

Volumetric Video and its Application to Archive the Memory of Contemporary Witnesses

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- Building the virtual environment
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Motivation (1)

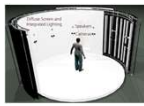
- Fully immersive environments have gained a tremendous push by advances in Head Mounted Display (HMD) Technology
- AR and VR HMDs enable new ways of media consumption and knowledge transfer
- VR can provide an extremely authentic experiences
- However realistic and lively representation of human beings is still a problem due to missing naturalness of computer generated avatars
- With Volumetric Video this problem can be overcome

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Motivation (2)

- With the availability of this technology the idea was born, to use it for archiving the memory of live persons for future generations
- This becomes extremely important, if the memory of such persons reflects an important period of history and as it is the case for the Holocaust.
- Although this dark period of German history is only 75 years ago, it disappears out of the thoughts especially of young people.
- Therefore, it is important to preserve the memories of contemporary witnesses in such a way, that it can be presented in an appealing way to young audiences.

Volumetric Video Production System



Hardware System
+ Software Suite for
Capture and Processing

3DHBR* Software

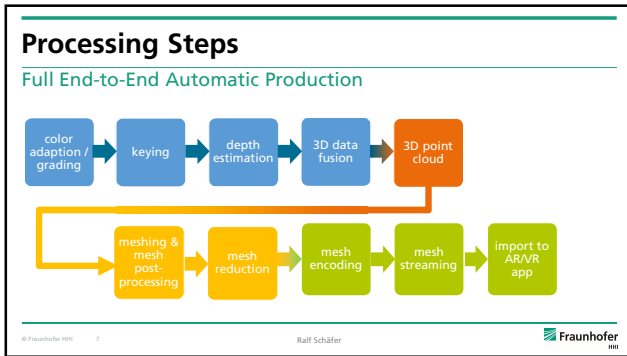


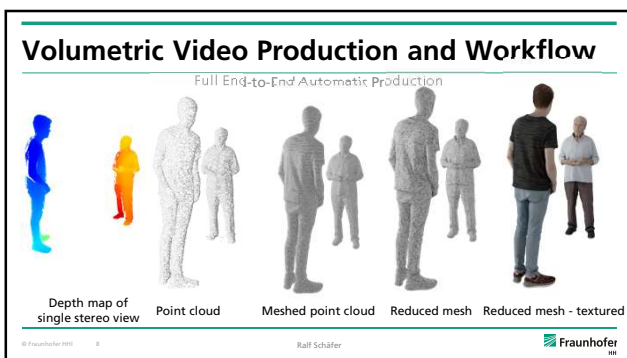
* 3D Human Body Reconstruction

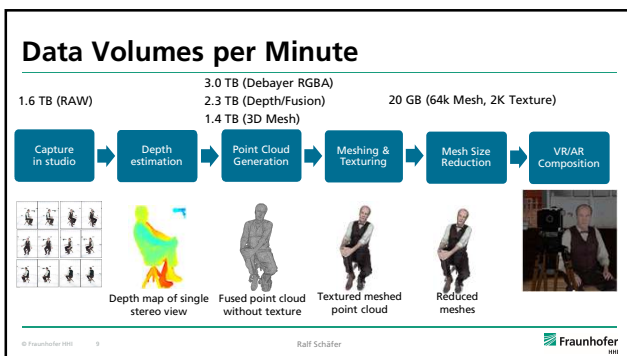
Volumetric Video Capture

360° Volumetric Video Capture: 32 20Mpixel (4kx5k) Cameras









The Story Board (1)

- The idea was to conduct interviews with Ernst Grube, one of the last German survivors of the Holocaust.
- The contemporary witness talks about his experience in Nazi Germany and his imprisonment in the concentration camp Theresienstadt.
- These interviews have been carried out by a young person, because the idea is to show these short films in schools, museums and memorials and to especially to young people

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The Story Board (2)

- The short VR film "ERNST GRUBE – THE LEGACY" consists of six interviews lasting about 8-12 minutes each. The topics are
 - the exclusion of the Jewish population by the Nazi regime;
 - the Jewish life in Nazi Germany;
 - Ernst Grube's life in the ghetto in Munich;
 - his fear of deportation;
 - the concentration camp Theresienstadt;
 - his life in Germany after the Second World War.

