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| **Project Title:** | Virtual Reality Locomotion with Oculus Rift |
| **Project Team:** | Christopher Stanwyck |
| **Abstract:** | Movement in virtual reality with the Oculus Rift and similar headsets is tricky due to limited room space and conflicts between what a user sees and what a user experiences with one's own body i.e. moving without physically moving.  Some recent games use instant teleportation to hop about an environment.  Others may simply use the joysticks of hand-held controllers. Some may introduce unique restrictions such as traveling on a moving platform.  Yet another option is the use of specialized omnidirectional treadmills. There are various tradeoffs with these techniques between immersion and user comfort. What I would like to explore is a form of walking/jogging in place to create virtual movement.  The handheld controllers in the Oculus platform can be moved about in a way that one would naturally perform while moving, but with feet just going vertically up in down. I believe that this can create a more immersive and more comfortable experience for virtual reality locomotion which doesn’t require additional expensive hardware or large room spaces. I would like to implement 3 different locomotion techniques for comparison against some traditional techniques. |
| **Milestones and deliverables:** | Oct-17: 3D environment and character models created with 1 “course”  Oct-31: Implementation of Locomotion capability 1 and “teleporting”  Nov-14: Implementation of Locomotion capability 2 and simple joystick movement  Nov-28: 3rd Implementation of Locomotion capability 3 and jumping  Dec-5: Refinements, capability comparison analysis, and Project submission  Dec-13: Project Presentation |

**Implementation detailed description:**

Environment: A virtual reality environment will be created in Unity to allow testing the locomotion. A variety of locations will be used provide practical scenarios and testing of the locomotion capabilities. Open source art and structures may be used to provide larger and more realistic environments.

Locomotion capability 1: This type of locomotion will involve swinging the arms back and forth as one would while walking. The user will have an Oculus Touch sensor in each hand. This will simulate walking.

Locomotion capability 2: This type of locomotion will simulate jogging/running. The user will swing arms back and forth, but with more upward motion. Since the typical running form involves bent elbows, the arc will be tighter.

Locomotion capability 3: Motion will be triggered by tilting the controllers up and down, similar to playing the maracas. This is a less exaggerated motion that should be less fatiguing, but possibly less immersive. However, it may allow the user to perform other tasks easier while moving.

Jumping: In addition to locomotion capabilities, the ability to jump will be added. This will be simulated by bringing both controllers up quickly. The speed of the controllers will dictate the height of the jump.

Joystick movement: An option for simple joystick movement will be implemented. The joystick will control forward and backwards movement, as well as side stepping. A button can be used for jumping.

Teleportation: This will be implemented by the user looking at a spot on the ground and pressing a button to teleport.

Locomotion selection: All capabilities will be available simultaneously due to the distinct nature of each movement.

Development environment: Unity with Oculus Rift with two handheld “Touch” controllers.