STUDENT INDUSTRIAL INTERNSHIP PROGRAMME LOGBOOK WEEK 3 & 4

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Programme: Bachelor of Technology in Information Technology

Place of Training: Universiti Teknologi PETRONAS (UTP) / Murdoch University, Australia

Period of Training: 6th May 2019 – 6th December 2019

Project Title: Project Neuromender (A Home Computer-Based Stroke Rehabilitation System).

LOG BOOK **WEEK NO: 3-4**

WEEK	DATE	BRIEF DESCRIPTION OF DAILY ACTIVITIES
3	16.09.2019	• Instantiating player controller
	17.09.2019	• Presentation by Murdoch student • Adding script to the project
	18.09.2019	• Implement remote procedure call into the scene
	19.09.2019	• Implement transfer ownership into the scene
	20.09.2019	• Fix the camera problem in the scene
4	23.09.2019	• Make the research on how to fix teleportation • Adding RPC to teleport
	24.09.2019	• Implement locomotion • Study on how to use NavMesh Agent
	25.09.2019	• Implement NavMesh inside the scene • Open new discussion inside Photon discussion forum
	26.09.2019	• Implement NavMesh inside the scene • Open new discussion inside Photon discussion forum
	27.09.2019	• Study the code from Reddit forum • Transfer position to server

Logbook Weekly Evaluation by HOST COMPANY SUPERVISOR					
I**nstruction to Host Company Supervisor** Please refer to the student's to assess his/her performance. Please award the scores based on the range below:					
Student's Score	**Beginning (<2.0)**	**Developing (2.0 to <3.25)**	**Accomplished (Rare) (3.25 to <4.0)**	**Exemplary (Exceptionally Rare) (4.0 to 5.0)**	**Score**
Initiative & Creativity	Had little observable drive and did not have new ideas	Some observable drive and some new ideas	Mostly self-starter and sometimes sought new challenges and offered new ideas	Always a self-starter and consistently sought new challenge and offered new creative ideas	**/5**
Task Accomplishment & Commitment	Partially accomplished given task despite full supervision	Accomplished given task but with full supervision	Accomplished given task but with some supervision	Accomplished given task with very minimum supervision	**/5**
Attendance & Punctuality	Frequently absent and always late	Sometimes absent and sometimes late	Never absent and almost always on time	Never absent and always on time	**/5**
Attitude & Self Control	Unable to demonstrate positive attitude and hardly maintained self-control under pressure	Occasionally demonstrated positive attitude and occasionally maintained self-control under pressure	Sometimes demonstrated positive attitude and maintained self-control under pressure	Consistently demonstrated positive attitude and consistently maintained self-control under pressure	**/5**
				Total Score	**/20**
Comments:					
Host Company Supervisor's Signature & stamp:					
Name & Designation:					
Date:					

(make copies if necessary)

DETAIL REPORT **WEEK NO: 3**

Objective(s) of the activities :

- **Instantiating player controller**

Contents :

Monday (16.09.2019)

1. Photon view has been added into controller to make it can be synchronized through network

2. To make things synchronized and instantiate through network, photon view and photon transform view need to be added to the things we want to instantiate

3. Implement code about the parent and child controller in the scene as UNet has implement

4. Research
   i. Make others player see our controller
      - The problem is that the client did not have a reference to the controller
      - One of the solutions is they sent the viewID using RPC to tell the client

   ii. For the object synchronization, since we have add photon transform view inside our object, it will automatically sync through network

   iii. The next question raised is that do we need to add photon view inside the cube since the cube will follow the movement of our hmd

5. Result
   i. Controller able to be instantiate

6. Problem
   i. When the controller has been instantiate, it instantiate 4 controller instead of 2
   ii. The movement of the player still did not meet our target
   iii. What we want to make is that the cube to act as avatar where it will follow the movement of the hmd

DETAIL REPORT **WEEK NO: 3**

Objective(s) of the activities :

