Assist Me VR

Robots for Disability:

ME-GY 7913-A

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Presented to:

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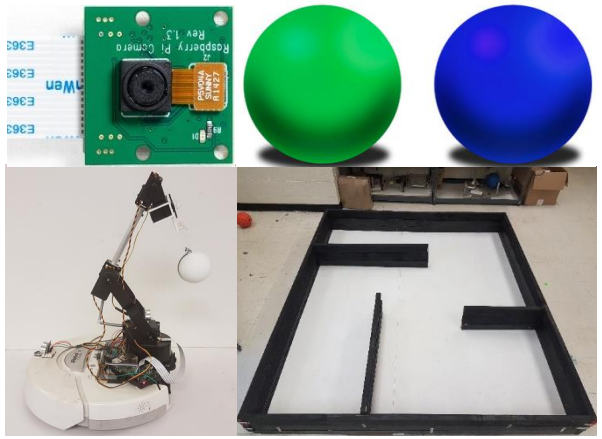
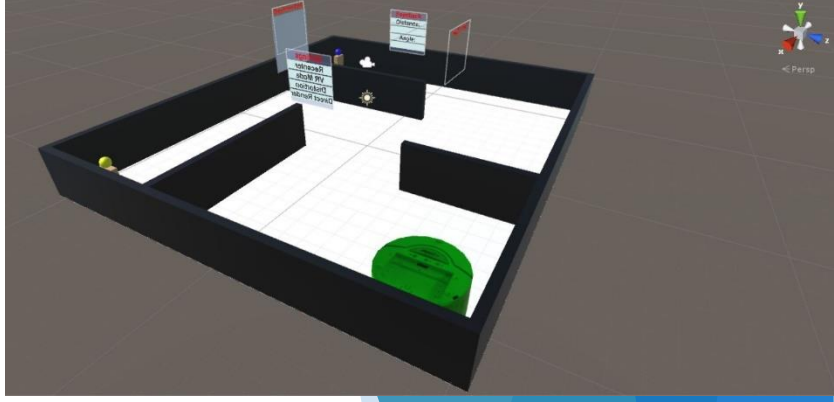
Introduction

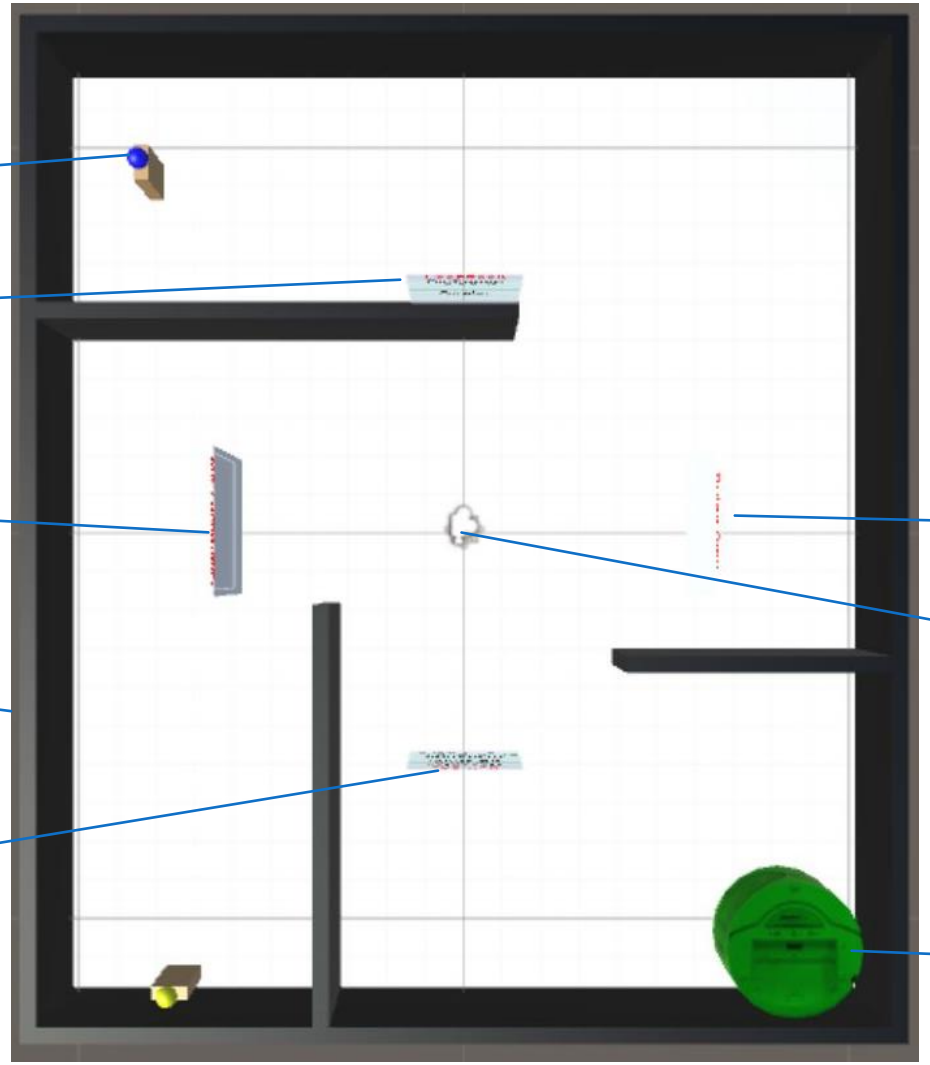
- Build a virtual reality application using Unity.
- Assist people with physical disabilities by delivering them object in a fun an interactive way.
- Design a virtual world reflecting the house(maze) and the robot.
- Synchronizing the real robot with the virtual one.
- User will select an object at a particular position within the 360 degree field of view.



