



Multi-User VR Viewer

Guide:

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Objective of the project

- Multi – VR Support
- Game concept – over the network
- Voice chat
- IK
- Leap Integration
- Platform support

Basic Hardware and Software Requirement

- Unity
- Steam VR
- Leap Motion
- Graphics Card
- Oculus Rift
- HTC Vive Pro

Introduction:

- In this project we have implemented a Multi-User VR-Viewer. In this several VR user can view the same scene and see each other's avatar. [\[Req1\]](#)
- The headset's position and rotation is taken into consideration for avatar movement. [\[Req1\]](#)
- Avatars can communicate with each other through voice. [\[Req2\]](#)

Introduction

- LeapVR has been integrated with one's avatar which capture hand motion and the bone model.

[Req3]

- You can also interact with ball. [Req3]
- This project is compatible with Mac, windows operating system and with different HMD's like Oculus and HTC vive. [Req4]

Game Concept..

Network

Environment

User1-Host

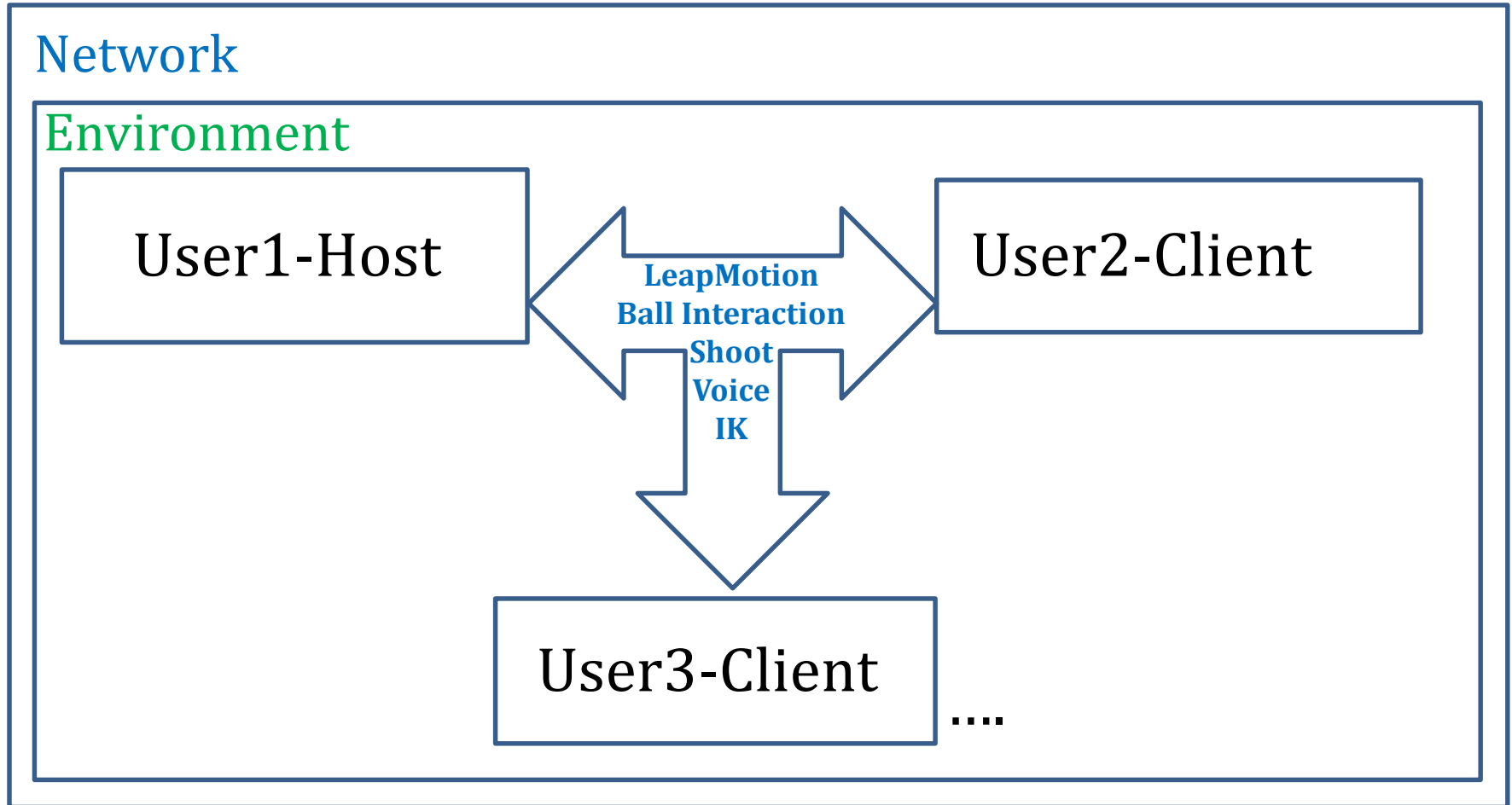
User2-Client

LeapMotion
Ball Interaction

Shoot
Voice
IK

User3-Client

....

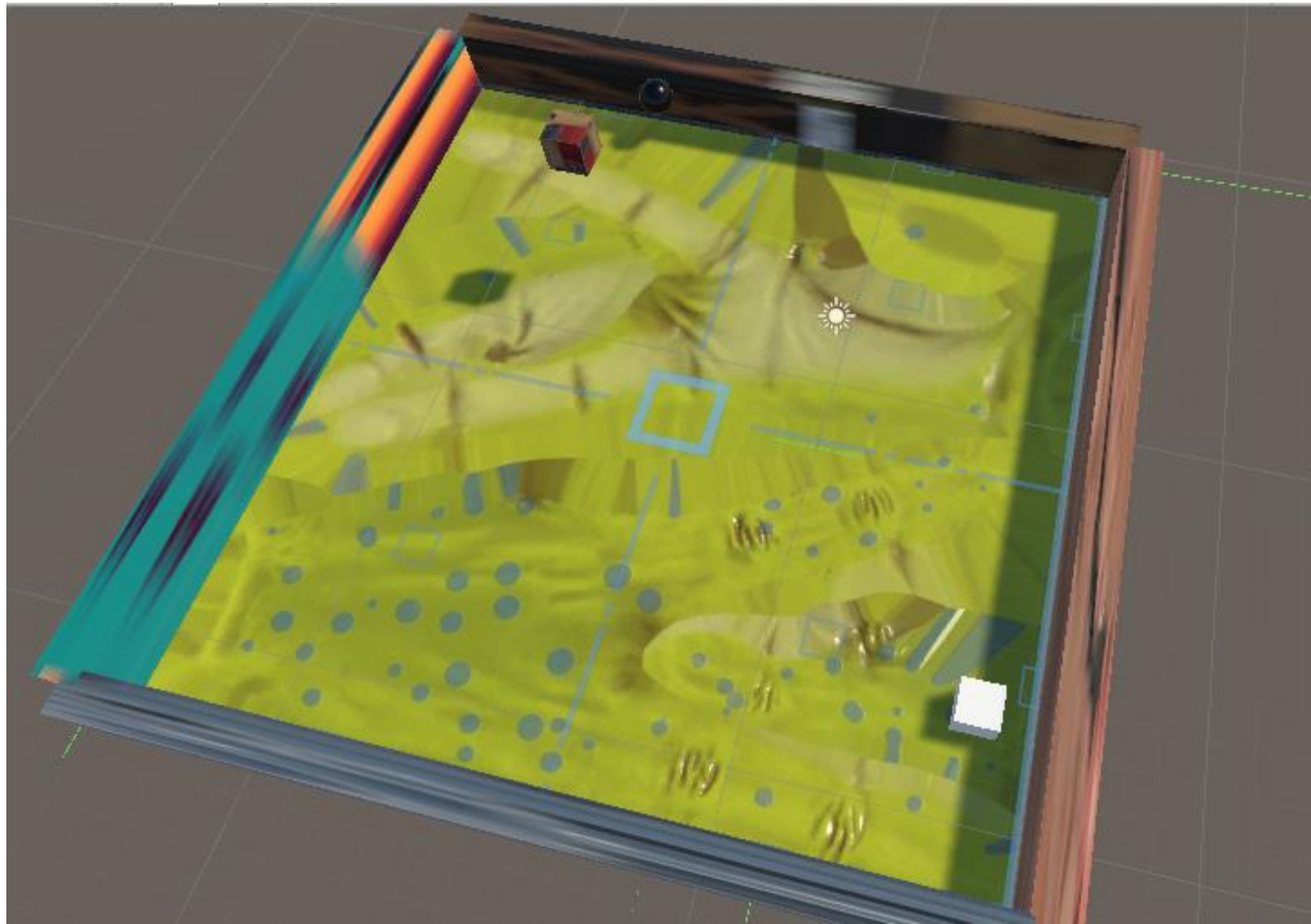




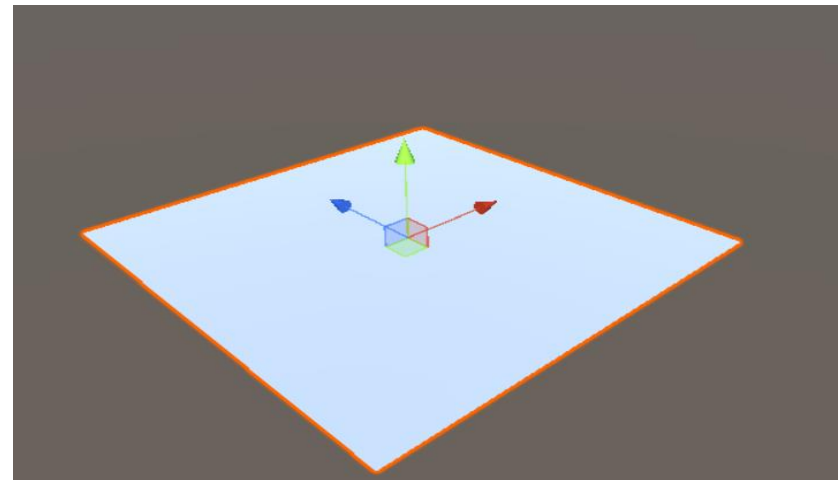
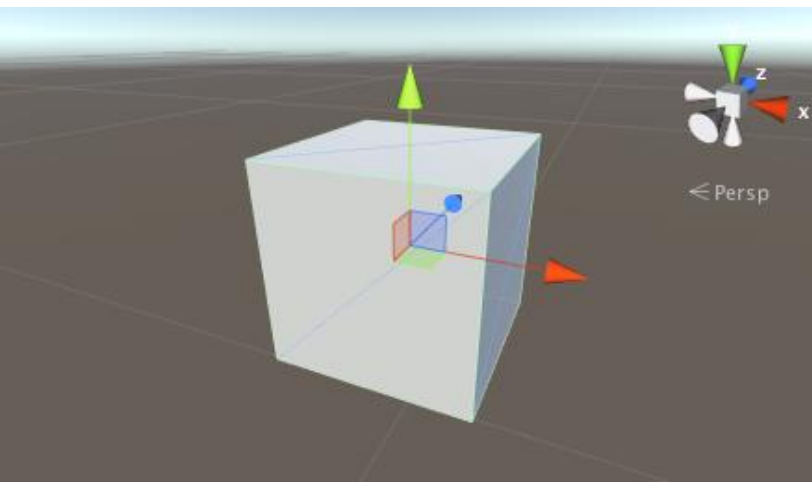
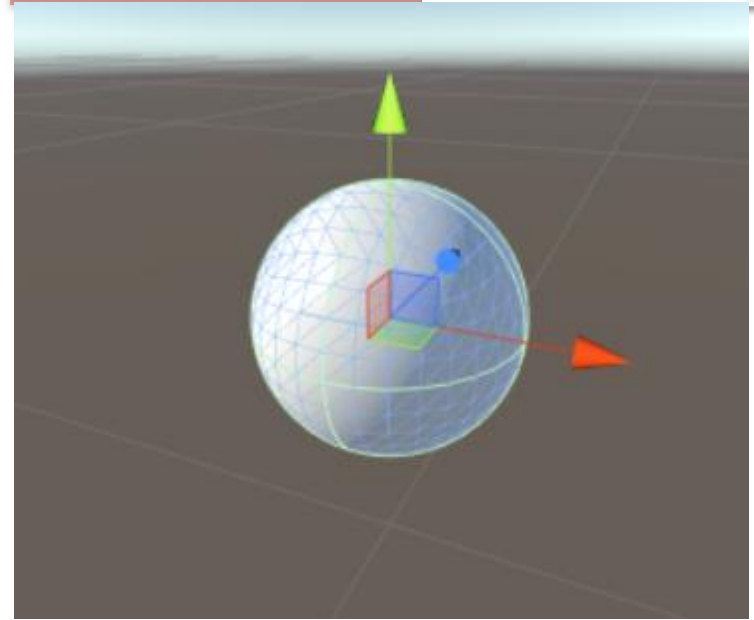
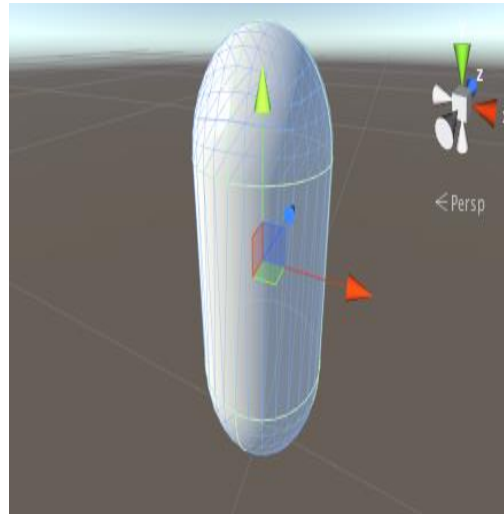
Game Environment