- **Presentation by Murdoch student**
- **Adding script to the project**

Contents :

Tuesday (17.09.2019)

1. Observed the progress presentation by Murdoch student about their project
    i. As their project much alike with our project, we got to see how their do they project

2. Able to make discussion with Murdoch student on how they do their project with the problem that we are currently faced

3. The things that we have shared are
    i. How to make the scene as first person view instead of third person view
    ii. Object snapping
        - Instead of using VRTK for object snapping we also shared on what are the other ways to do object snapping in unity
        - They also shared the pro and cons on using VRTK for object snapping by the version of the VRTK
        - Since VRTK just upgrade, there are not much documentation has prepared for the new version that we can refer to

4. New script has been added to the scene to make sure that the player will have their own camera instead of the remote player camera

5. From that code, we can make that if it is local player, we need to enable all the script and object that the local player need to used however if it is remote player we need to disable all the script and gameobject

6. Result
    i. The player now has their own camera to used

DETAIL REPORT **WEEK NO: 3**

Objective(s) of the activities :

- **Implement remote procedure call into the scene**

Contents :

Wednesday (18.09.2019)

1. To ensure that all player in the scene get all of our data, we need to sent all the movement and position to them

2. Remote procedure call (RPC) is an function provided by photon which their function is to sending and retrieve data

3. To use a RPC function there are concept that we need to understand for example, **[PunRPC]** and **photonView.RPC**

4. Research: We can define which clients execute an RPC
   i. RPCTarget
      - All
        - Sends the RPC to everyone else and executes it immediately on this client. Player who join later will not execute this RPC.
      - Others
        - Sends the RPC to everyone else. This client does not execute the RPC. Player who join later will not execute this RPC.
      - MasterClient
        - Sends the RPC to MasterClient only. However,the MasterClient might disconnect before it executes the RPC and that might cause dropped RPCs.
      - AllBuffered
        - Sends the RPC to everyone else and executes it immediately on this client. New players get the RPC when they join as it's buffered (until this client leaves).
      - OthersBuffered
        - Sends the RPC to everyone. This client does not execute the RPC. New players get the RPC when they join as it's buffered (until this client leaves).
      - AllViaServer
        - Sends the RPC to everyone (including this client) through the server. This client executes the RPC like any other when it received it from the server. Benefit: The server's order of sending the RPCs is the same on all clients.
      -

- AllBufferedViaServer
  - Sends the RPC to everyone (including this client) through the server and buffers it for players joining later. This client executes the RPC like any other when it received it from the server. Benefit: The server's order of sending the RPCs is the same on all clients.

5. In our code, we need to add RPC in “Hand” script to make sure all the movement that our hands have made are being sent to all the client

6. Result:
   All the movement of the cube which made by the controller can be seen inside the scene

DETAIL REPORT **WEEK NO: 3**

Objective(s) of the activities :

- **Implement transfer ownership into the scene**

Contents :

Thursday (19.09.2019)

1. To make sure all the player can interact with all the object in the scene, we need to implement transfer ownership code into the scene

2. Ownership transfer allow player to pass control of any network object

3. In photon concept, every object can be controlled only by one player. When the player instantiate something, that player will be the owner of the object.

4. In order to make other player have the control of the object, the client need to request ownership from the player

5. There are 3 type of ownership transfer provided by photon
   i. Fixed
      - Owner keeps the creator of a GameObject as owner.
   ii. Takeover
      - Enables any client to take the GameObject from the current owner.
   iii. Request
      - Asks the current owner to pass it over. This can be rejected.

