What we are currently working on:

Plan: Finally integrate Python into the simulation

Create a time slide/button to manipulate the time

- Little bookmarks on where future eclipses will appear
- Calculate how it's a solar eclipse
- Calculating Penumbra and Umbra

Designated camera locations to see the moon on the earth

Coordinate the system to position the camera anywhere the user wants

Enhancements for Solar Eclipse Simulation

1. Python Integration

Objective: Incorporate Python scripting to enhance the simulation's functionality.

Actions: Integrate Python libraries (e.g., NumPy, Matplotlib) for data processing, visualization, and mathematical calculations.

Implement Python scripts to automate simulation (e.g., data generation, trajectory calculations).

2. Time Manipulation Interface

Objective: Provide users with a user-friendly interface to manipulate simulation time.

Actions: Create a time slider or button that allows users to adjust the simulation time forward or backward.

Ensure synchronization with other simulation parameters (e.g., position of celestial bodies).

3. Eclipse Prediction Markers

Objective: Enhance user experience by indicating future eclipse events.

Actions: Add visual markers (bookmarks) to the simulation timeline to highlight upcoming solar and lunar eclipses.

Display relevant information (date, type of eclipse) when users interact with these markers.

4. Solar Eclipse Calculation

Objective: Accurately simulate solar eclipses based on celestial mechanics.

Actions: Calculate eclipse paths using astronomical algorithms (e.g., Besselian elements).

Consider factors such as Earth's rotation, Moon's orbit, and Sun's position.

5. Penumbra and Umbra Visualization

Objective: Illustrate the shadow regions during an eclipse.

Actions: Visualize the penumbra (partial shadow) and umbra (total shadow) cast by the Moon during a solar eclipse.

Provide tooltips or information overlays to explain these concepts.

6. Camera Locations and Perspectives

Objective: Allow users to view the eclipse from different vantage points on Earth.

Actions: Predefine camera locations (e.g., major cities, observatories) and their corresponding perspectives.

Enable users to select their preferred camera position for observing the eclipse.

7. Custom Camera Placement

Objective: Empower users to position virtual cameras anywhere within the simulation.

Actions: Implement a camera placement system that allows users to specify latitude, longitude, and altitude.

Dynamically adjust the simulation view based on user-defined camera coordinates.