Weekly Report Progress

Computer Graphic Lab

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Week 1:
Course introduction and understanding of the requirements.

Week 2:
I suggested developing a game that combines hardware and software similar to “Game Boy”, using Arduino and ESP32 with a touch screen and joystick. The idea was to implement a game such as “fly bird”. The idea has been rejected due to its simplicity.

Week 3:
I had a zoom meeting with Roi, in which he suggested exploring PePaKura (Shape representation by Zippables). I played with it to get familiar with this app. I also learned 4 lectures that were given by Roi for self-learning.

1. Polygonal Meshes
2. Differential Geometry - Motivation
3. Mappings
4. Distortion minimization

Week 4:
Roi’s suggestion was very interesting but I got exposed to a new field 'Metaverse’, which amazed me very much so I suggested doing something related to the Metaverse and VR/AR. The suggestion was welcomed and approved by Roi.
I started searching for equipment and limitations. The idea was to look for a headset and eGPU compatible with my own PC. We decided to go for an all-in-one headset so I bought Oculus Quest2.

Week 5:
Learning about Oculus and Unity. I took the “development for Oculus and unity” course from Udemy.

- Unity project setup and basic knowledge
- Creating and implementing a learning project “
- Packages, Scene, Camera, controls, scripts, XR, Sidequest, and open XR ramp-up
- Building, installing, and testing my initial project on Oculus
- Link: https://github.com/HussenAH/ComputerGraphicsLab_OculusVR

Week 6:

Working on a final project proposal, Virtual Control Room. A zoom meeting has been scheduled and the project's slides have been presented to Dr. Roi and how we can take it forward. The proposal has been accepted.

Week7:

Started working on object visualization. Packages for room accessories were imported and integrated into a project. Common Room scene has been created, compiled and runs fine in Oculus.

Week8:

Started working on MRTK, Mixed Reality, which will be a UI platform that will be used in the project.

> Virtual Control Room, POC has been implemented. Screen and static buttons were added for our Virtual Room, without interaction (only the layout), the view without model, logic, and user interaction using Oculus controls.

Week9:

A bug while moving inside the Room on Oculus was discovered. The "player" can move but can't turn around to see objects and MRTK's controls behind. Trying to solve this by changing the standard camera to an XR camera. There is a little bit of improvement, but the bug is still open and needs to be resolved.

Week10 and week 11:

- I started working on implementing the Virtual Room using the Top-Down model, which means, I started working from the room itself and I will continue breaking it down into more small problems to deal with.
- All Bugs have been solved, I can move in the scene
- The controls have been integrated and work properly in the scene
- MRTK is integrated into the project and the player can interact with it
- External packages that were used to build the room was integrated

Week12:

After a zoom meeting with Roi, we decided to make a POC for three features, Audio, video, and Server.
In this week I learned about MixedReality-WebRTC, the platform that will be used to implement the features:3 שבועו

- Peer-to-peer connection completed.
- Signaler and server configuration completed

Week13:

The WebRTC concept was completed. The communication between Unity and server was completed and I started working with Video and audio transactions in Unity:

1. example 1: describing the concept and basic component's implementation: peer connection, Signaler, Mesh, and rendering
2. example2: a local and remote data transaction between server and client (peer2peer)
3. examples 3: full example including UI and media player.

Week14:

The Client-side has been completed. I started and finished the implementation of the POC. The server was implemented in NodeJS. The client can successfully connect with the server using HTTP protocol and can ask for GET/POST request.
The presentation video is done and sent to Roi.

Week15:

Final Report, Clips and project submission.