6. Result
   i. All player can interact with the object in the scene that has photon view attach to them

DETAIL REPORT **WEEK NO: 3**

Objective(s) of the activities :

- **Fix the camera problem in the scene**

Contents :

Friday (20.09.2019)

1. When all the code has been implemented, there are new problem arise. When the new player has been instantiated, our local player insists to take over the new camera which just been instantiate

2. Problem
   i. Computer #1 / Player #1: Host of the game, spawn players fine, camera is attached appropriately.When a second player joins the game,
   ii. Computer #2 now controls the camera (appears to be only one in the scene, but each player should have their own).
   iii. Computer #1 now sees itself in 3rd person and the camera is controlled by Computer #2.
   iv. Computer #1 can still move their own character, but it is no longer a first person point of view.

3. Solution
   i. We need to disable the new instantiate camera by using code
   ii. If it is a remote player, make sure to disable their camera
   cam.enabled = false;

DETAIL REPORT **WEEK NO: 4**

Objective(s) of the activities :

- **Make the research on how to fix teleportation**
- **Adding RPC to teleport**

Contents :

Monday (23.09.2019)

1. Problem
    i. Teleportation can only be implemented when the player is alone in the room
    ii. Once other player came into the room, teleportation cannot be used

2. This issue might happen since we did not send the new position to the network

3. I have tried to implement the same way how I implement the movement of the cube into the network

4. I have implemented RPC inside the teleport function and call it together with "Drop" and "Pickup" function inside "Hand" group

5. Problem
    i. There is no improvement after implementing RPC inside the teleport function
    ii. Both of our player still cannot teleport inside the same room

6. Research
    i. In Steam_VR, they have prepared a script Steam VR_Teleport which it can teleport on click or there are certain teleport type that they can choose
    ii. However, this script is not supported in the latest Steam VR update

DETAIL REPORT **WEEK NO: 4**

Objective(s) of the activities :

- **Implement locomotion**
- **Study on how to use NavMesh Agent**

Contents :

Tuesday (24.09.2019)

1. Besides teleportation, I have tried to do locomotion on the player

2. Locomotion that I have implement is the player can move by placing their finger on the touch pad and they can walk through the scene

3. Locomotion is suitable especially for exploration games

4. When the player have been spawned, they can move followed the movement of their finger on the track pad

5. Problem
   i. The same problem with teleportation occurred which player cannot move when there are other player inside the room

6. Research
   i. In unity there is a function called NavMesh Agent
   ii. NavMesh Agent is a component that is attach to a mobile character in the game which will allow it to navigate in the scene
   iii. NavMesh Agent have some function called “Walkable” which allowed player to move along the walkable which we have set

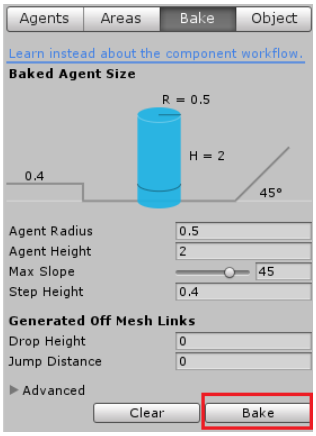


Figure 1 We can set the player properties inside the NavMesh Agent Navigation tab