Environment Accessories

- Play Ground
- Walls

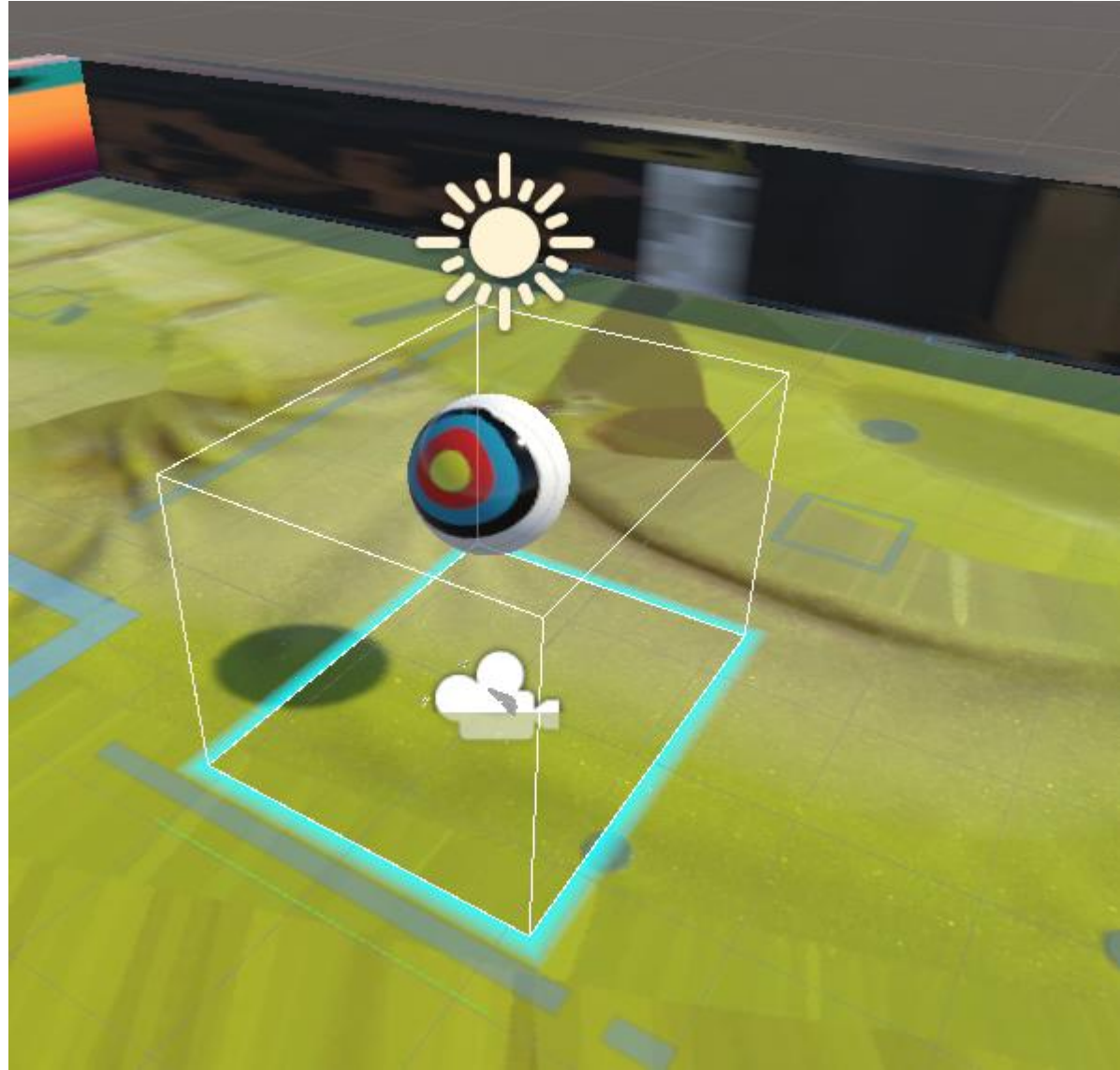


Cube
Plane
Sphere
Capsule



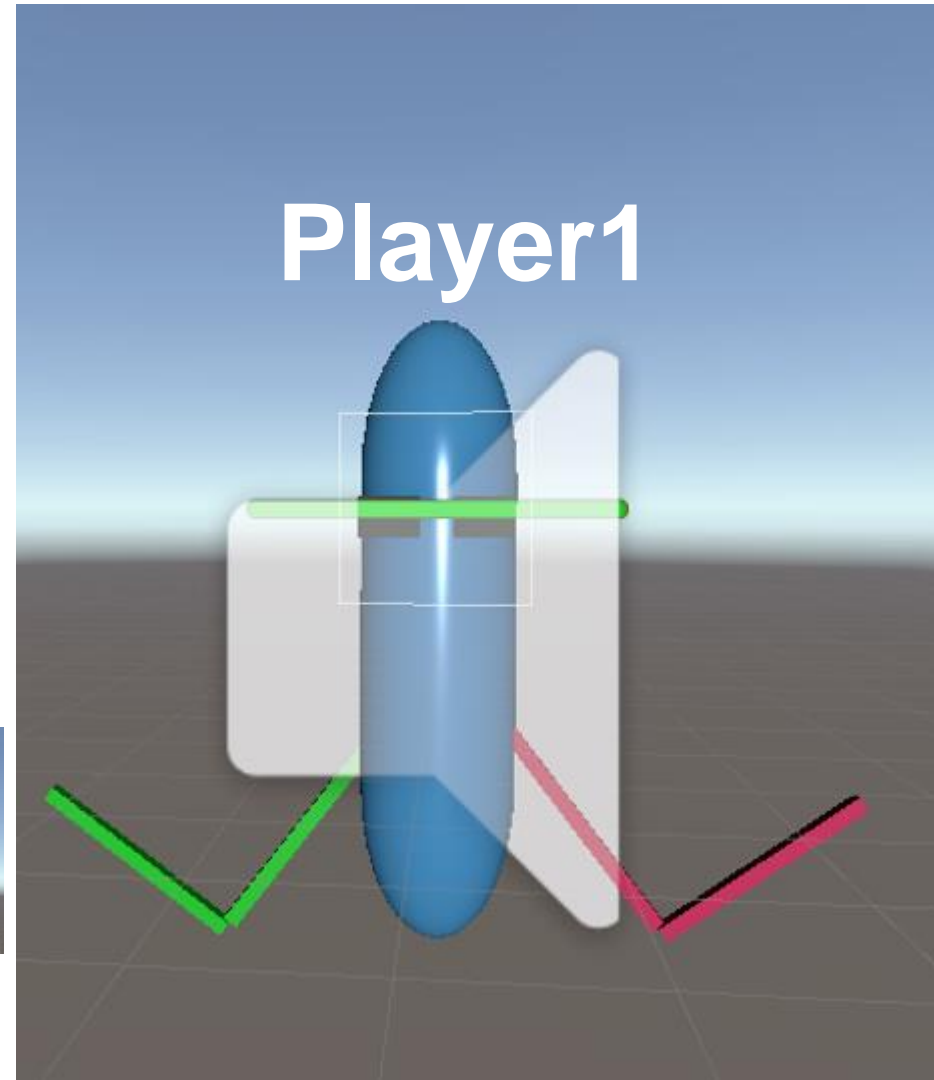
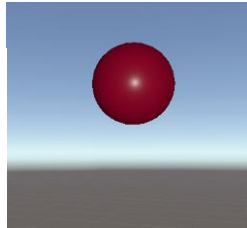
Environment Accessories

- Player Location
- Camera
- Directional Light
- Ball



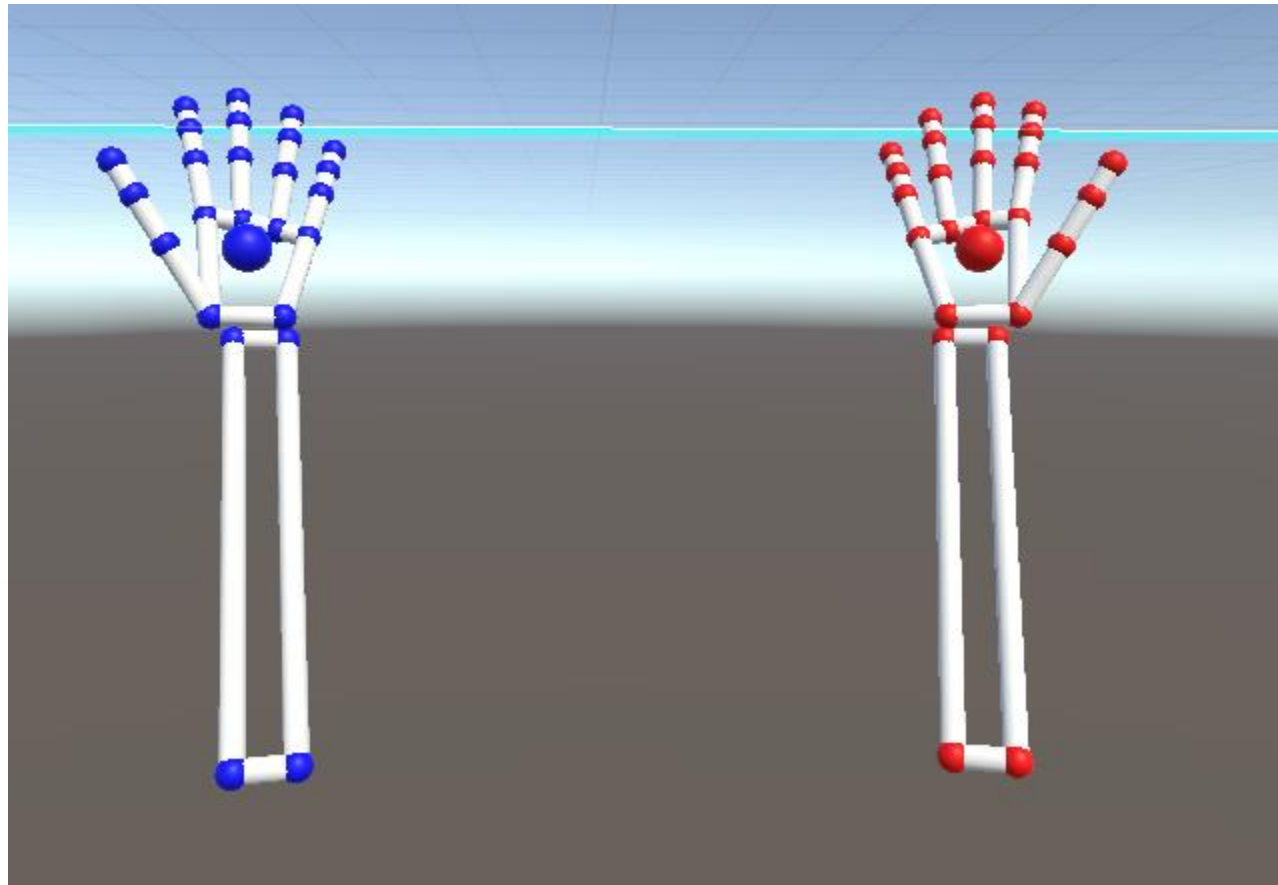
Environment Accessories..

