Design document

By The Project Helios team

This document details the design of Project Helios, a simulation game created for the NASA Space Apps 2021. This first draft needs a lot of work to be a considered a finished product, since it was created with very little research due to time constraints.

Target Demographic:

Project Helios is aimed at kids who are also Explorers. Explorers are otherwise known as the most curious of players, who enjoy finding out the ins and outs of a game and what may happen if they interacted with it in a certain way.

Mechanics:

Solar Emissions:

The sun will emit many kinds of hazards for the probe and things the player could be interested in measuring.

Plating:

The player will choose what the plating will be made of. Each kind of plating will block certain emissions from the Sun. The player may choose up to 2 kinds of **Plating** or **Vacuum**. Both layers of plating will be used simultaneously.

Measuring Instruments:

The player will choose what Measuring Instruments will get carried by the probe. Each kind of instrument will detect different kinds of phenomena, as well as emissions from the Sun. The player may choose up to 4 different **Measuring Instruments**.

On Board Computer Redundancy:

On Board Computer Redundancy will reduce the liability for the system to be compromised by hardware malfunction caused by various phenomenon, such as cosmic rays. The player can choose to reduce the possibility for errors in the data or the computer getting busted, by introducing up to 4 levels of **Redundancy**. By default, the probe will have 1 level of **Redundancy**. The level of **Redundancy** may not be reduced to be less than 1. Each level of **Redundancy** will reduce the maximum amount of **Measuring Instruments** the player can choose.

Hazards:

Several hazards will imperil the equipment inside the probe. Each of them is listed below alongside the effect they have in gameplay. All hazards can be measured by instruments.

Electromagnetic Radiation (EMR): Augments **Heat**. **EMR** has a chance to cause faulty data. It also has a lower chance to cause fatal errors in the computers.

Measured by: Radiation Detector

Heat: Heat will be naturally produced by computers. Each level of redundancy will produce more **Heat**. If the **Heat** level goes beyond 473 Kelvin, all computers will suffer a fatal error.

Measured by: Thermometer

Gravity: If fatal errors caused by either **Heat** or **EMR** are somehow avoided, the gravitational pull of the Sun will break apart the assembly of the probe even before it reaches the Sun's surface.

Measured by: Dynamometer

Other phenomena the player can measure:

Light Flux: measured by Photometer.

References:

LUMITEX. (2021, 10 2). *Lighting System Design and Development | Lumitex*. Retrieved from The Ultimate Guide to Light Measurement: https://www.lumitex.com/blog/light-measurement#3

Setra. (2021, 10 2). *What is a Dynamometer and How Does it Work?* Retrieved from Premium Sensing Solutions | Setra Systems: https://www.setra.com/blog/test-and-measurement-dynamometer

VORAGO Technologies. (2016). *VORAGO Technologies VA10800 Microcontroller Surpasses 4,000 hours of.* Austin: VORAGO Technologies.

Höeffgen SK, Metzger S and Steffens M (2020) Investigating the Effects of Cosmic Rays on Space Electronics. *Front. Phys. 8:318. doi: 10.3389/fphy.2020.00318*