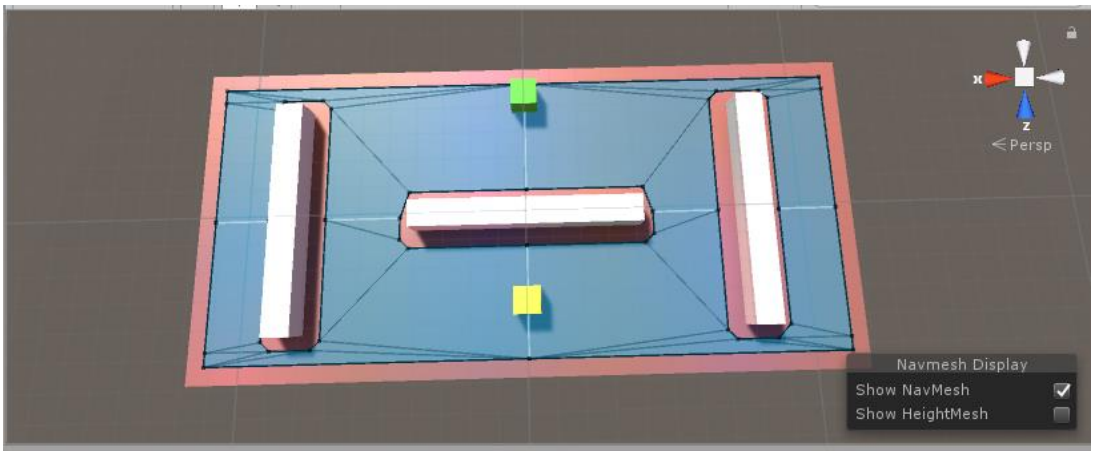


Figure 2 The blue color floor indicate the walkable floor which player can move around in the scene

DETAIL REPORT **WEEK NO: 4**

Objective(s) of the activities :

- **Implement NavMesh inside the scene**
- **Open new discussion inside Photon discussion forum**

Contents :

Wednesday (25.09.2019)

1. Tried to implement NavMesh Inside the scene to see either it can work with our project or not

2. Research on NavMesh
    - Agent Radius: Decides how close the agent center can go near the non-walkable objects.
    - Agent Height: Decides height of the agent.
    - Max Slope: Ramp slope that agent walks up
    - Step Height: Decides the height of the obstacles that agent can step up

3. A NavMesh is a map of the environment that enables supported agents, called NavMesh agents, to traverse the environment. By building this map ahead of time, agents won't have to repeatedly compute where they can and cannot go while the game is running.

4. This is why some programmer use NavMesh and implement it to heir enemy since their enemy will walk around the scene randomly

5. I have tried to do NavMesh in 3D version first to see how it will work

6. Player can walk to the last position that we have set along with walkable area which we have baked before

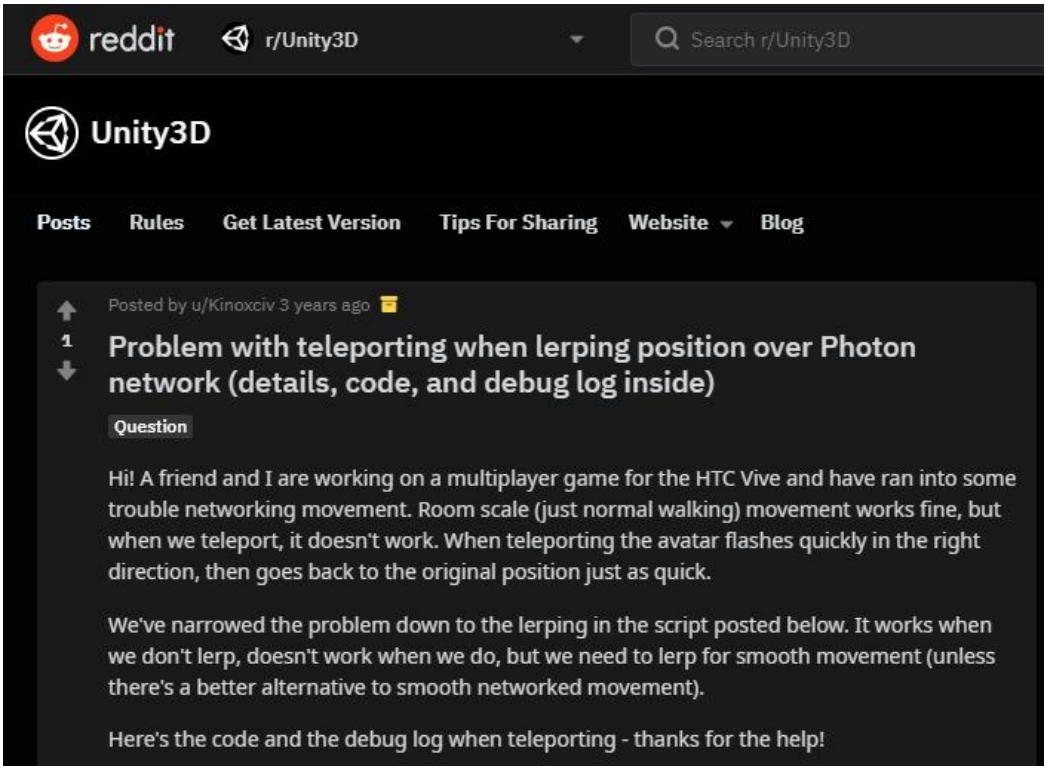
7. However, to make it work with VR especially with Unity, there is not enough research that I can search