- Player
- Health Bar
- Player Arm
- Controller
- Bullet

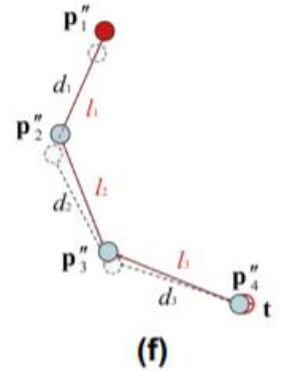
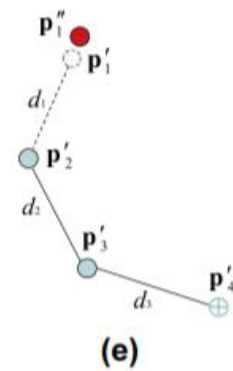
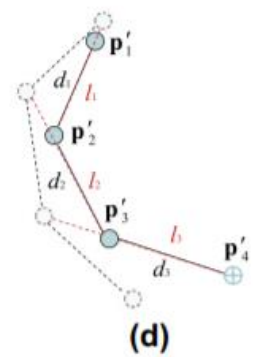
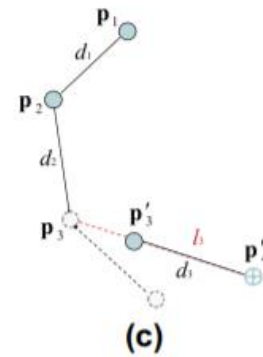
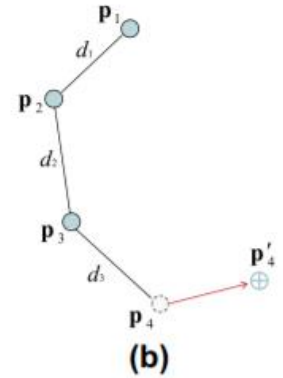
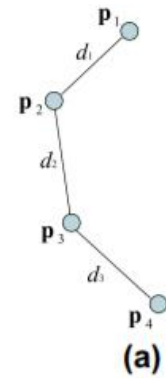


Environment Accessories...

- Leap Hand Model



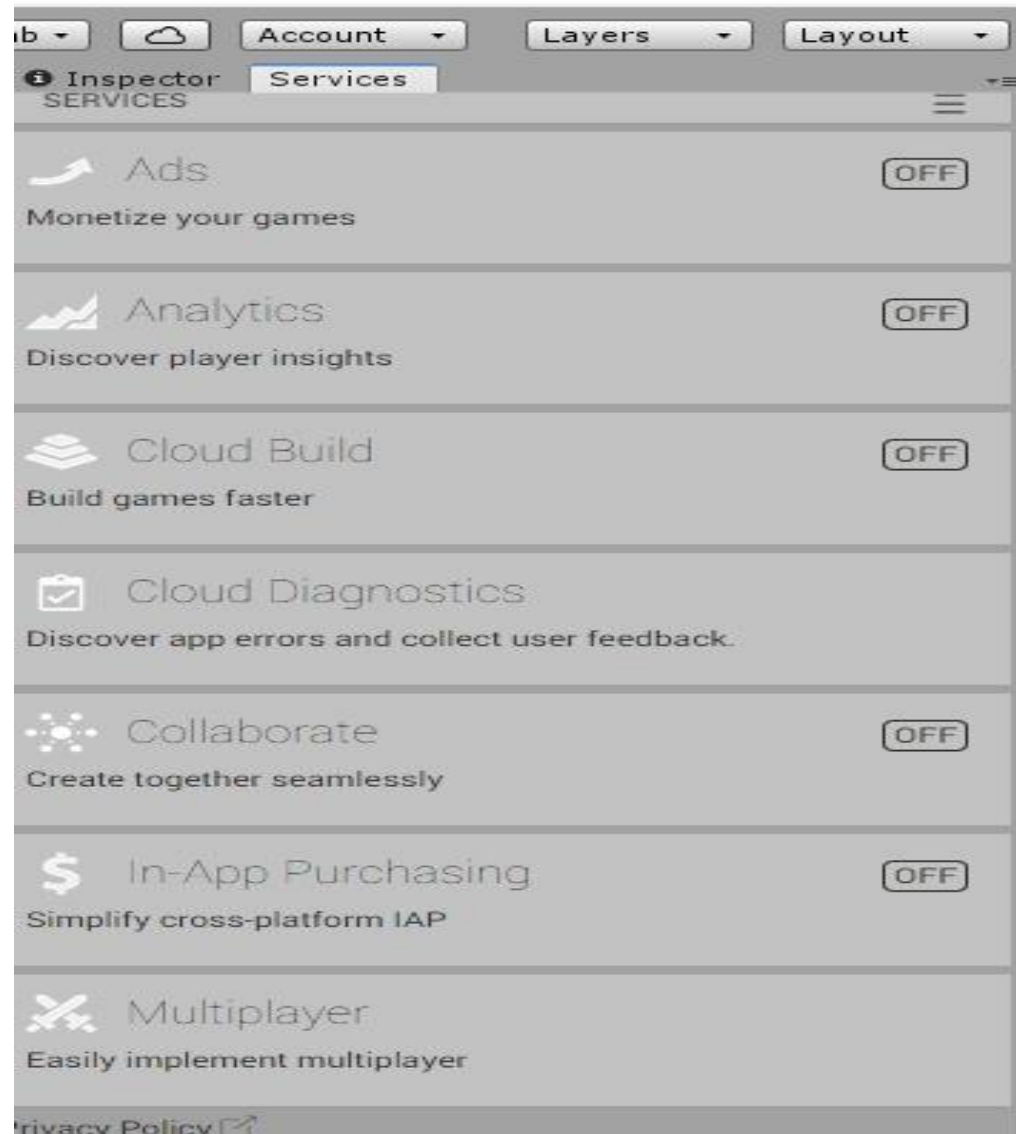
Arm IK



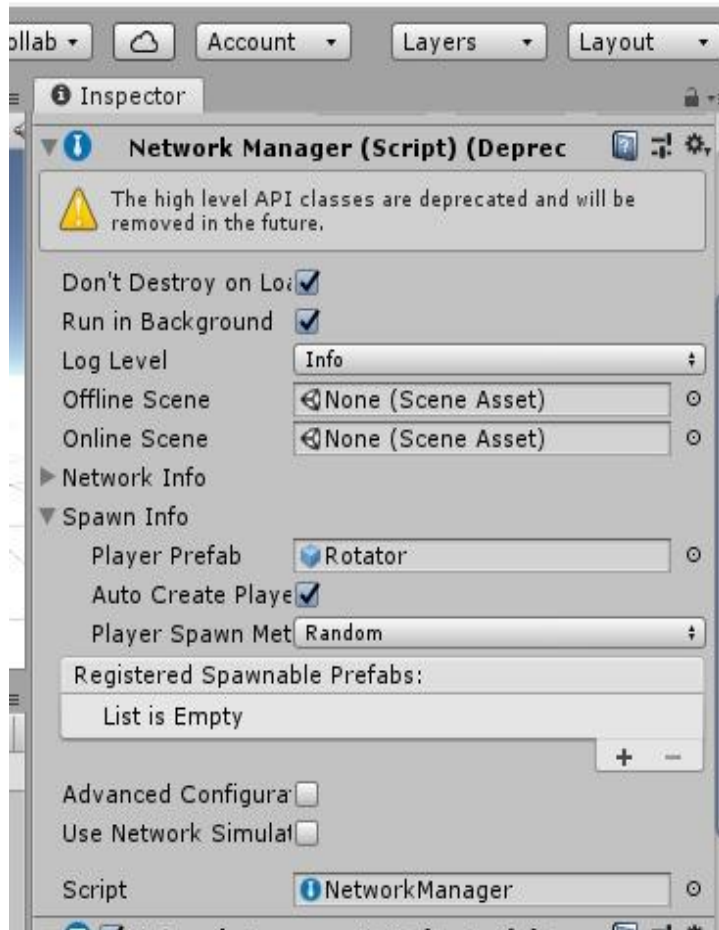


Basic Networking Idea

Networking

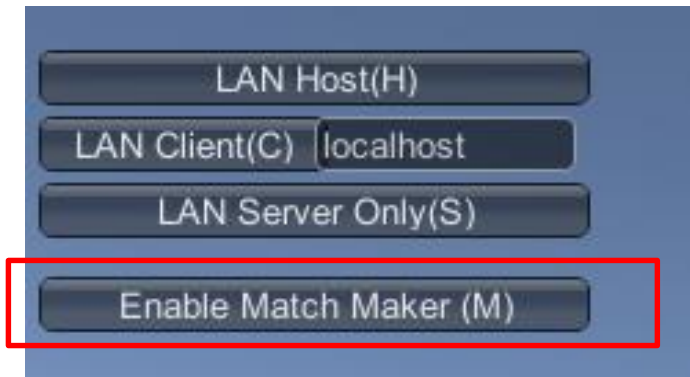


Network manager

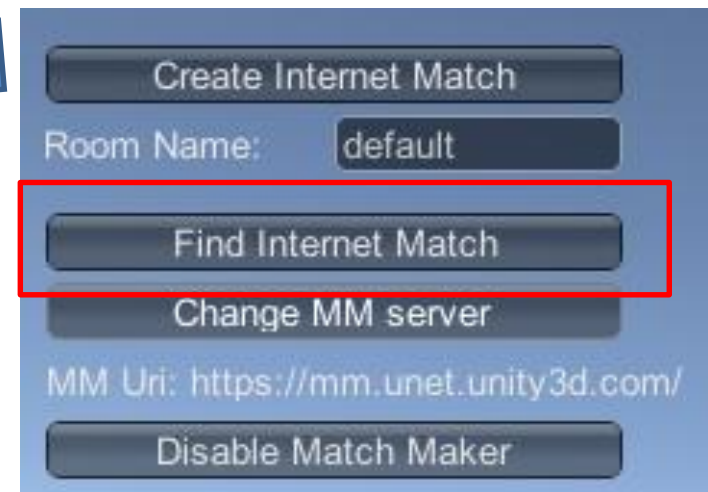
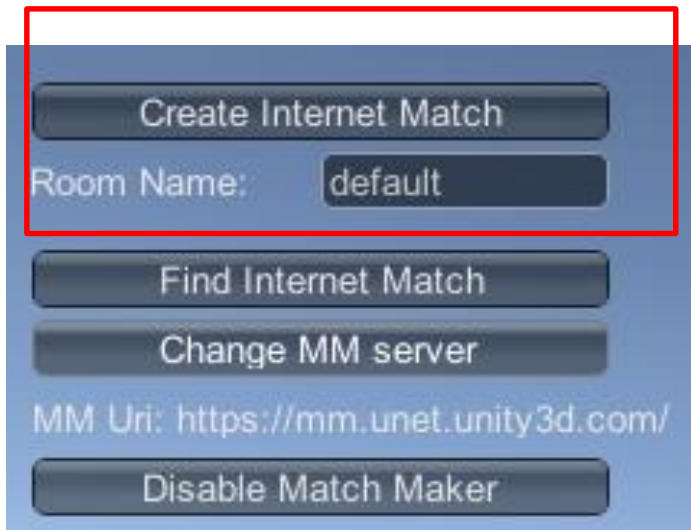