Virtual World



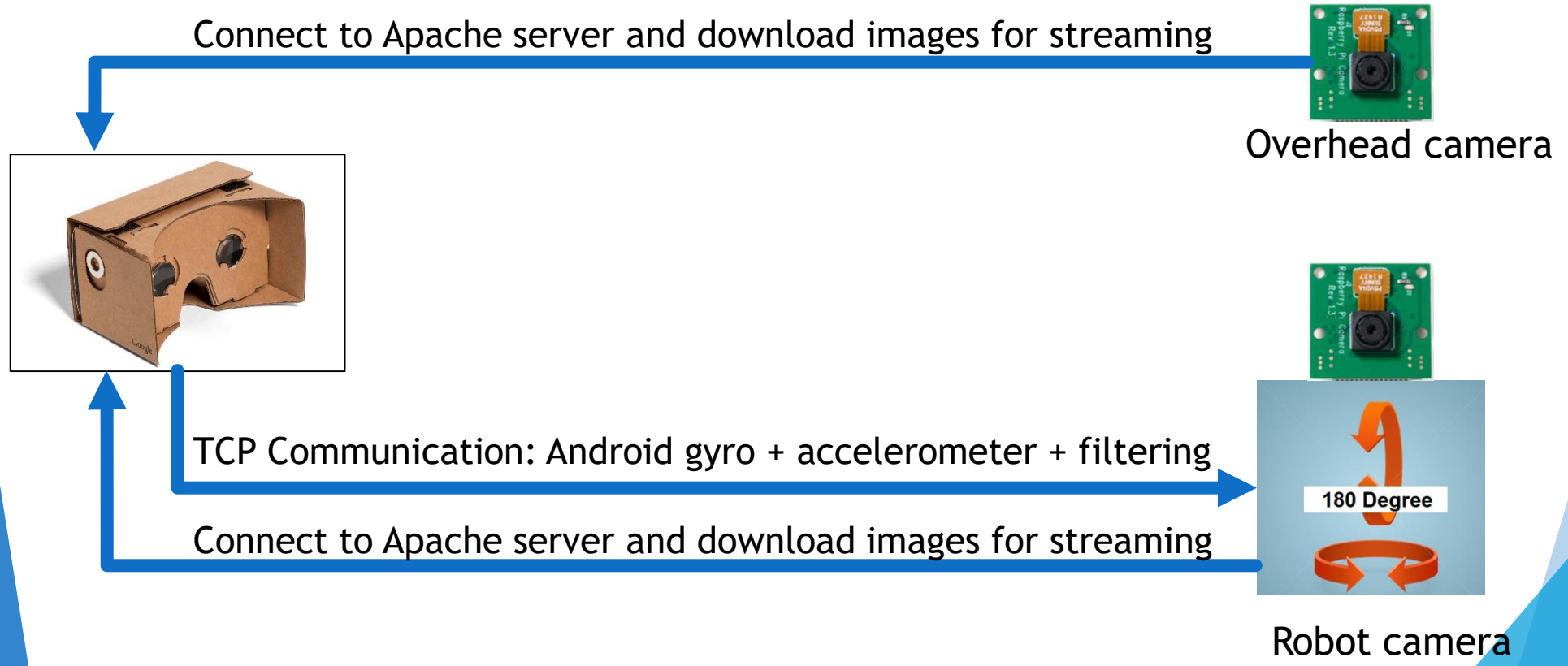
3D View



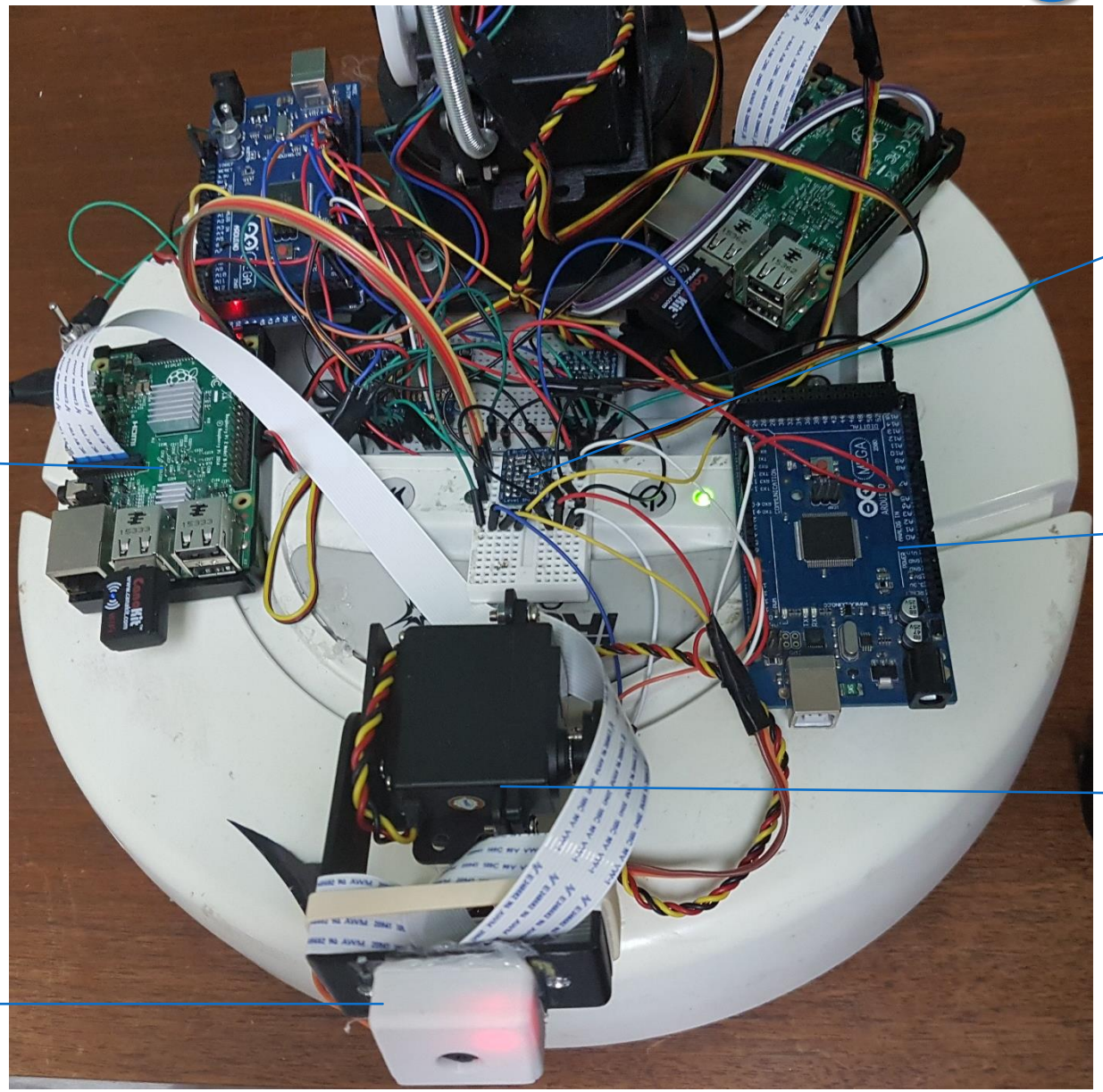
Top View

Merging Real and Virtual Word

- Adding **two** live stream video blocks inside the virtual world.
  1. **Overhead:** Raspberry pi camera mounted on top of the maze.
  2. **Robot:** Raspberry pi camera mounted on top of the robot with a 180 degree field of view.



