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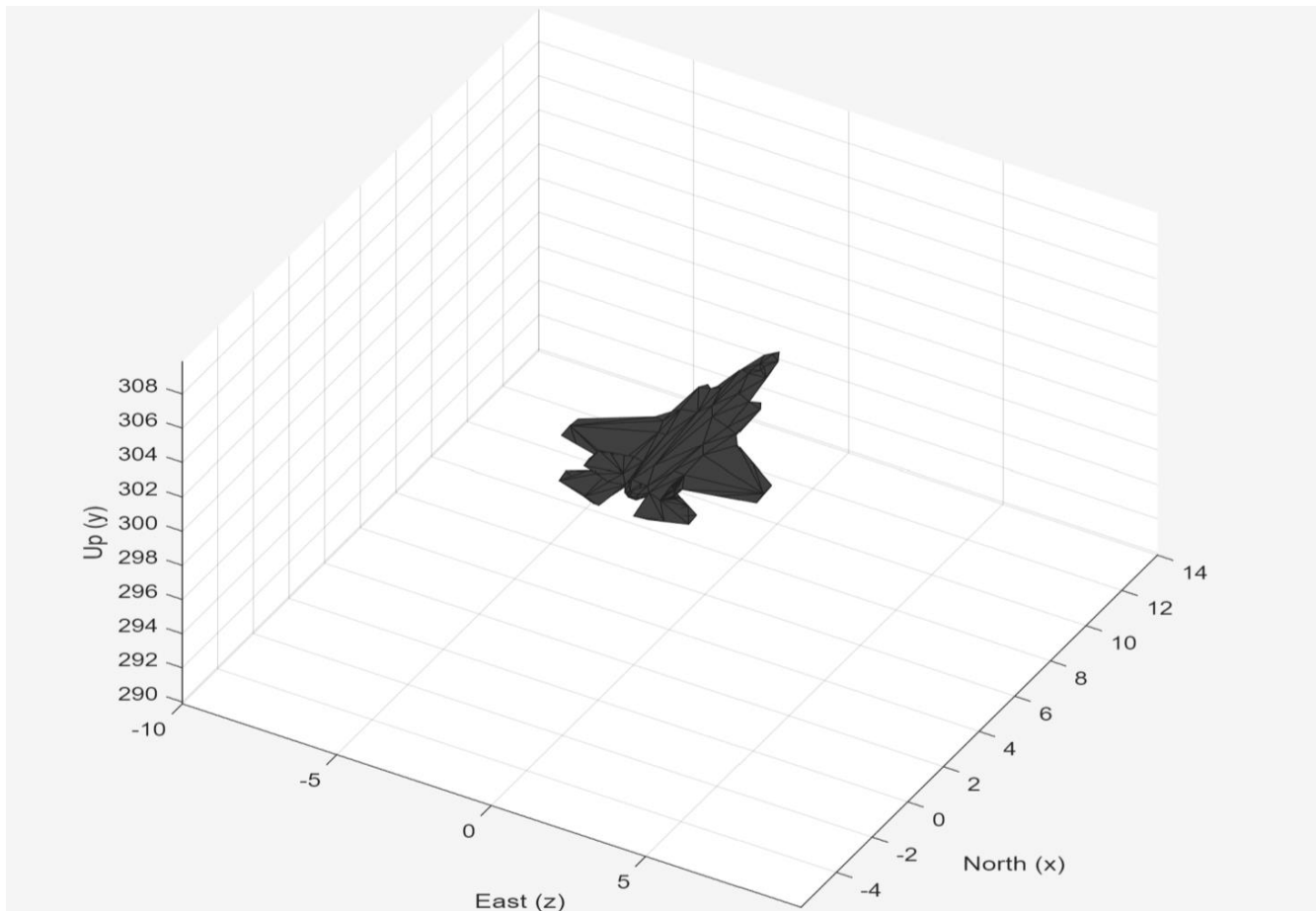
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F-35 Flight Simulator

Objective:
To simulate the flight dynamics of a fixed-wing aircraft using MATLAB and real-time input from an Arduino-based joystick controller, enabling intuitive control of aircraft motion and orientation.

Technical Details:
The simulator was developed in MATLAB using multiple function files to separate graphics, dynamics, and control logic. A custom 3D airplane model was created and animated using quaternion rotations to maintain stable orientation. Aircraft motion was computed using six-degree-of-freedom equations of motion solved with a 4th-order Runge-Kutta method. An Arduino microcontroller was integrated to read joystick inputs and control the airplane's motion in real time.

Findings and Outcomes:
The final simulator displayed smooth and stable 3D flight motion and responded accurately to user inputs. Proper quaternion normalization ensured realistic aircraft orientation throughout the simulation. This project strengthened my understanding of flight dynamics, numerical methods, and coordinate transformations.