- Launch the game.
- Be a server and ask others to join as a client

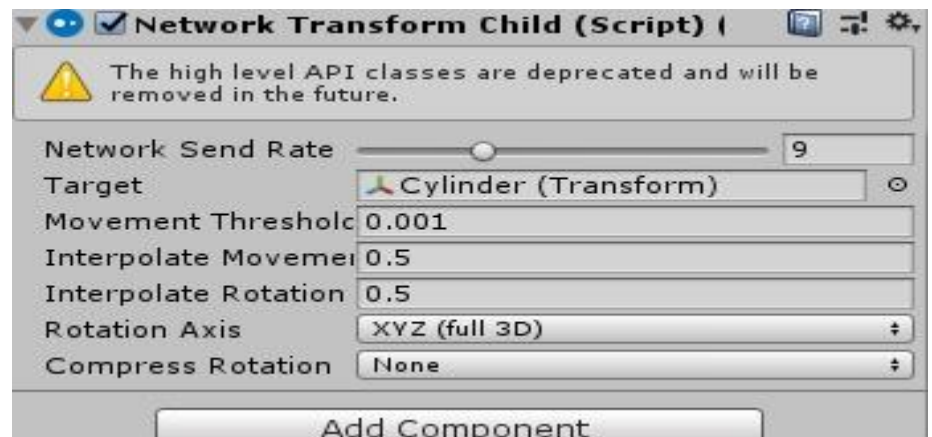
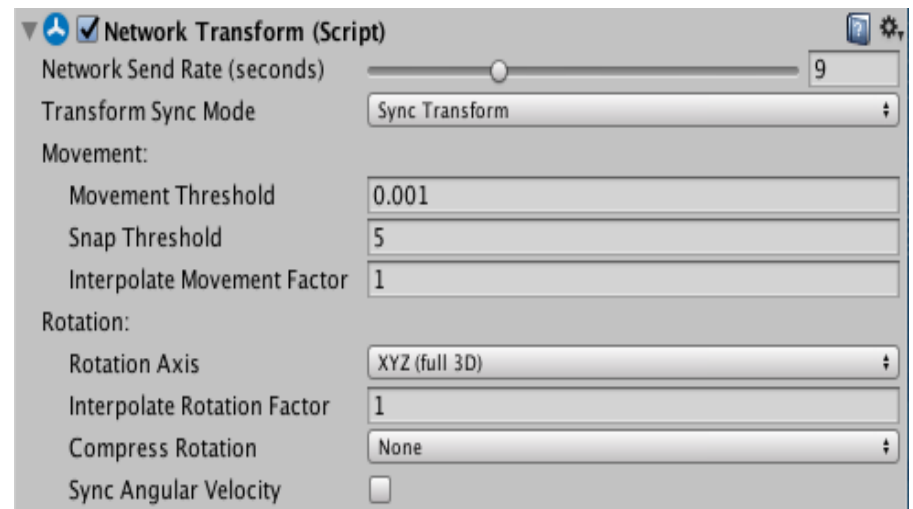
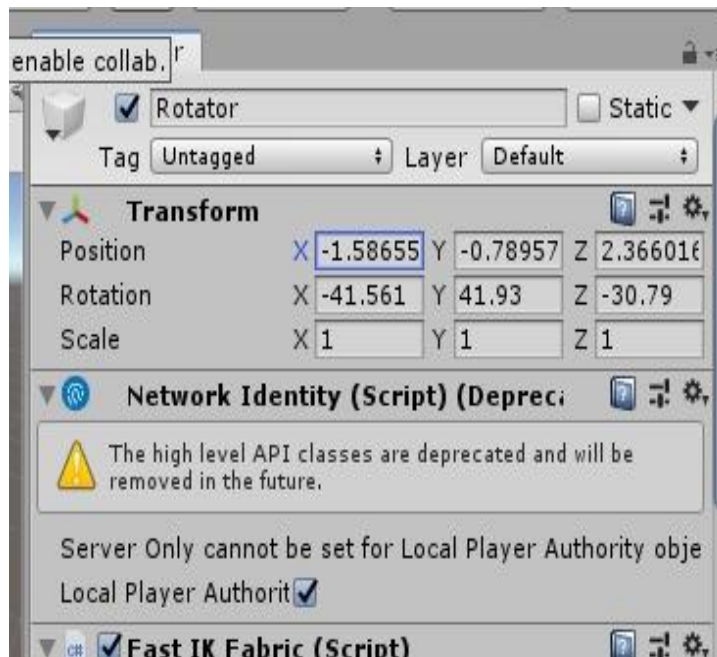
Server