8. Many articles said, they using NavMesh with Unreal engine which it is different with unity

9. Research
    i. Inside the unity forum, someone said that they have 2 option on how to do the teleportation
        - Writing own transform sync code entirely, either using OnPhotonSerializeView() or RPC and choosing how to handle the position coordinates based on the distance to the previous position

- However, this functionality has been provided by photon which is Photon Transform View
- The second ways is to add a reference of Photon Transform View to the script that control the player position. If the previous position has enough distance to the next position, toggle transform sync off, and do the teleport sync the new position of the player manually

10. Other than that, inside the unity, there are someone who has the same problem as us.



DETAIL REPORT **WEEK NO: 4**

Objective(s) of the activities :

- **Study the code from Reddit forum**
- **Transfer position to server**

Contents :

Thursday (26.09.2019)

1. From the code, what they have done is
   i. They have an avatar which declare in global
   ii. Transform for both local and remote player
   iii. Vector 3 for both local and remote player
   iv. If local player,
      - Remote player will find the game object with "camera rig" tag
      - Local player will find "camera (head)"
      - Setparent (local player)
      - Avatar will be set to false
   v. In update function,
      - It will take all the transform and vector 3 data for the position
      - Avatar position
   vi. Then, it will send all the data to the server
      - Position for remote player and local player
      - Position for avatar

2. From this code, I got some idea on how to solve my problem
   i. Instantiate the local player and remote player in different line of code
   ii. Sending position of data to the server
   iii. If they are local player, only then the can teleport

3. Problem
   i. The code to instantiate local and remote player cannot be implemented
   ii. Some of the code implemented has runtime error
   iii. Some of the code also has syntax error which has different type

4. Research
   i. In some script, we need to instantiate a game object per player
   ii. Inside OnPhotonSerializeView()(), we need to write our own input into stream that we want to sent
   iii. If we want to implement the movement onto server, we need to use photonnetwork.raiseevent()
   iv. With photonnetwork.raiseevent, you can make up your own events and send them without relation to some networked object
   v. Other than that, since every player has their own player character, they need to set the position in its own instance

5. When I tried to send the position data into server some problem has occur
    i. Player still cannot teleport when there are several player inside the room
    ii. Master client are getting all the data but not the client
    iii. For example, when master client left from the room, client did not get the data that master client has already left the room

DETAIL REPORT **WEEK NO: 4**

Objective(s) of the activities :

- **Do another testing on Module 3(IKEA)**
- **Review back on instantiation and RPC implementation**

Contents :

Friday (27.09.2019)

