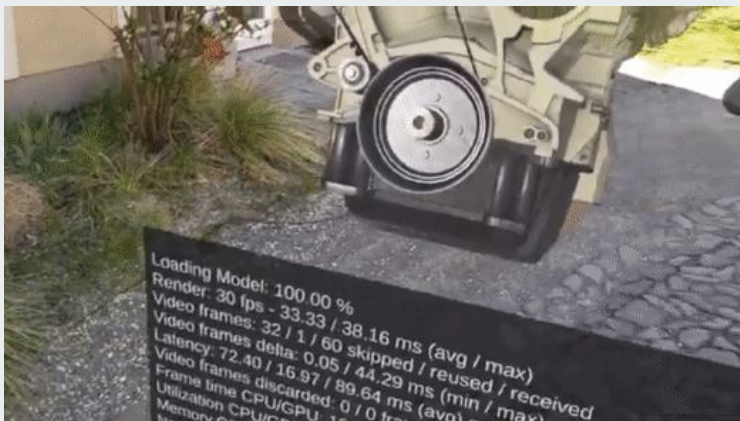
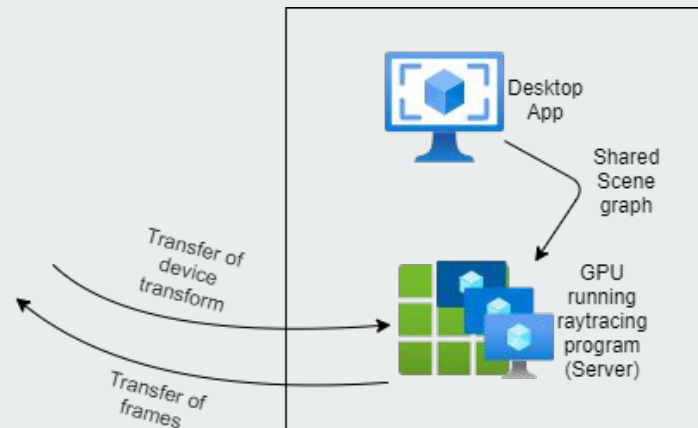


# Remote Rendering for XR

*By- Gizem Dal, Dayu Li, Tushar Purang*



XR  
Platform  
displaying  
final  
frames  
(Client)



# Overview: Milestone 1



## Progress in project

- Video streaming client/server program.
- Nvidia Optix path-tracer.
- GPUnet.
- Extraction of the hololens spatial mapping.

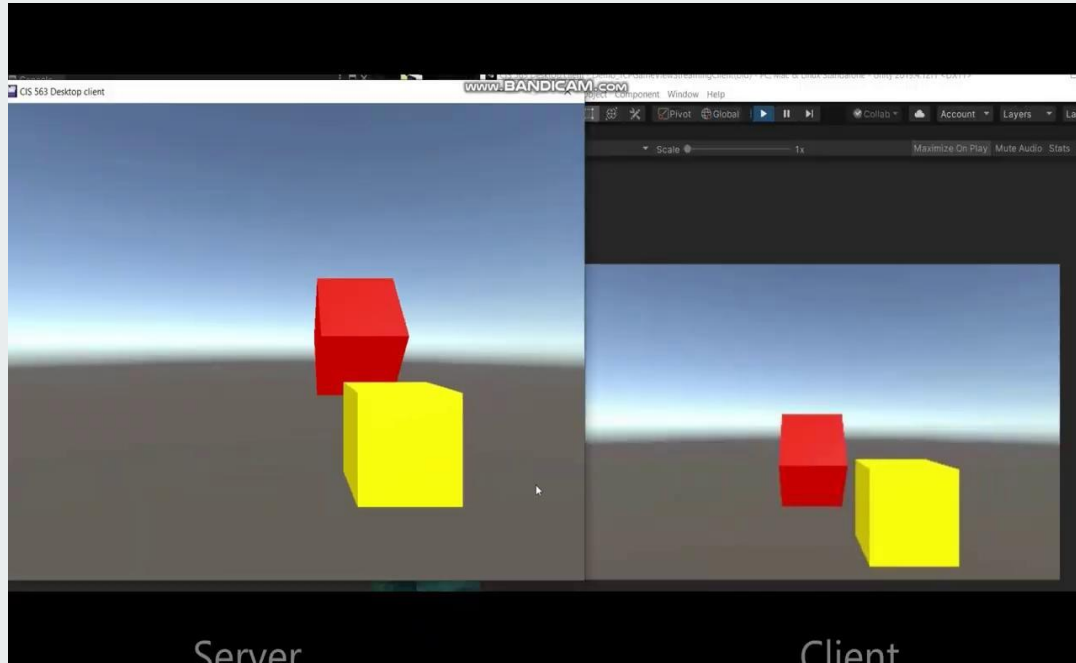
## Researches and Studies

- GPU level steaming and data transmission methods.
- Real-time ray-tracer with global illuminations in XR.
- Real-time ray-tracer using Unity.
- Mesh-simplification methods.
- Hololens gesture & spatial mapping APIs.