Robot Webcam Design



Logic level converter

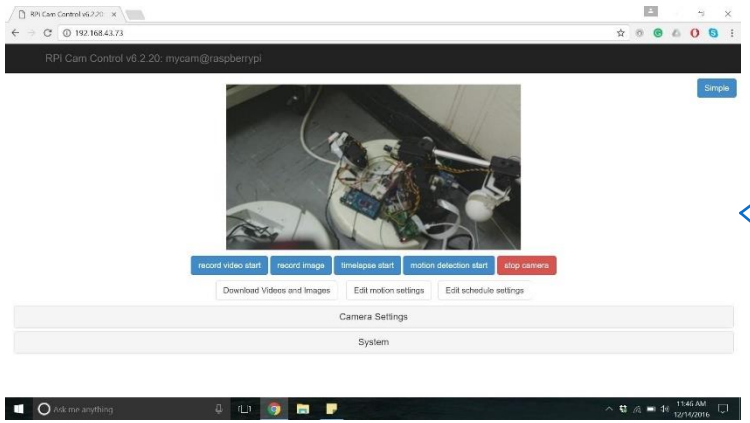
Raspberry pi

Arduino

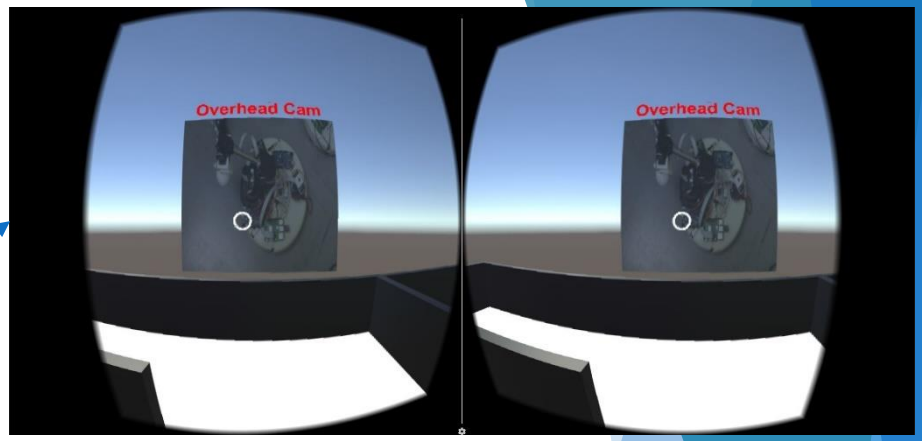
2 DOF servo

Pi camera

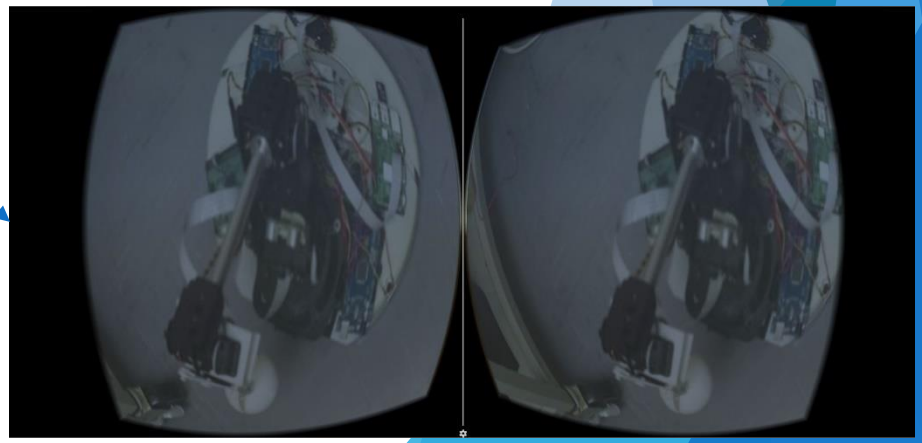
Webcam Streaming



Pi camera streaming over Apache server



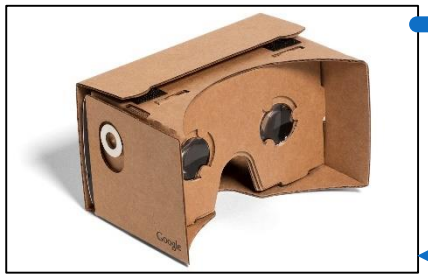
Streaming inside the virtual world



Full split screen mode

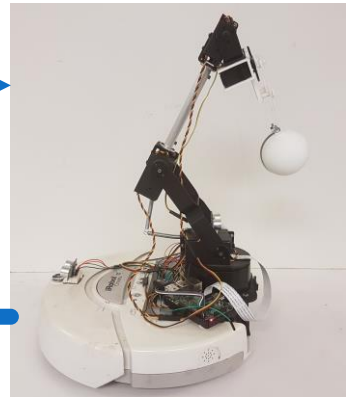
Synchronization

- Synchronizing the real robot with the virtual one inside Unity.
- Two way full duplex TCP communication should be established.
- User will visualize the virtual robot(as well as the real one) moving toward the target within a 360 degree field of view.



