**Cesium Project Explanation**

**Overview**

This project uses **CesiumJS** for the frontend and **Flask** for the backend. The **3D simulation** allows users to add, manipulate, and analyze **objects, sensors, and satellite movement** in real time.

**Key Functionalities**

**1️. Object Management & Audio Signals**

* Users can **add objects** from a list (e.g., Arduino, Telecommunication Tower, Satellite).
* Each object has a **specific sound** representing its **signal type**:
  + **Arduino → Wi-Fi sound**
  + **Telecommunication Tower → 5G Network sound**
  + **Satellite → Satellite broadcast sound**
* The user can **play the audio** for each object.

**2️. Satellite Simulation**

* A satellite **flies over the Earth** along a predefined trajectory.
* If a **Satellite Broadcast Sensor** is placed under its path, the **satellite speed increases** temporarily when passing over it.
* The user can **reset the satellite to its initial position**.

**3️. Sensor System (Wi-Fi, 5G, Satellite Broadcast)**

* Users can **add, move, and customize sensors** in real time.
* Each sensor has **adjustable parameters**:
  + **Detection Range**
  + **Field of View**
* Sensors can **detect overlaps**, changing color dynamically when they intersect.

**4️. Collision & Overlapping Detection**

* **Collision:** If an entity (object or sensor) is placed too close to another, a **collision is detected**.
* **Overlap:** If two sensors overlap, their **color changes** to indicate the shared area.

**5️. Real-Time Data with IoT Integration**

* The frontend and backend communicate via **WebSockets** to send **live sensor data**.
* Sensors receive **real-time updates** for:
  + **Temperature**
  + **Signal Strength**
  + **Status (Active/Inactive)**
* The **sensor color changes dynamically** based on its status.

**How It Works**

1️. **Add an object** to the map.  
2️. **Play its sound signal.**  
3️. **Simulate the satellite movement.**  
4️. **Add and adjust sensors.**  
5️. **Observe collisions and overlaps.**  
6️. **Receive real-time IoT updates.**

**Summary**

This **interactive CesiumJS simulation** helps visualize **sensor networks, real-time data, and satellite tracking**. Users can **place objects, adjust sensor parameters, track satellite movement, and analyze coverage zones** with **dynamic interactions**.