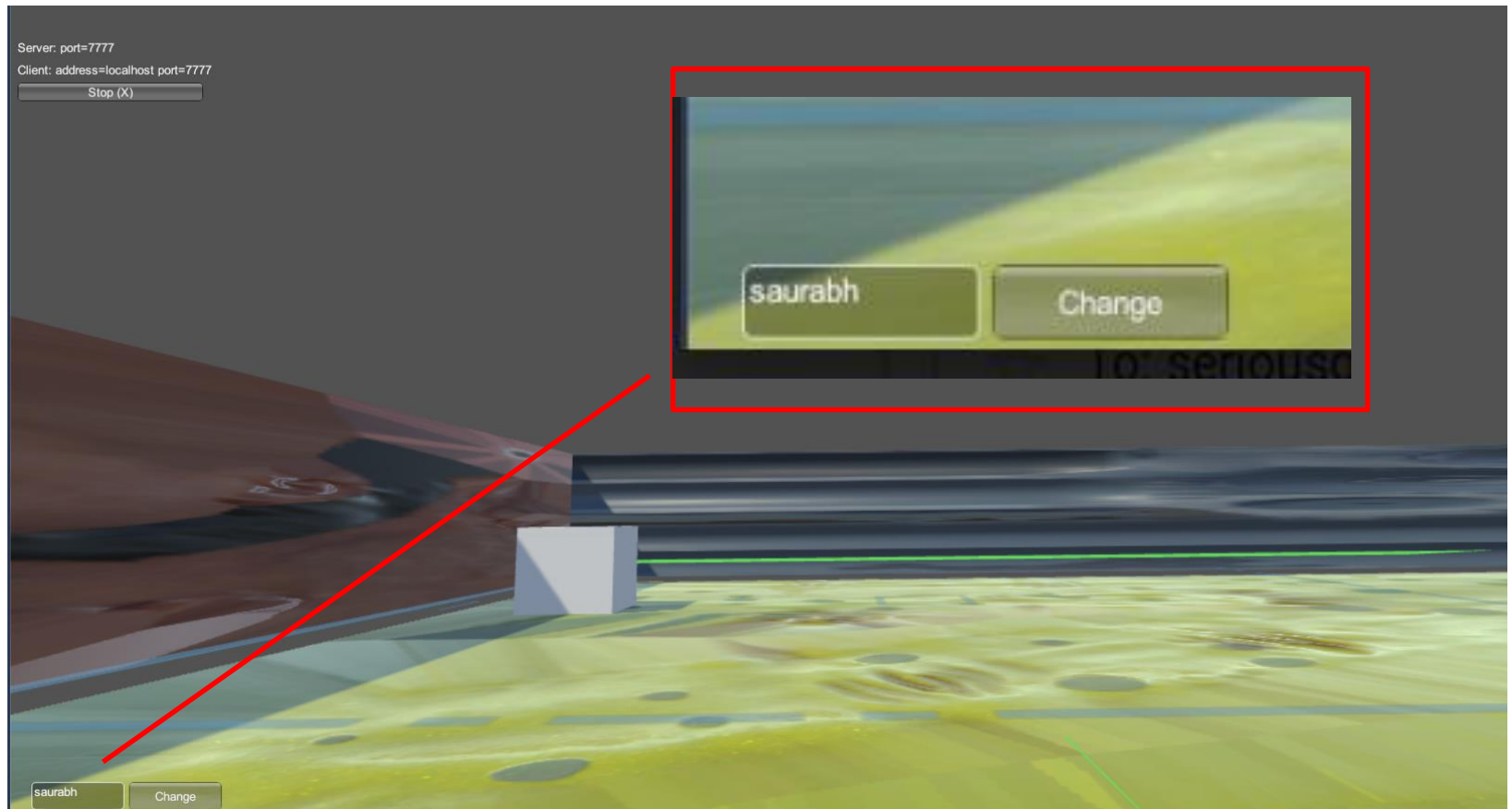
Client



Network Identity and Transform



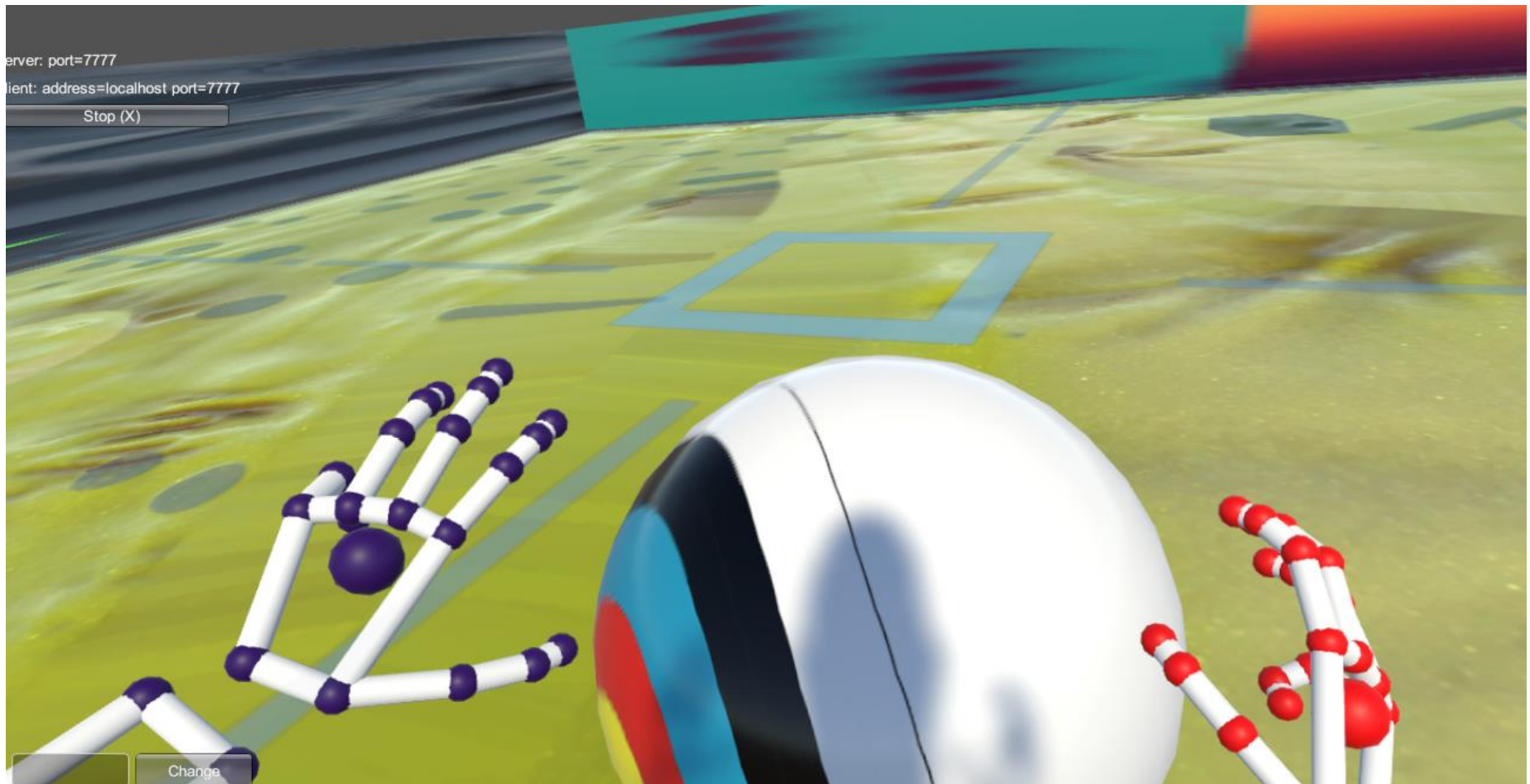
Player ID



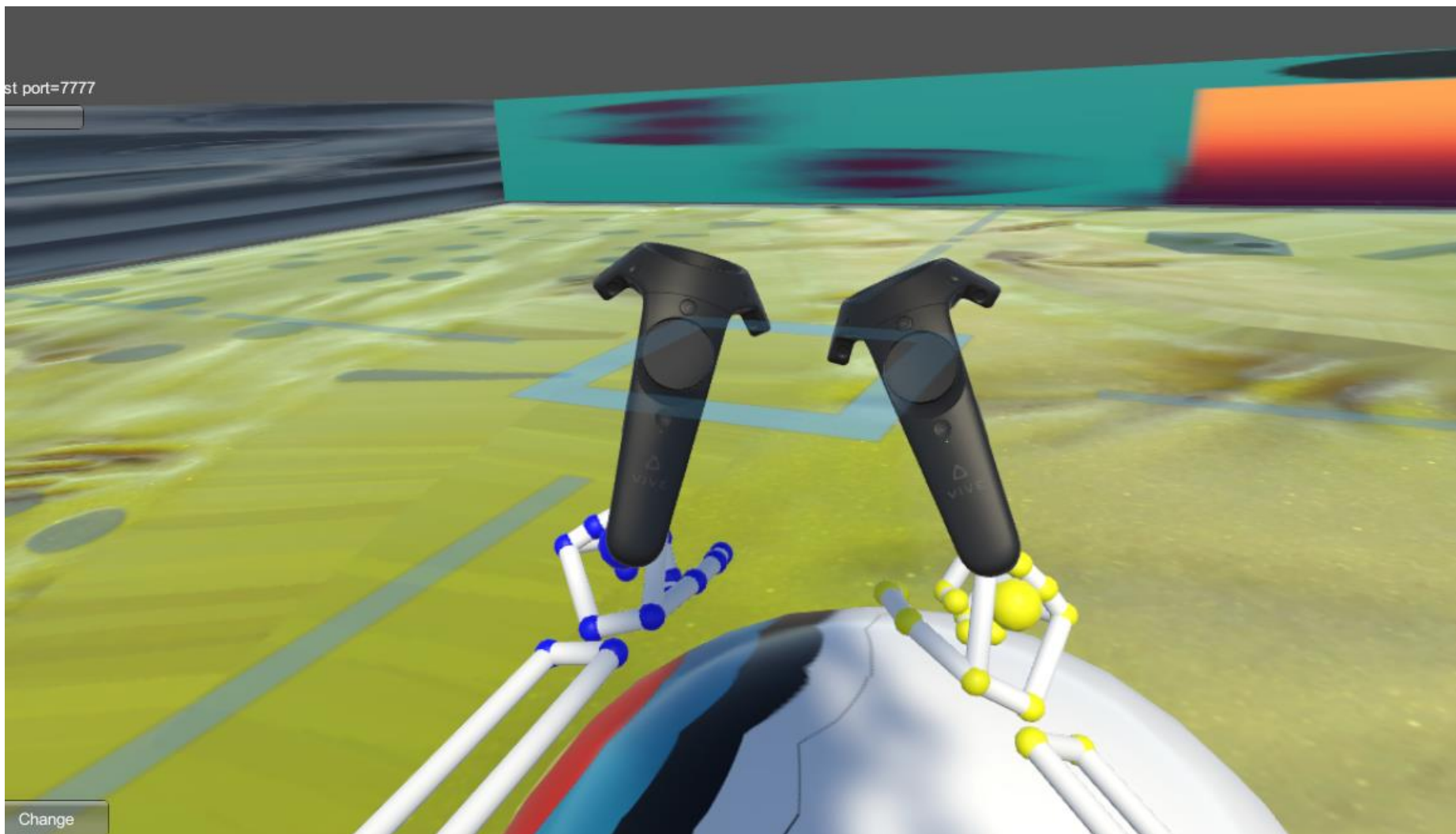


More about the Game

- After user enter into the game then he can see his hand skeleton when he place his hand in front of the leap camera

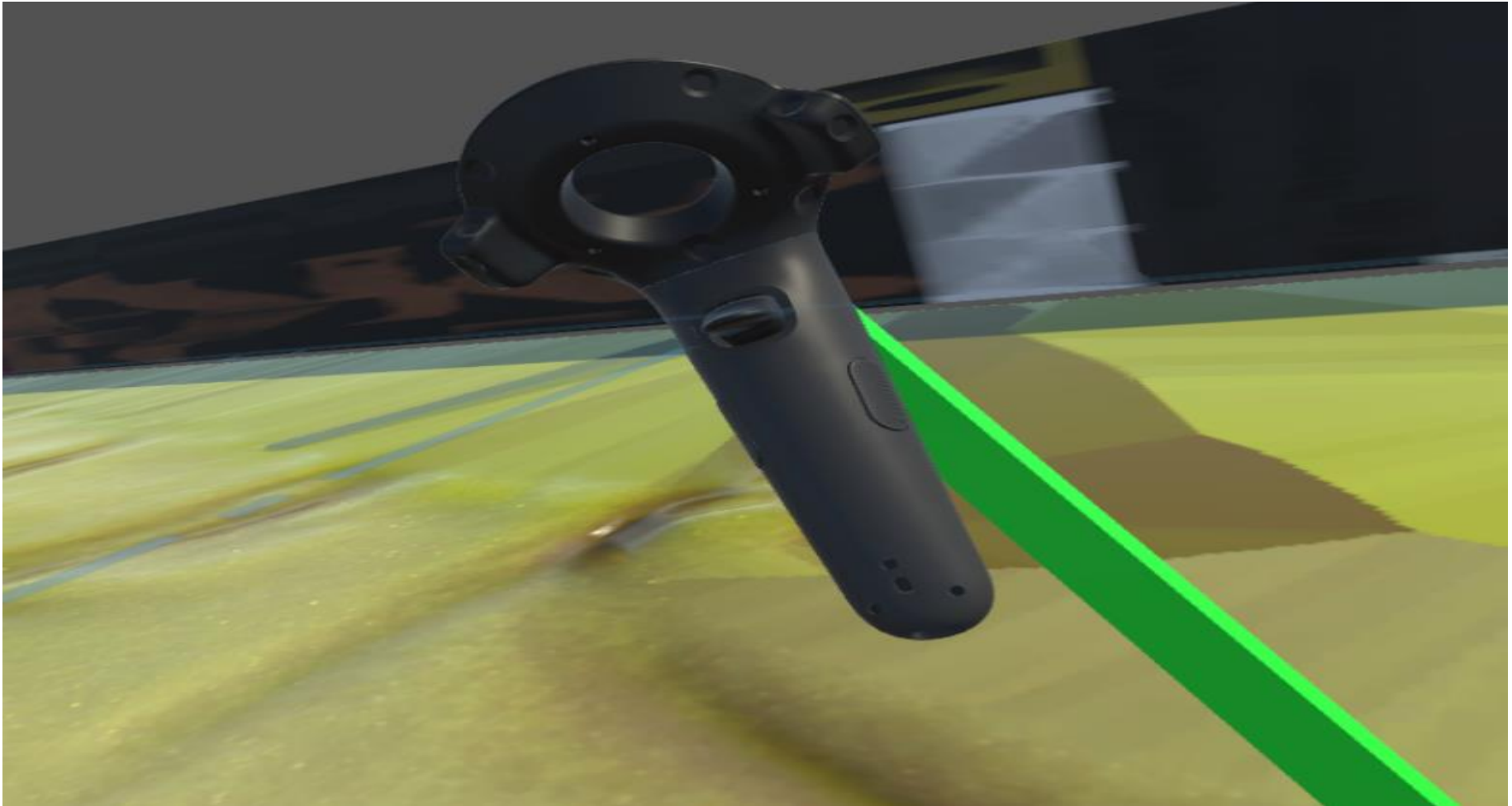


User can hold HMD's controller



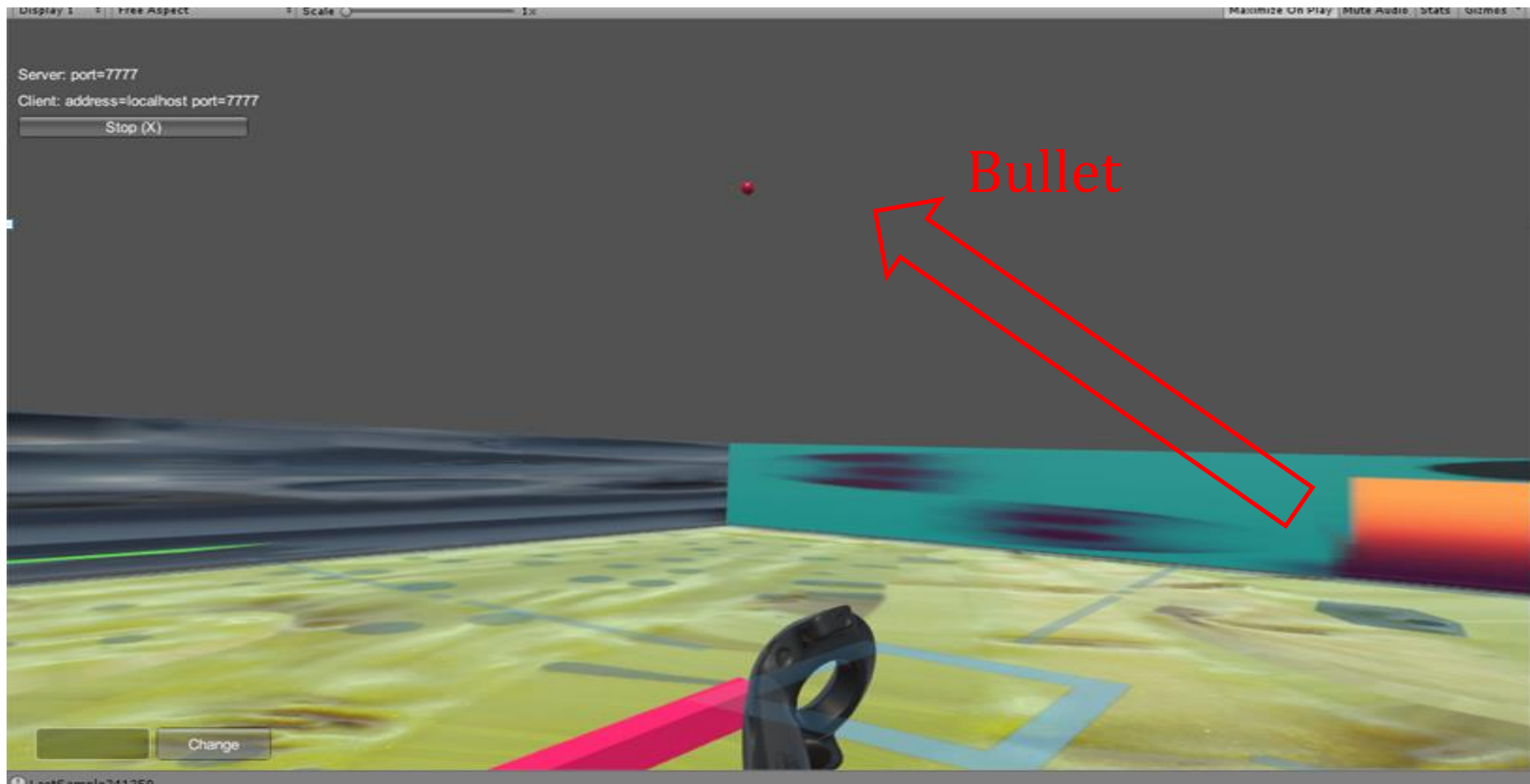
Player can shoot with the help of triggers

