

Enhancements in the CesiumJS-Based 3D Simulation Application.

Implemented Features

Object Rotation Capability

To enhance model realism and user control, a rotation mechanism was implemented.

- UI Sliders for Rotation: Three independent sliders were added to adjust heading, pitch, and roll.
- Users can modify these values dynamically, and the changes reflect in real-time.
- Cesium.HeadingPitchRoll Transformation: Implemented to apply the correct rotation based on user inputs and ensuring smooth and accurate orientation adjustments for models.

Integration of Drone and Satellite Models

The application was expanded to support additional 3D models.

- New Models Added:
 1. Drone (lightweight, hovering aircraft).
 2. Satellite (used for orbital simulations).
- Asset ID Assignment: Each new model was assigned a unique Cesium Ion asset ID to load its 3D representation.
- Custom Orientation Settings:
 - Satellite: Rotates around the Z-axis for realistic orbital movement.
 - Drone: Maintains a neutral hover position with no predefined orientation changes.

Model Placement at Specific Locations

A new functionality was implemented to allow precise model placement.

- Latitude and Longitude Input: Users can enter specific coordinates to position a model accurately.
- Camera Navigation: Once a model is placed, the camera automatically flies to its location for better visibility.
- Error Handling: The system verifies that inputs are valid geographical coordinates before placing the model.

Enhanced Drag-and-Drop Mechanics

The drag-and-drop system was improved to allow easier model manipulation.

- Dynamic Placement:
- Models can be dragged from a toolbar and dropped onto the Cesium globe.
- Screen-to-Globe Coordinate Mapping: Converts screen coordinates to globe positions, ensuring accurate placement of models.

User Interface Improvements

- Dropdown Menu for Model Selection: Users can now select the model type before placing it on the globe.
- Integrated Placement Button: A "Place Model Here" button enables users to position selected models at specific coordinates.
- Error Handling and Validation: Prevents incorrect coordinate inputs and provides alerts for invalid data.

Conclusion

The enhancements significantly improve the simulation's functionality, usability, and interactivity. The ability to rotate objects, place models at specific locations, and interactively drag and drop models creates a more dynamic user experience. These updates lay the foundation for further developments, such as integrating real-time data streaming and sensor-based model interactions.