

The Hologram Lecturer

Proposal author and supervisor

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Background

Volumetric video capture is the technology to record a subject (for example a human performer) from multiple angles, and then digitally combine this into a volumetric display. Such a video can be played back and viewed from any angle. The technology is so far highly experimental, but have been used in some applications to create art performances and characters in computer games and movies. Usually this is done with a large number of cameras and a very expensive studio set-up. Volumetric video is so far primarily pre-recorded, but streaming of live volumetric capture have been done and will probably be important in the future. One interesting application of live streaming is virtual reality or augmented reality meetings. Another is recording lectures for play back in VR or AR. The ultimate vision is to create the “hologram” that have been portrayed in so many science fiction stories, most famously the Leia hologram in Star Wars.

Is this a technology that could be used to record lectures? Imagine having a “hologram” of your teacher in your study room, instead of having a video image confined to your screen. Is it technically possible to create a simple and low-cost production and distribution pipeline? Would there be a pedagogical benefit compared to traditional video recordings?

Project description

As mentioned above, the technology is still highly experimental and usually expensive. The purpose of this project is to explore the possibilities, methods and techniques for creating quick and dirty volumetric recordings. Simple cameras such as Kinects or Realsense could be used, as well as simple configurations with only three cameras, and either free or custom-made software. Such a set-up could be cheap (approximately 20 000 SEK) and could take an hour to set-up in any room.

Two previous master thesis projects have established some methods, and these should be used as a starting point. How can the methods and technologies be further refined and made more efficient? The recording quality from these previous projects have been quite raw; how much better can the image quality be with simple equipment?

The display of these recordings is also technically challenging. Mixed reality headsets such as Hololens and Magic Leap is very expensive, and it is not feasible that a student would afford such a device just to watch hologram lectures. However, there are low-cost mixed reality headsets such as Aryzon, and these could possibly be enhanced with 3d printed parts.

The steps of the project would be the following.

1. Review (together with supervisor) existing hardware
2. Set up hardware for volumetric recording (in the Kuggen Medialab at Lindholmen)
3. Test existing software and evaluate need and possibilities for creating custom software
4. Record volumetric video sessions, use Unity or Unreal Engine to create 3d assets, and export to a suitable display format
5. Build an application suitable for low-cost mixed reality headsets
6. Test different set-ups such as camera positions, lighting and green screens
7. Refine quality
8. Make a real-life demonstration of the production and distribution pipeline.

Previous and future work

In 2019 and 2020, two master thesis projects worked on a similar project, so there exists previous hardware and material, and project reports to have as starting points.

Since the project could continue after your thesis work we strongly suggest that all material from the project is considered open source and/or licensed under creative commons. This needs to be discussed before the project starts.

Suggested reading (watching) material

Blade Runner 2049

Virtual character implemented with volumetric capture. Video giving an idea of the experience:
<https://youtu.be/z2BkCEPImGA?t=117>

EF EVE

One of the existing platforms. Video giving an idea of one of their streaming tests:
<https://www.youtube.com/watch?v=D8QRdOSBLPQ>

Microsoft Ignite keynote in AltspaceVR

Microsoft show cased some of their volumetric capture in this discussion with James Cameron, in VR:
<https://youtu.be/r-QGgCixk80?t=2640>

Target group and stakeholders

The proposal is relevant for students from DV, D and IT.

Potential stakeholders is the company Aryzon and the non-profit organization Educators in VR.

Special prerequisites

Skills in Computer Graphics, Unreal Engine or Unity is a big advantage.