- Trigger state = False

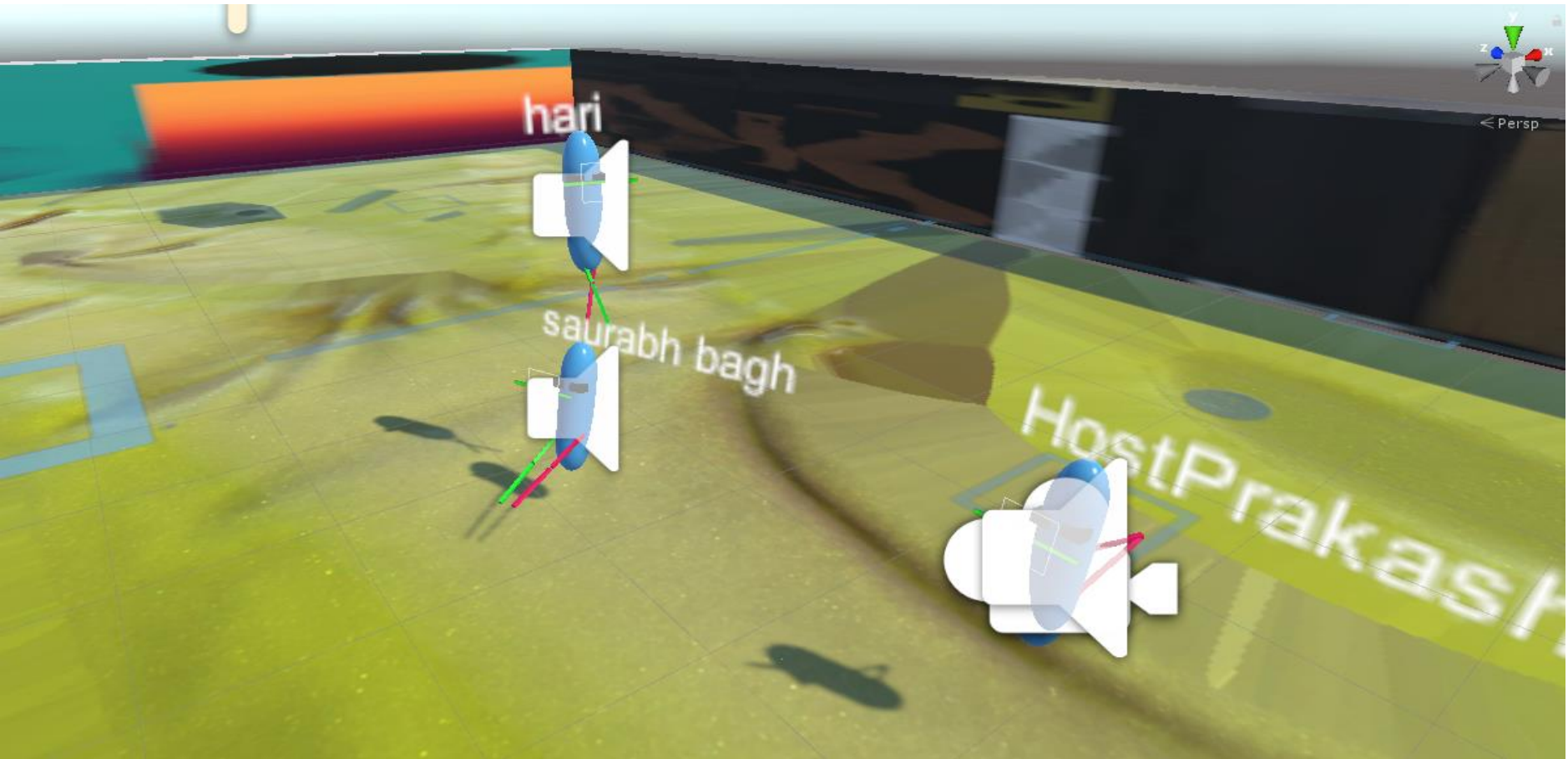


Player can shoot with the help of triggers

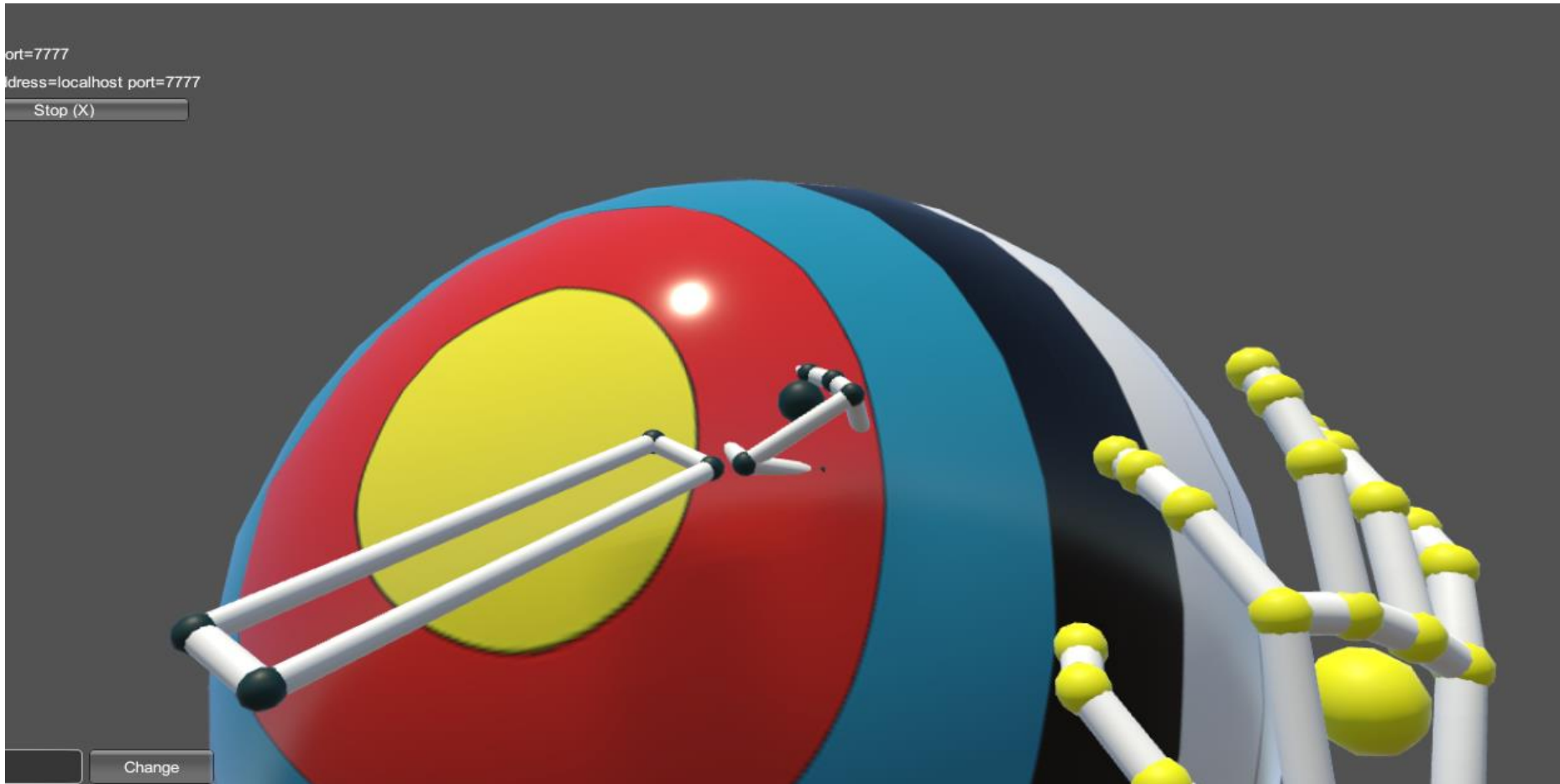
- Trigger state = True



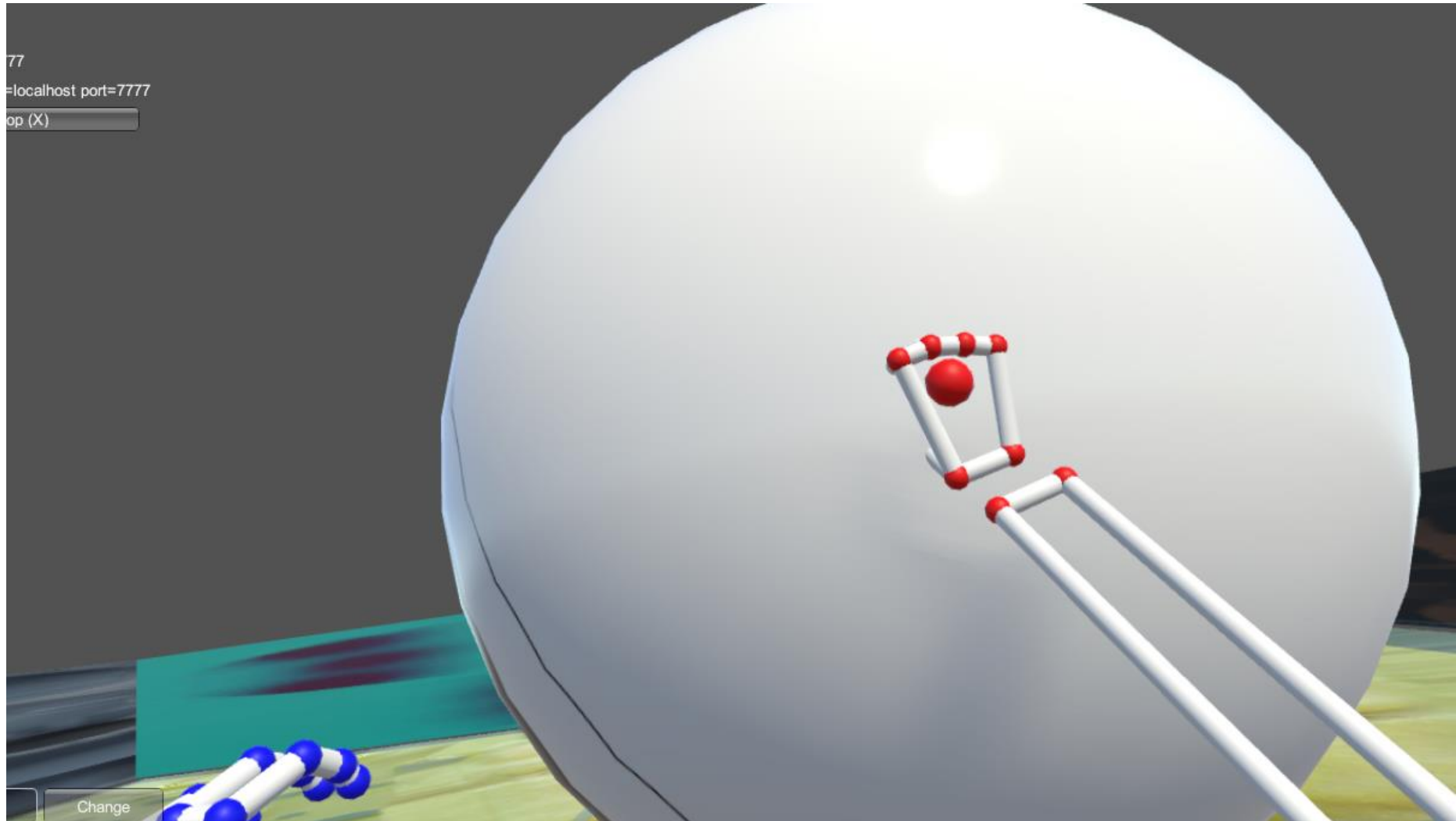
When other player join the game then they can see each other ...



