QoE Evaluation of Remote Reality Based Applications: Case of FPV Drone Piloting

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Introduction

- Remote Reality (RR) is a form of telepresence technology that, through the appropriate network infrastructure, enables an immersive experience of a remote real environment in real-time with latency low enough to enable an interactive experience in very dynamic scenarios.
- First-person view (FPV) is a method of controlling a radio-controlled (RC) vehicle from the driver's or pilot's viewpoint.
- The size of different sections may be adjusted as needed.

Description of the research problem

- This technology's critical requirements is to enable high-speed video signal transmission.
- Given variable network conditions commonly observed in wireless and mobile networks, there is a need for algorithms that dynamically adjust the video encoder parameters to the network state.
- Dynamical adjustment of encoder parameters can be achieved through a specific QoE model.
- Development of the QoE model requires subjective studies.

Research methodology

- First study was conducted using a drone flight simulator in a laboratory setup which simulated remote drone control utilizing cloud gaming technology with the addition of FPV goggles as an output display.
- 14 participants tested 18 scenarios with different video codec parameters (resolution, framerate, bitrate) and rated overall QoE, graphics quality and virtual scene fluidity.

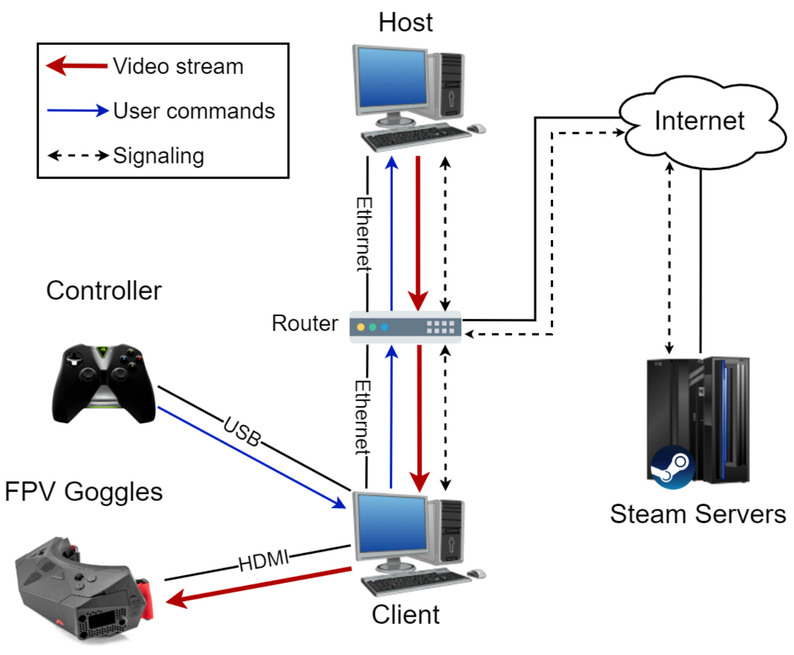

Figure 1. Laboratory Setup

Preliminary results

- Results showed significant impact of video encoding parameters on QoE.
- QoE score below 3.5 caused dramatic decrease in willingness to continue using the simulator.

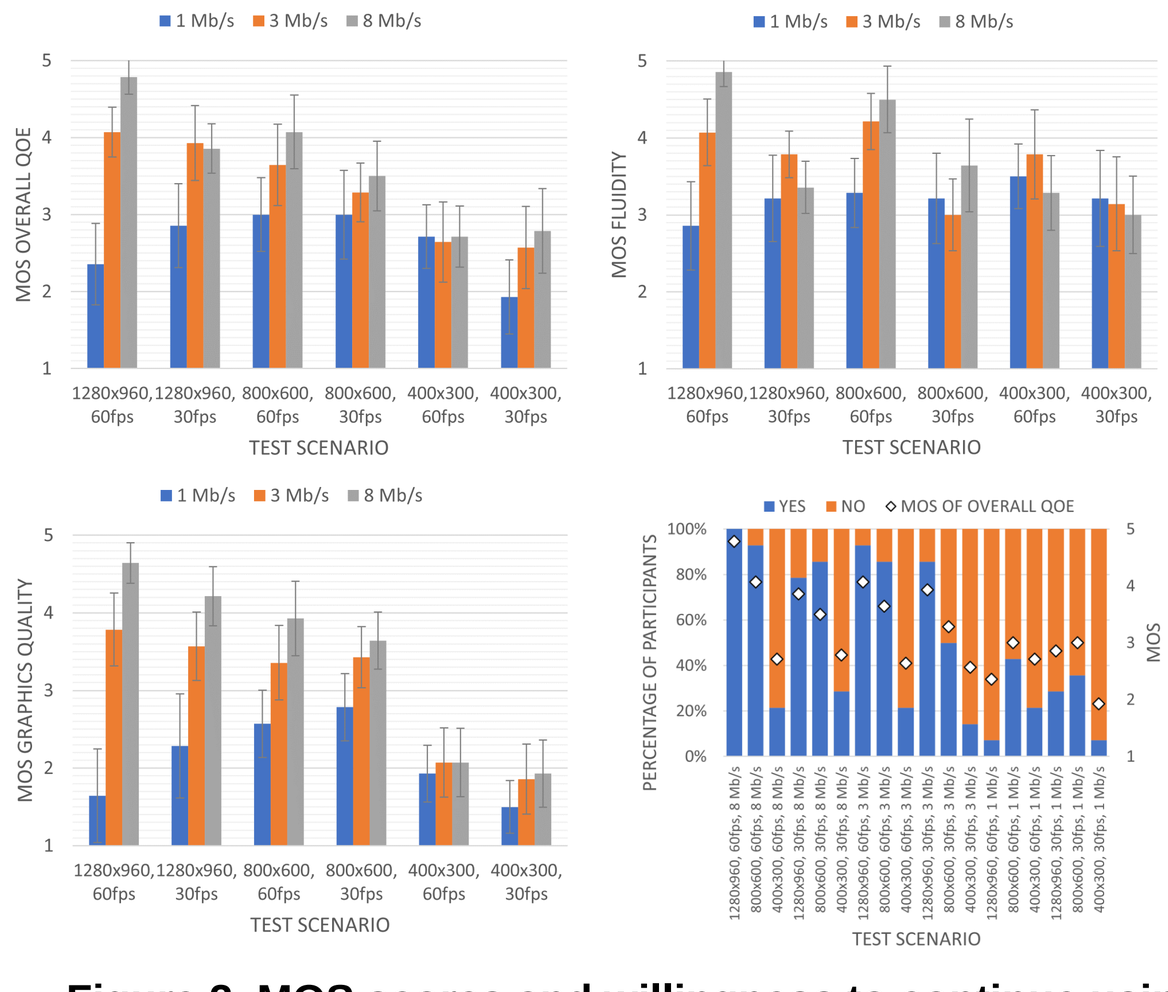

Figure 2. MOS scores and willingness to continue using the simulator

Future Goals

- Improving methodology – better testing procedure, simulator improvements, more detailed data collection.
- Study impacts of latency on QoE.
- Conduct studies with real drones.

References

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