

Semester project: Procedural Game Based on the Real World.



Main Objective:

Develop a game in Virtual Reality taking advantage of tangible elements of the world surrounding the user.

Background:

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> .

We wish to use it to generate a map for our game in real-time.

The new Virtual Reality (VR) Headset from Microsoft partnership, use two cameras mounted on the front to know his position in the space. Thus, if we combine this headset with a computer backpack, we can go everywhere without any limit.

Project Idea:

We want to develop a game with an infinite 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 around him. 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, you need first to extract in real-time the map generated in Unity. Then, in a second step, you have to find a way to:

- automatically identify the object you want to interact with (reliable passive haptic feedback)
- simplify the mesh with some basic 3D form to create mesh colliders
- adapt the 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 your 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/>

Zed API: <https://www.stereolabs.com/documentation/overview/spatial-mapping/using-mapping.html>

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