User can hold the ball (bare hand) that will be tracked by Leap camera.



User can throw the same ball and that can be seen by other users too.





Voice Chat

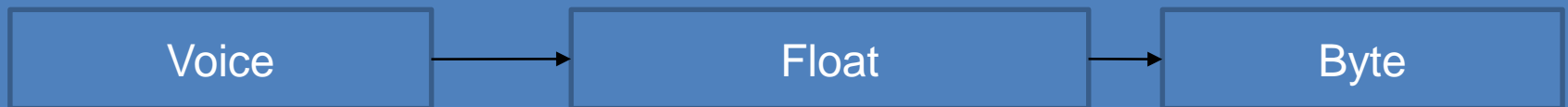
Voice chat : Functionality

Voice Chat is enabled through a walkie talkie feature.

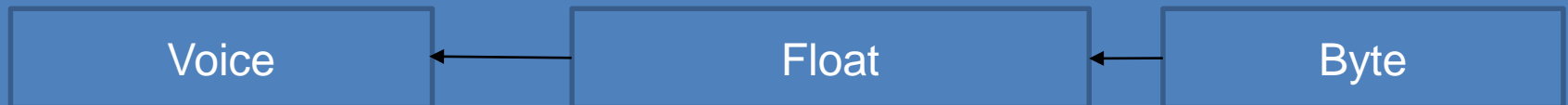
Player has to press the grip to talk and the voice will be transmitted to the other player.

First the Voice Clip is converted to float and then to byte and then is transmitted over the network and converted back from byte to float and then to voice.

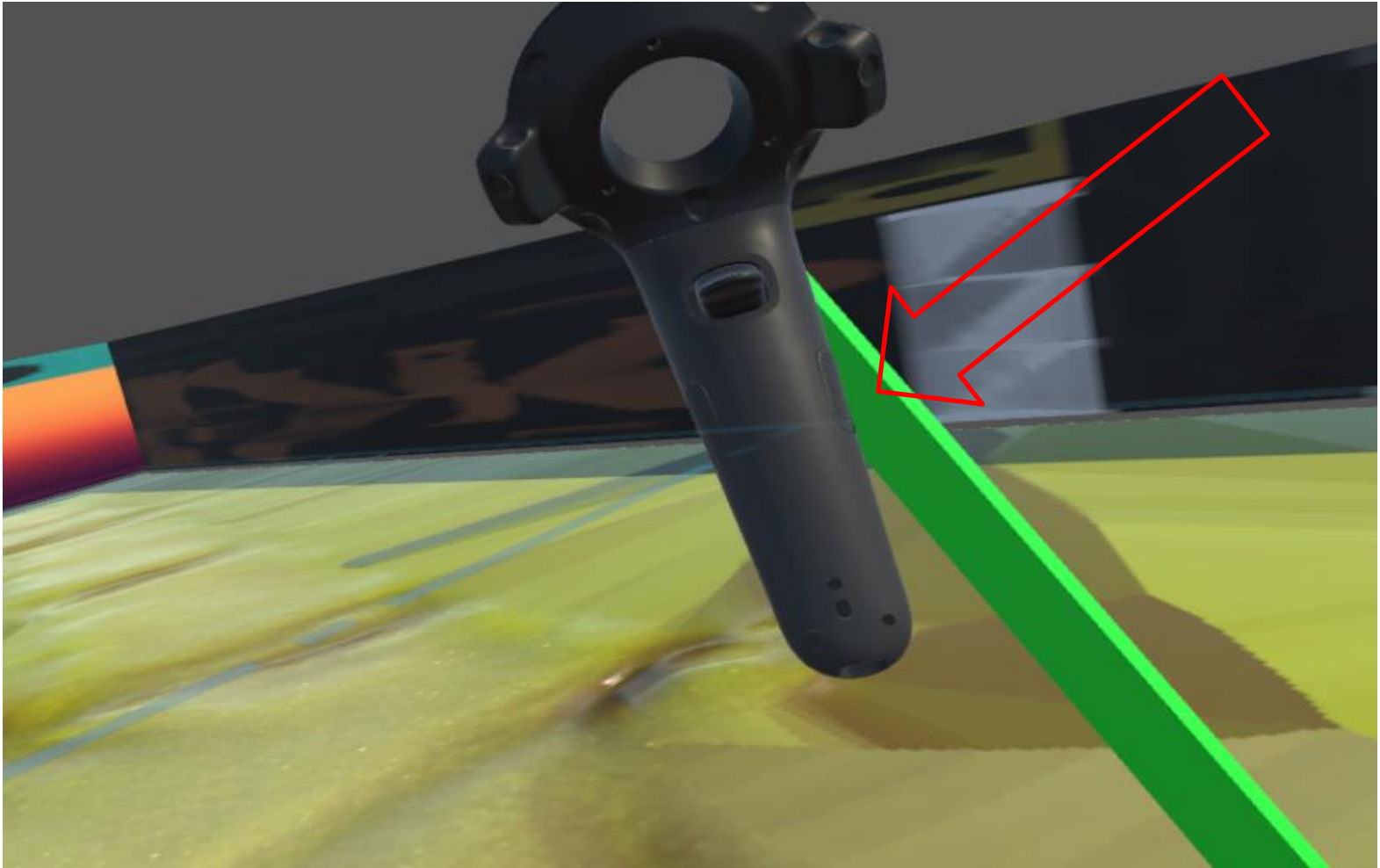
At local Machine



After being sent over the network , on other client machine



Voice..

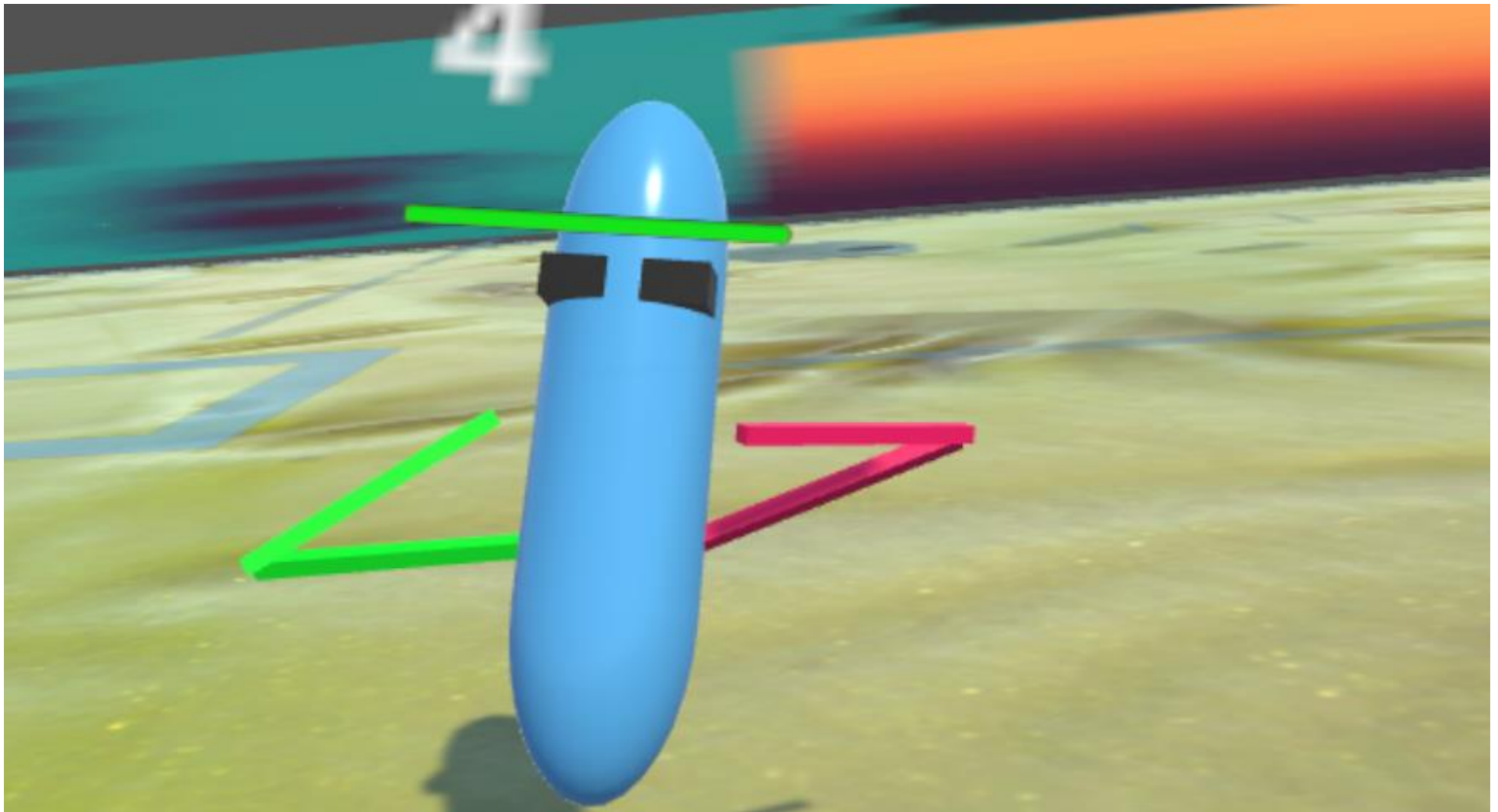




Health Bar

Player Health:

A health bar is created to project the health value of the player.



