus:** For Venus, I wanted to represent its strong atmosphere. This game revolves around a thrust mechanic, where the player must fight against gravity. This is to represent Venus's atmospheres of pressure, and the visuals of dodging yellow acid clouds is meant to show how the planet is a hostile planet, with sulfurous composition.

**Earth:** For our planet Earth, I created a game where the user needs to protect the Earth. It's a kind of orbital defense game that addresses the Kessler Syndrome, the idea that space debris can hit the Earth. The player controls a rotating shield, and uses the mouse to move it around the earth and protect it. To add in a little extra twist, I added green dots that hover into earth, meant to be friendly spacecrafts that give the player extra points. The player must only protect the earth against the grey debris

**Mars:** For Mars, I decided to shift the pacing entirely. Inspired by the Mars Rover, this game utilizes driving physics, where the user can choose to go left or right(rover automatically steers forward). Controlling the rover is deliberately made to be difficult, to simulate how difficult it is to drive on a martian regolith.

**Jupiter:** For Jupiter, I wanted to simulate orbital mechanics. The user is constantly pulled toward the center from gravity, and must click fast to increase velocity and widen their orbit. The goal here was to teach the player about gravity assists, similarly to how the Voyager was used to explore the outer planets.

**Saturn:** For Saturn, I was obviously inspired by its rings. By generating a dense field of obstacles that move rapidly down the screen, the user controls a spacecraft diving through the ring plane. The density of the asteroids are meant to be similar to the ice particles.

**Uranus:** For Uranus, the player exists at the cloud layer. I coded a collection mechanic where the player moves in the objective of gathering gas samples, while having to dodge falling “ice”. This mechanic highlights Uranus’s composition, an atmosphere that is rich in both hydrogen and helium, with ice raining down.

**Neptune:** For Neptune, I wanted to represent the fact that it has the fastest winds in the solar system. This game focuses on that by making the player get perpetually pushed backwards, requiring an active input just to stay in place. It’s a constant struggle against the wind.

**Conclusion:** In conclusion, Cosmic explorer is more than just a collection of mini-games, but an interactive and engaging experience on planetary science. Through translating physical constants like gravity, pressure, velocity, and more into gameplay variables, I tried to make this game come to life.