TCP Connection: Send object type and position

TCP Connection: Receive position of the robot



Multiprocessing and Networking

1- Loading images from robot webcam

- **Server** communication

2- Actuating servos

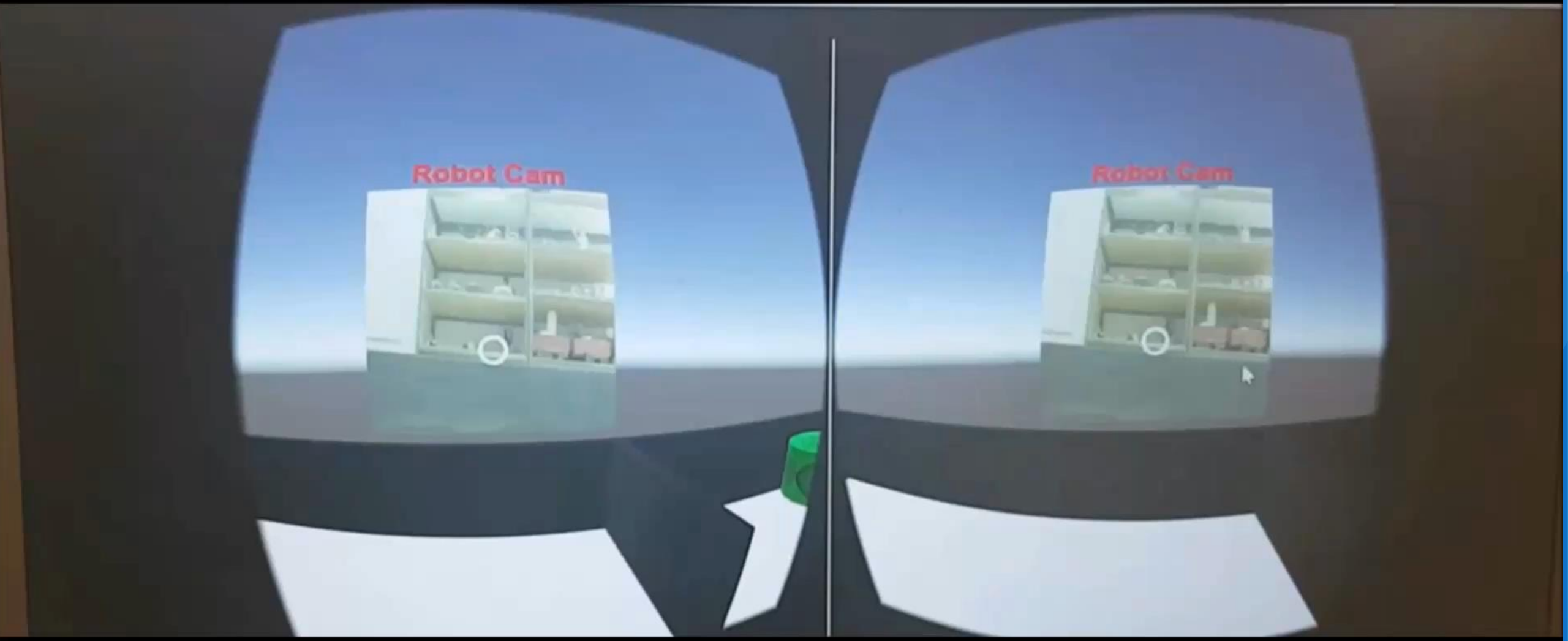
- One way **TCP** communication

4- Synchronizing with real robot

- Full duplex **TCP** communication

3- Loading images from overhead webcam

- **Server** communication


Robot Cam
Robot Cam

Thank You

Questions ?

References

- **Unity Google vr tutorials:** https://www.youtube.com/user/NurFACEGAMES/videos
- **TCP communication:** https://github.com/Fulviuus/unity-network-client
- **Pi cam server:** https://github.com/silvanmelchior/RPi_Cam_Web_Interface