Together in VR

Degree programme: BSc in Computer Science | Specialisation: Computer Perception and Virtual Reality
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At the moment there is no virtual reality application that allows people that are together to share the same VR experience based on their position in the physical world. Our aim is to develop an application that allows multiple people that are in the same room to be represented accordingly in a virtual world and to share the experience.

Introduction

Virtual reality is a fast-evolving technology that provides someone with a very immersive experience. Those experiences are limited to a person playing either alone or with online multiplayer. There is currently no VR game or application that allows two people that are in the same room to be represented in a virtual world based on where they stand in the physical one.

Goals

Minimum goals:
- Two people can play in the same virtual world and their hands and heads are represented in the virtual world accordingly to where they are in the physical one
- The latency of the multiplayer shouldn't be noticeable, the errors in the position of the players shouldn't exceed a few centimeters
- One player must have the ability to teleport the group, teleportation is done by pressing a button on the controller or by making an hand gesture if no controllers are used. while one of those two triggers is active an arc is cast from the player's hand and when he releases it the group is moved to the end of the arc.

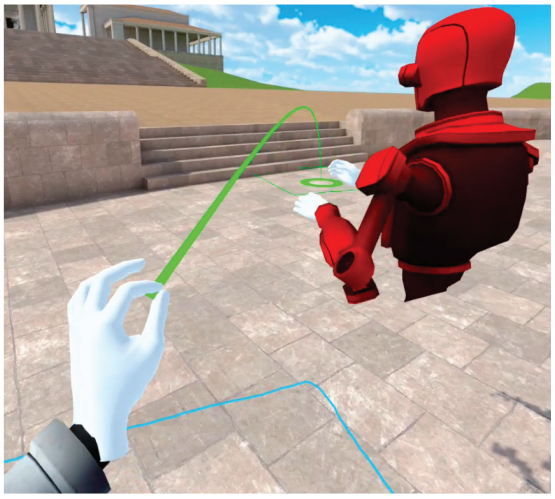
Additional goals:
- A large number of people can play the application at the same time
- The players are represented by a humanoid avatar (upper body only) that uses inverse kinematic.
- The representation of the players in the virtual world is very precise allowing them to have physical interactions (ex. shake hands) based on what they see in VR.
- Teleportation is not performed if someone from the group would clip into a wall.

Results

The developed application allows a group of people to experience a virtual reconstruction of a Roman amphitheater. In it the members of the group's upper body are represented by a humanoid robot, and their position is based on the one in the physical room. The avatar's hands and head have inverse kinematic constraints that make the rest of the avatar move accordingly. All players can teleport the group and the teleportation rays are visible for everyone. The error range in the players' position in the virtual world consists of a few centimeters, this still allows physical interactions like shaking hands possible and doesn't make players have unwanted collisions between them.

Diego Omini

Two people handshaking while using the VR application



Aiming the teleportation ray, once the user opens the fingers the group is moved to the arc end