Assignment on Virtual Reality and Physically-Based Simulation - Sheet 1

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Exercise 1

a) **Virtual Reality**: it is a technology that allows a user to dive into computer-generated environment, which can be a reproduction of real world or not, where his senses are involved to perceive it and in which user can perform action to interact with it.

Virtual Environment: a non-physical-existing surrounding condition in which the user is projected through the use of devices that interact with human body.

Immersion: how much the user perceives the environment. Everything a person perceives from the world is perceived by senses; therefore, more are the senses stimulated in the simulation and more Immersion a user should feel.

Presence: the feeling of being in the Virtual Environment and that what is happening in the Virtual Environment is really happening.

Fidelity: how real the virtual environment is perceived by the user. For instance, the more is the rendering quality of the images and the more is the physical plausibility of the virtual world and the more is the fidelity.

Suspension of Disbelief: it is the acceptance by the user of the Virtual Environment despite of the distance from the real world in order to enjoy it.

b) At first glance the described scenario seems not to be clearly definable as an AR or VR. However it looks closer to a VR scenario than to an AR scenario: despite the senses of the user are not blocked as in a VR, the objective of the simulation is to "transport" them into a different environment and not to add something into the real world. Infact, the user is projected into a totally different scenario compared to the place where they are actually staying. The simulation is not actually increasing something already existing because the glass is not, for example, on a rooftop as it should be in a AR simulation, but the user is experiencing through the

use of the sight the sense of staying onto an artificial environment created by a computer. We can finally say that it is a VR simulation because of the focus that is on the glass representation and not on the surrounding area.

c) Examples of application of VR are: Medical science, Games, Military, Car industry. VR is not applied, but could be, in fileds as interactive movies, music visualization, Memory enhancement (e.g. Memory palace).

- Interactive movies: movies where the viewer can live the story by the point of view of a selected character, a character can be chosen in every moment of the narration
- Music visualization and editing: the listener can see the representation of the sounds, produced by every single instrument in the song, around himself in an environment and they can modify these sounds by interacting with them
- Memory enhancement: as in a memory palace, the user can store his memories in a selected palace's room, and so they can use the virtual reality to enforce their memory

Comments on Exercise 3

In the implementation of the assignment we set three variables: MaxHigh, MinHigh and Direction. MaxHigh and MinHigh refer to maximum and minimum height reachable by the sphere respectively, Direction is a boolean value such that when its value is set to false, the sphere moves up, when true, the sphere moves down. The functions that actually make the sphere move are the blue ones named "AddActorLocalOffset" that recieve as input in the field "Delta Location" a vector acting on the Z-axis multiplied for Delta-time. The direction of the motion is decided by two comparisons that are used to check whether the sphere reaches the MaxHigh or MinHigh on the Z-axis. In case these values are reached the value of the variable Direction is set to the opposite value in order to activate in the Branch the function associated with the correct movement.

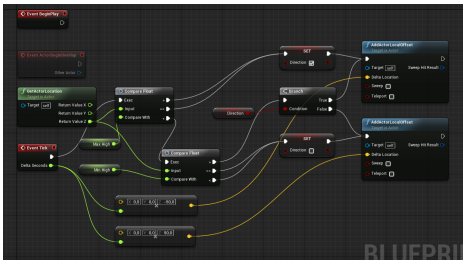

Figure 1: Sphere motion blueprint