# Tasks completed in milestone 1



Setting up desktop app (Video streaming to a client platform like android, hololens etc)



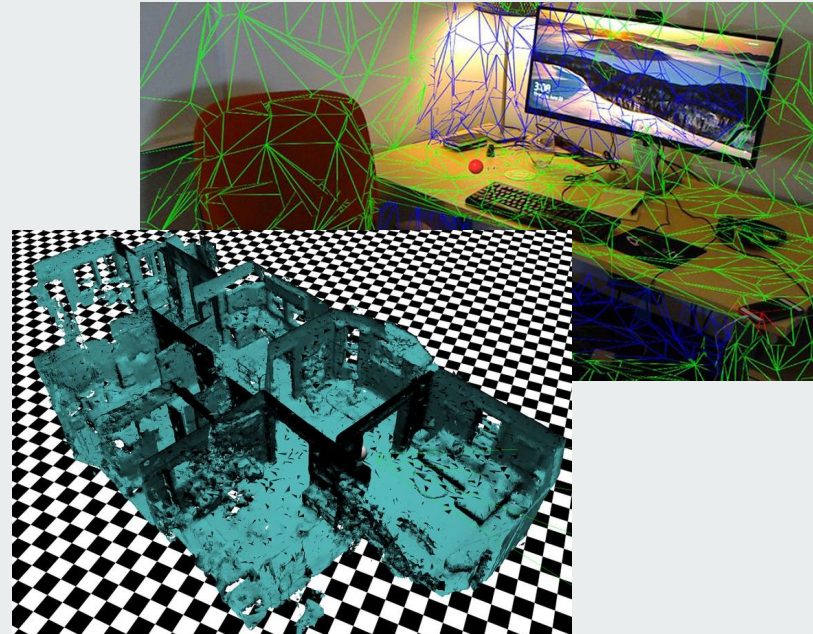
# Tasks completed in milestone 1

## GPUnet:

A native GPU networking layer that provides a reliable stream abstraction over high-level socket APIs to GPU programs for NVIDIA GPUs.

## Extraction of the Hololens Spatial Mapping:

A scan of the real world as .obj format



# Tasks completed in milestone 1

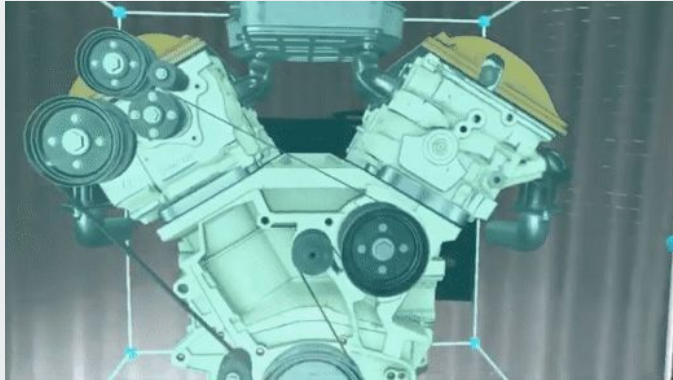


The real-time ray-tracer sample  
of the Nvidia Optix



# Tasks planned for milestone 2

- [Streaming](#) rendered frames of the raytracer to client platform.
- Modifying Raytracer to process hand interaction and gestures captured by the Hololens.
- Implementing shadow mapping and color bleeding effect for the holograms.



# Schedule



## Milestone 1 – Nov 18<sup>th</sup>:

- Basic Desktop app (Control Panel) + Hololens app
- + GPU networking + basic realtime raytracer

## Milestone 2 – Nov 30<sup>th</sup>:

- Hybrid Rendering (Scene + UI)
- Real time ray tracing with only virtual light

## Milestone 3 – Dec 7<sup>th</sup>:

- Late Stage Reprojection for Hololens
- Global illumination in augmented reality

## Final – Dec 13:

- Bug fixings and optimizations
- Performance analysis

# References



1. About Azure Remote Rendering  
<https://docs.microsoft.com/en-us/azure/remote-rendering/overview/about>
2. CPU-GPU Algorithms for Triangular Surface Mesh Simplification  
<https://imr.sandia.gov/papers/imr21/Shontz.pdf>
3. A Positional Timewarp Accelerator for Mobile Virtual Reality Devices  
[https://escholarship.org/content/qt96r870gs/qt96r870gs\\_noSplash\\_4abbaba6bd4266514b1d56cbdd9dc5d7.pdf](https://escholarship.org/content/qt96r870gs/qt96r870gs_noSplash_4abbaba6bd4266514b1d56cbdd9dc5d7.pdf)
4. Differential Irradiance Caching for Fast High-Quality Light Transport Between Virtual and Real Worlds  
[https://publik.tuwien.ac.at/files/PubDat\\_220665.pdf](https://publik.tuwien.ac.at/files/PubDat_220665.pdf)
5. GPUnet: Networking Abstractions for GPU Programs  
<https://www.usenix.org/conference/osdi14/technical-sessions/presentation/kim>
6. Dynamic Diffuse Global Illumination with Ray-Traced Irradiance Fields  
<http://jcgt.org/published/0008/02/01/paper-lowres.pdf>
7. High-Quality Real-Time Global Illumination in Augmented Reality  
<https://www.ims.tuwien.ac.at/projects/ravengine>
8. Nvidia Optix SDK  
<https://developer.nvidia.com/optix>