Semester project: Procedural Game Based on the Real World.

Main Objective:
We wish to use the ZED camera device to generate a map from an indoor environment. The goal is to develop a game in Virtual Reality that takes advantage of tangible elements of the world surrounding the user.

Material:
The ZED mini is a new generation of depth and motion sensing camera. The camera can build a geometric map of the environment in real time and even produce a photogrammetric environment from the world surrounding the user; see the video: https://gfycat.com/fr/gifs/detail/GrotesqueAllArabianwildcat.

The project will use the new Windows Mixed Reality headset with a computer backpack to allow large range displacements.

Project Idea:
We want to develop a game exploiting a potentially large map generated in real-time according to the world surrounding the user. To this end, the user is equipped with a computer backpack to be able to move with no constraint, a VR headset and some leap motion to interact with the world. Because the virtual environment is generated according to the real world, the user is able to physically interact with the virtual world as passive haptic feedback devices. In order to implement this project, the mesh generated by the ZED camera needed to be extracted in real-time in Unity. Then, in a second step, different important part need to be implemented:
- automatically identify the real objects which can be used to interact (reliable passive haptic feedback)
- simplify the mesh with some basic 3D form to create mesh colliders
- adapt a simple game (interaction, enemy...) to the currently available mesh.

The theme of the game is free but has to be validated by T. Porssut and R. Boulic.

Goal:
- Evaluate the performance tradeoff for preparing the game for a predefined environment and while playing depending on the complexity of the environment.
- Adapt the game to any mesh while ensuring the user safety.
- A Unity plugin ready to use has to be produced.
Requirements:
- Unity (scripting in C#/DLL in C++)
- 3D geometry and quaternions (Vectors, cross products, rotations)

Information, materials and resource:
*Unity3D game engine*: http://unity3d.com/learn
*Leap Motion SDK*: https://developer.leapmotion.com/

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