Project Proposal

Project Name: Planet Tracker

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Problem Statement:

Society is moving towards more innovative aerospace systems. With these new systems, it is crucial for accurate trajectories to be calculated and visualized beforehand. The planet tracker solves the problem of rocket trajectories interfering with planet orbits on their mission. This is a problem when planning rocket trajectories that cross the path of planet orbits, regardless of origin and destination planets. It is also important to consider the issue of gravitational fields of these planets, that can be used in favor of or against these rocket trajectories. These problems need to be solved before taking a mission by any major aerospace company. The planet tracker can calculate and visualize multiple solutions for testing beforehand.

Stakeholders:

Primary stakeholders: Professor Towhidnejad, Walter Hernandez, Carly Bosma, Luke Newcomb, Clay Pate, Hannah Ramsden.

Secondary stakeholders: NASA (National Aeronautics and Space Administration), Aerospace Engineers, Mission Specialists.

Proposed Solution:

The program will be a 2D visual representation of the planet's location in their orbit over time. The user will be able to view all the planets (and various smaller bodies in the solar system) at various points through a certain date range (e.g., 1970-2020). Additionally, the user will be able to launch a spacecraft from any body and simulate the path it would take to reach any other body with a visual representation of its "orbital track" through the solar system. This simulation would calculate and show the required Delta-V for a spacecraft of various user-input parameters. The simulation will not be high fidelity, limited to view of planets and not specific areas on planets. Additionally, the program will be limited to the Solar System, consisting of all major bodies and only a few minor ones (notable asteroids and moons).

Proposed method to solve the problem:

The initial approach is to use an interactive GUI to display all the planets in a 2D plane showing their location based on date, using ephemeris data to calculate the position of the planets at specific times. The user would be able to adjust the current date over a certain range and the planets' orbits would be adjusted accordingly matching to historical data. Using the

orbital equations of motion, the spacecraft's trajectory can be calculated and then shown to the user graphically on the 2D plane.