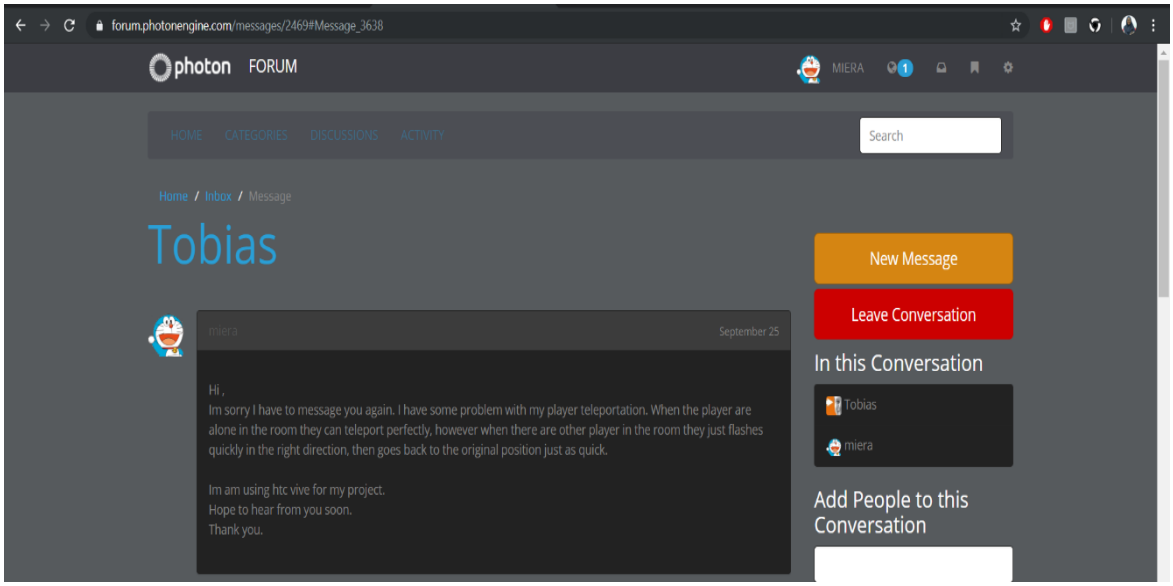
1. RPC is used to control the send and received the logic in the game

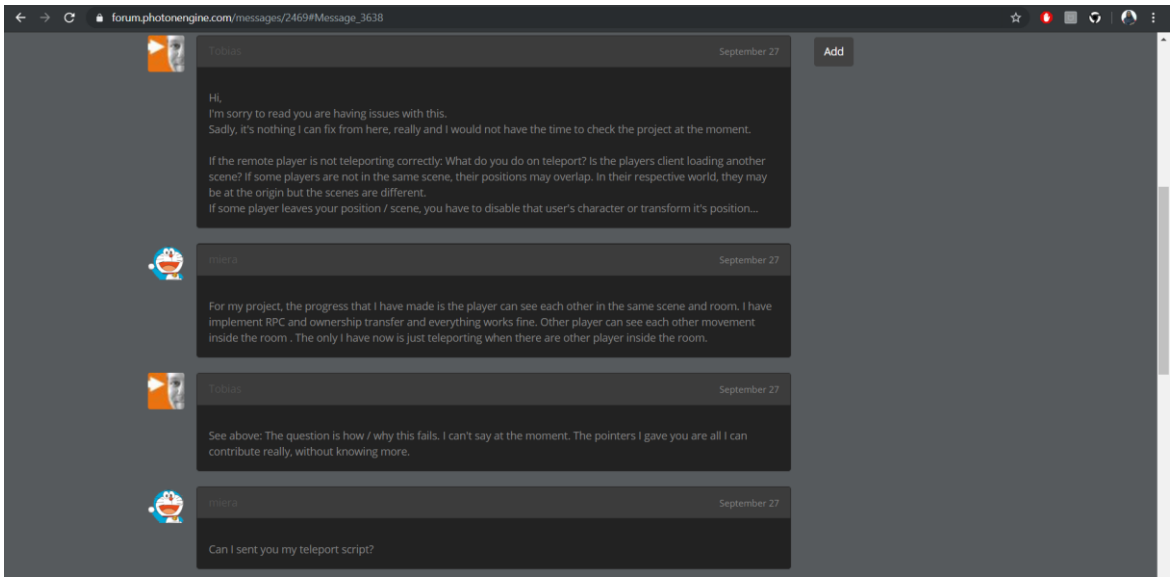
2. Instantiation is used to instantiate the player and for our case the instantiate is do on network