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Building the virtual environment

| Challenges | Approach |
|--|-----------------------------|
| recreate historical sites in CGI | conduct historical research |
| locations no longer exists | create a concept art |
| how to mix historical imagery with CGI ? | walk along the timeline |
| How to interact? | get info at stele |

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The interactive experience (1)

1st episode: The apartment in Munich

Screens for archive material

2nd episode: Children's home

3rd episode: Deportation

interactive stele with supporting material

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The interactive experience (2)

- Stele-shaped milestones represent the interactive content that the user can access.
- Thus, the set is also the user interface. The user can teleport into the various time segments along the way and control the interactive elements.
- Archive material is displayed on floating, transparent screens.

Interactive steles in the virtual scene


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Concepts for the virtual environment (1)

Concept art of apartment in Munich (left) and children's home (right)

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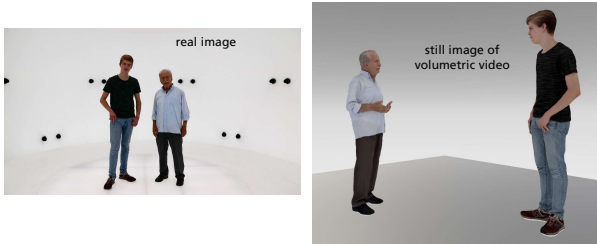
Concepts for the virtual environment (2)



Concept art of
freight yard (left), deportation camp (middle) and main gate of Theresienstadt (right)

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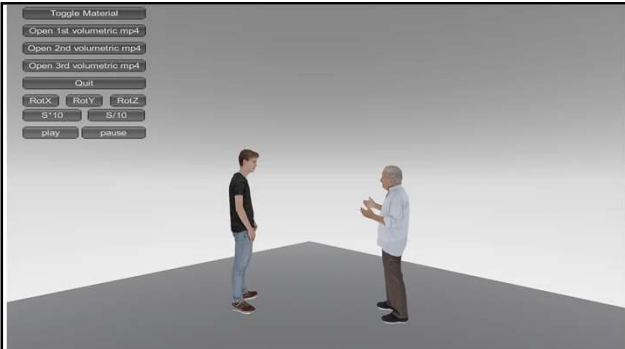
Volumetric video production - results



real image

still image of
volumetric video

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Toggle Material

Open 1st volumetric.mp4

Open 2nd volumetric.mp4

Open 3rd volumetric.mp4

Quit

RotX RotY RotZ

S+10 S-10

play pause

Sample of the virtual environment (1)



Screenshot of the VR scene of the children's home rendered in Unity 3D

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Sample of the virtual environment (2)



Screenshot of the VR scene of the children's home rendered in Unity 3D

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Evaluation

- A first episode lasting 3 minutes has been produced, however with a considerable delay caused by Covid-19
- In this episode the user joins the contemporary witness Ernst Grube and the young student in the garden of the children's home.
- This production will be
 - presented in the visitor center of the memorial site Sachsenhausen, Germany.
 - will be brought to a Berlin secondary school to let the pupils experience the story of Ernst Grube during history lessons in order to test this new concept of interactive storytelling for education.

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Future Work

- In such experiences, it is possible to get close to the “volumetric” persons and to look into their faces.
- In such cases it might be desirable to have direct eye contact with these persons.
- Therefore we develop technologies to manipulate volumetric video
- Example: Interactive gaze correction



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Example of tracked viewpoint



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Summary and outlook

- In this paper we have presented a system for the production of volumetric video.
- This system has been used to produce the short VR film “ERNST GRUBE – THE LEGACY”, which consists of six interviews with Ernst Grube lasting about 8-12 minutes each.
- The idea of this production is to keep the memory of the Holocaust alive by interviewing one of the last German survivors of this dark period in German history and letting him report about different stages of his martyrdom.
- It is intended to showcase this film at different locations such as the former concentration camp Sachsenhausen, which today is a memorial site.
- Most importantly, it is planned to use this VR experience in history classes, because it is important to keep young people informed about the felony of the Nazi regime.
- Future research is focused on better quality, real time capability and Animatable Volumetric Video – AVV.

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Thank You

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