CS 5743 EXTENDED REALITY

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Project Description:

This report covers a Unity-based simulation designed to demonstrate the assembly of a building from distinct parts, followed by a dynamic interaction where a plane collides with the assembled structure. The simulation utilizes advanced Unity scripting to manage object movements, collisions, and physics interactions, ensuring a seamless and visually appealing experience.

Objective:

The primary goal of this simulation is to display the capabilities of Unity in handling complex animations and physics-based interactions while adhering to the principles of hierarchical object management and collision detection. The project aims to educate and demonstrate these concepts in a clear and engaging manner.

Simulation Details:

Building Parts:

Components: The simulation features unique building components. Each part is designed with individual characteristics and colors to enhance visual differentiation.

Assembly Process: Parts are animated to move from an initial position to a predetermined final position using smooth transitions facilitated by linear interpolation of positions and rotations over a fixed time interval.

Plane Interaction:

Collision Mechanics: After the assembly, a plane is animated to fly toward the part of the building. Upon collision, the plane triggers a collapse of the part it hits, demonstrating effective use of Unity's collision detection mechanisms.

Physics Response: The collision initiates a physics response where the plane and the affected building part employ gravity and rotational dynamics to simulate falling and rotating, adding realism to the simulation.

Hierarchy and Scripting:

Hierarchy Usage: The simulation script organizes building parts in a hierarchical structure, which simplifies the management of component relationships and interactions.

Script Functions: The script BuildingAssembly controls the sequential movement of parts, handles the timing and execution of animations, and manages collision responses. Detailed error checking ensures that the simulation runs smoothly without misconfigurations.

Innovative and Creative Elements:

Creative Design: The choice of building parts and their assembly sequence is designed to be visually striking and unique among submissions from other groups, ensuring a high level of originality.

Interactive Element: The inclusion of a plane that not only flies but also interacts with the building introduces a narrative element that is both unexpected and engaging.

Additional Features (Over and Beyond):

Multiple Camera Views: The simulation incorporates multiple camera angles, enhancing the visual coverage and allowing viewers to appreciate the complexity of the assembly and the dynamics of the collision from different perspectives.

Voiceover and Introduction: A voiceover provides an introductory overview at the beginning of the simulation, setting the stage for what the viewer will witness. This addition not only enhances understanding but also engages the audience more effectively.

Conclusion:

This Unity simulation stands out due to its sophisticated integration of multiple Unity features, including animations, physics, and camera management. It demonstrates a high level of technical proficiency and creative thinking, effectively utilizing the platform to teach and showcase essential principles in a memorable and impactful way. This project not only meets but exceeds the basic requirements by delivering an enriched educational experience through additional interactive and multimedia elements.