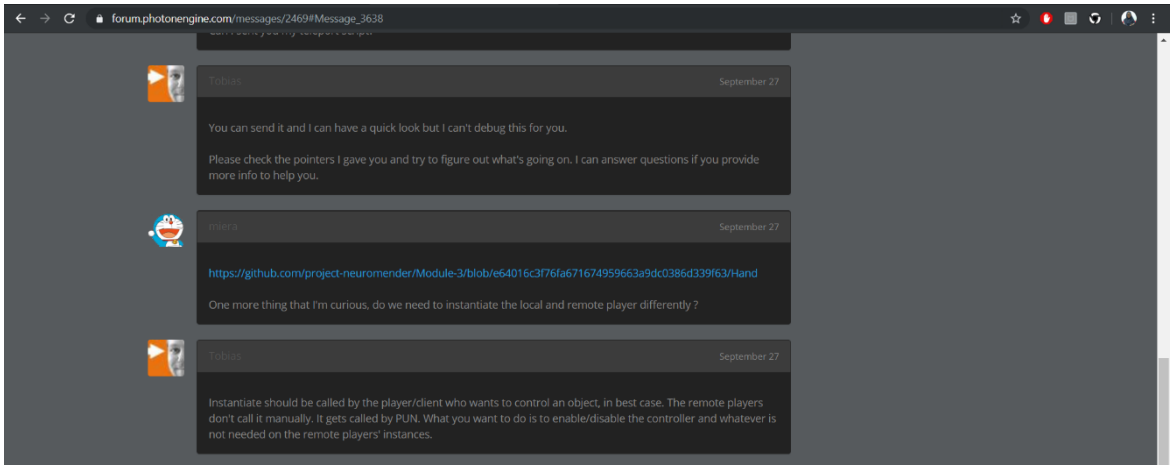
3. There is also a way we can instantiate the player via buffered RPC

4. The player who needs to instantiate something will call PhotonNetwork.AllocateViewID() to get a viewID, then it calls some RPC with that viewID. All clients execute the RPC method and execute GameObject.Instantiate a local object or a proxy. BOTH prefabs you instantiate need a PhotonView and in the RPC method you need to assign the viewID that the originating player sent.

5. I have asked someone in Photon about my problem. Below, is our conversation




forum.photonengine.com/messages/2469#Message_3638
Tobias
September 27
Add
Hi,
I'm sorry to read you are having issues with this.
Sadly, it's nothing I can fix from here, really and I would not have the time to check the project at the moment.
If the remote player is not teleporting correctly: What do you do on teleport? Is the players client loading another scene? If some players are not in the same scene, their positions may overlap. In their respective world, they may be at the origin but the scenes are different.
If some player leaves your position / scene, you have to disable that user's character or transform it's position...
miera
September 27
For my project, the progress that I have made is the player can see each other in the same scene and room. I have implement RPC and ownership transfer and everything works fine. Other player can see each other movement inside the room . The only I have now is just teleporting when there are other player inside the room.
Tobias
September 27
See above: The question is how / why this fails. I can't say at the moment. The pointers I gave you are all I can contribute really, without knowing more.
miera
September 27
Can I sent you my teleport script?


forum.photonengine.com/messages/2469#Message_3638
Tobias
September 27
You can send it and I can have a quick look but I can't debug this for you.
Please check the pointers I gave you and try to figure out what's going on. I can answer questions if you provide more info to help you.
miera
September 27
https://github.com/project-neuromender/Module-3/blob/e64016c3f76fa671674959663a9dc0386d339f63/Hand
One more thing that I'm curious, do we need to instantiate the local and remote player differently ?
Tobias
September 27
Instantiate should be called by the player/client who wants to control an object, in best case. The remote players don't call it manually. It gets called by PUN. What you want to do is to enable/disable the controller and whatever is not needed on the remote players' instances.