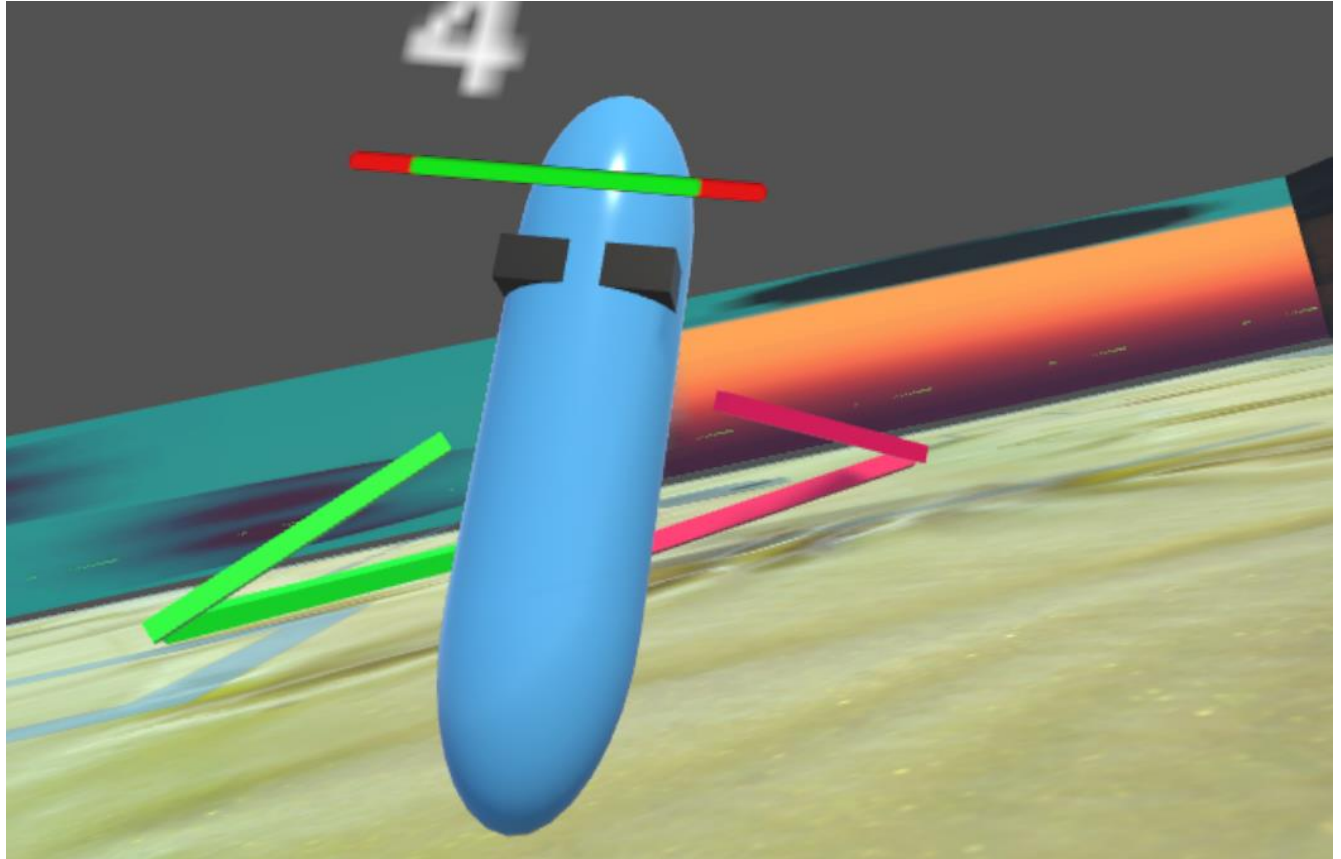
Health Bar UI

- In unity editor a health bar UI is projected with max health displayed in green.
- For each damage taken the health becomes red and when it completely becomes red then the player is dead.
- For this a health bar canvas was created, a background was created as its child with color red.
- Foreground was created as child of background with display colour green.

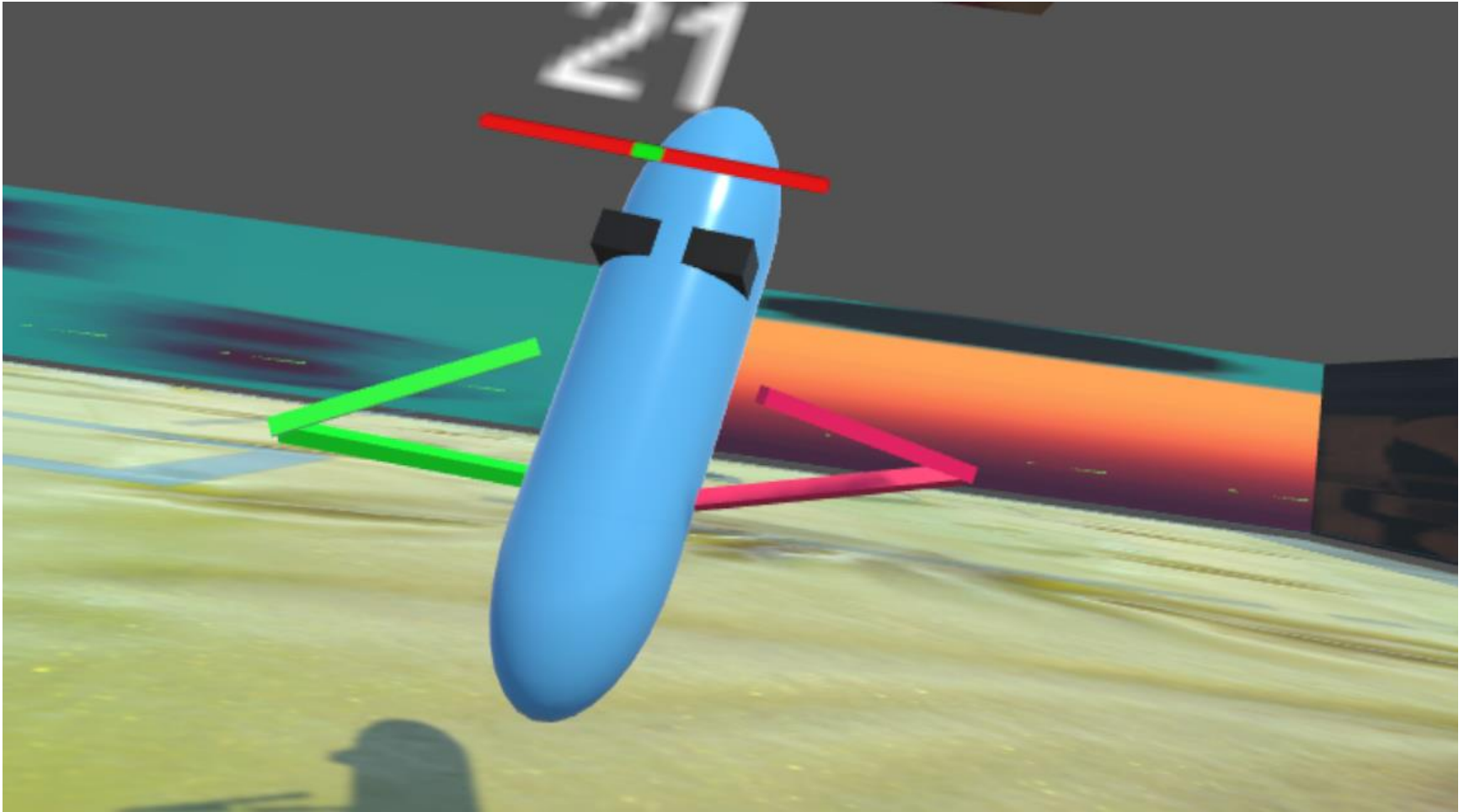
Player Health System

- Create a public Health to represent our max health and currentHealth to represent how much health our player has.
- In Start() we instantiate our currentHealth to be our max health.
- We create public TakeDamage(), inside this function, we get our damage amount.
- We update our currentHealth and we change the value to reflect health loss

Taking damage

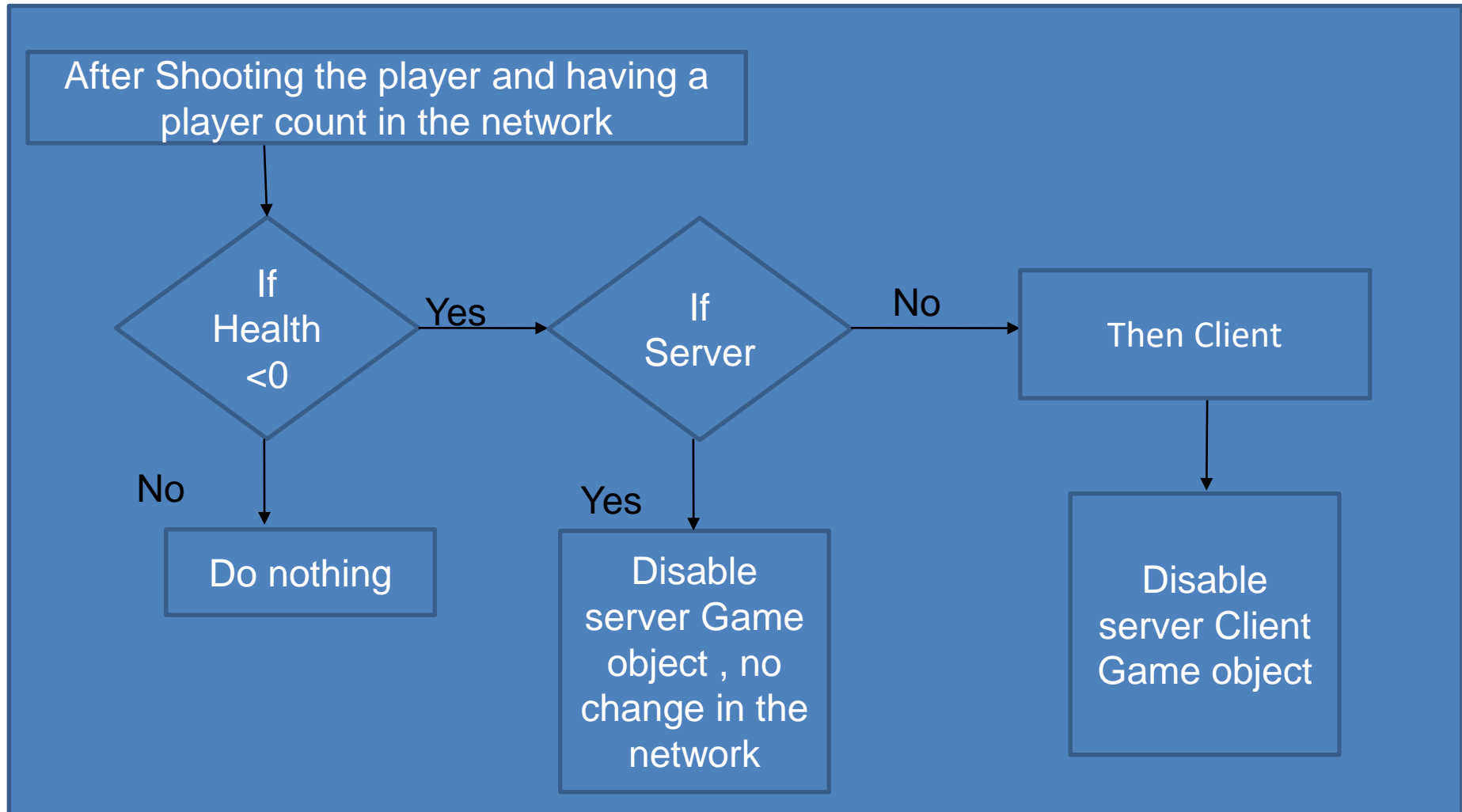


Decreasing health..



Health < 0 , what happens then ?

Exit Function



Cross platform applications & Support of HMDs

- Our application can be used with Oculus Rift and HTC vive and HTC vive pro with which it has been tested.
- We have used Steam VR asset 2.2.0 which enables us to use the controllers of any VR devices.
- Unity can create builds for Linux and Mac OS also . This application work on Mac OS.



Testing

Testing

Sr No.	Requirement	Test Scenario	Status
1	[Req1]	Validate if user is able to enter in game scene	Pass
2		Validate if multiple users are able to enter in same game scene (Remotely)	Pass
3		Validate if multiple users are able to see each other in game scene	Pass
4		Validate if User should be represented as Avatar which is controlled by headset and controller	Pass
5		Validate if each avatar can see others movement.	Pass
6	[Req2]	Validate if user is able to communicate through his voice	Pass
7	[Req3]	Validate if bone model of hand is calculated and tracked by Avatar's Arm	Pass
8		Validate each user can see there hand in game which is tracked by LeapVR	Pass
9		Validate if user is able to shoot and health is getting reduced.	Pass
10		Validate if user is able to grab, hold and throw ball with bare hand	Pass
11	[Req4]	Validate if entire game is working in cross platform like Mac OS and Windows	Pass
12		Validate if entire game is supported by different HMDs like Oculus and HTC Vive	Pass

Limitation

- Voice: Voice load is not managed
- Teleport: User can't move around freely
- More than 20 users can't join
- Testing has not been done for more than 3 users
- Shooting sound missing



Tasks

Task Done as Follows :

- Game Concept over the network :
 - Saurabh Bagh
 - Prakash Verma
 - SriHari
- Testing
 - Prakash
 - Saurabh
 - SriHari

- Platform Support
 - Unity
- Networking
 - Unity Mostly
 - Code :
 - Saurabh
 - Prakash

- Saurabh
- Prakash

- IK Over the network implementation
- Multi VR support
- Leap Integration

- Environment
 - Prakash
- Health Bar
 - SriHari
- Player ID, Voice and Exit
 - Saurabh



Thank You..