360 Video and Image Unity Projects

Overview

The projects are used as part of the Meta Pilot Study. The 360 Video Project shows the user a 360 Video based on which the user has to answer certain questions, while the 360 Image Project shows a 360 Image to the user on which he/she has to perform certain navigation tasks. Both the projects record several features from the Quest Pro headset as part of the study. These include:

- Eye Gaze
- Body Joints Pose
- Head Pose
- Facial Expressions

Both the projects make use of Meta's **Movement SDK** to record the mentioned features using body, face and eye tracking functionalities provided by the Movement SDK.

Implementation Details

The features extracted ie. eye gaze, body joints pose (includes head pose) and facial expressions are saved in respective CSV files leading to the creation of 3 different CSV files for each run of the project. The features are recorded at a frequency of around 17-20 recordings per second.

The following files have been modified for the feature recording task:

- **OVREyeGaze.cs** : Records the position and rotation of the left and right eyes, along with the Windows machine timestamp and stores them in a CSV file.

- **OVRBody.cs** : Records the position and orientation of 70 body joints which includes the head, along with the corresponding Windows machine timestamps. These are then stored in a CSV file.

- **OVRFaceExpressions.cs** : Records the weights of 63 facial action units with their associated timestamps and stores them in a CSV file.

Setup Instructions

- The below steps should be followed on a **Windows Machine**. The specs of the machine should be as mentioned here.
- Download Meta Quest Developer Hub
- Install the Unity Hub and Editor. I use version 2021.3.23f1
- Download the Oculus App for Windows PC.
- Download the Oculus Integration SDK. I used version 50.0
- Download the Unity Movement SDK.
- Create a new project.
- For detailed steps regarding project creation and setting project configurations, refer to this video.
- For setting Movement SDK specific configurations, refer to this video.

4K Video Downloader

The **VideoProc Converter** was used for downloading 4K videos from youtube. It provides high resolution youtube 360 video downloads in the appropriate formats and alignment.

Centering 360 Youtube Videos

The videos downloaded from VideoProc are not centered and need to be rotated left horizontally so that the center of the downloaded video matches what we see on youtube. The below **ffmpeg** command is used for a 90° left rotation.

ffmpeg -i "FileName" -vf v360=e:e:yaw=90:pitch=0:roll=0 "OutputFile"

Adding 360 Image to Project

We perform navigation tasks using 360° images as part of the Pilot Study.

- This involves using the starting image frame of the associated video to allow the user to explore the video environment while performing nagivation tasks on the 360° image.
- The complete tutorial for adding a 360° image to the environment is available in this video.
- We use Skybox Materials for adding 360° images. The displayed resolution can be controlled by setting the *Max Size* field in the *Inspector Tab* for the Image.

Adding 360 Video to Project

As part of the Pilot Study, we show a 360° video to the user and ask a question about the video.

- This involves using *Render Texture* and *Video Player* tools within Unity.
- The complete tutorial for adding a 360° video to the environment is available in this video starting 6:00 mins.
- The displayed video resolution can be adjusted within *Render Texture*.