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University of Applied Sciences

HSD

3DGS, AR, AND VR FOR VIRTUAL PRODUCTIONS

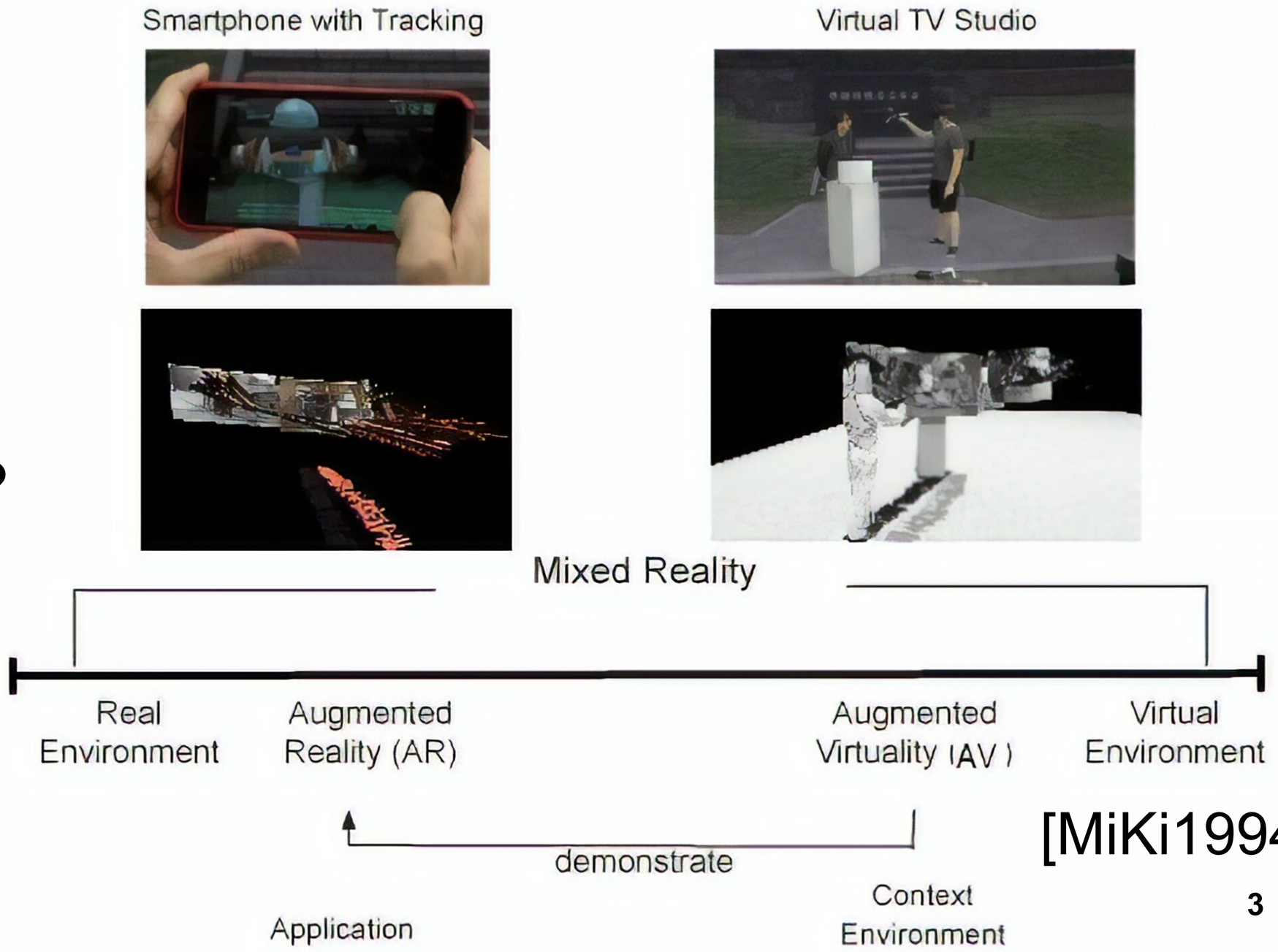
JENS HERDER, VIZRT DAYS 2026

Person Jens Herder

- 1983 TH Darmstadt, Germany
  - Informatics / Computer Science
- 1991 Symbolics (Lisp Machines were used for AI research and development)
  - Lisp, Rapid Prototyping, Object-oriented Versioned Database
- 1993 University of Aizu, Japan
  - Teaching and Research
- 1999 University of Tsukuba
  - PHD
- 2000 Hochschule Düsseldorf - University of Applied Sciences
  - Virtual Studio / Virtual Reality
- 2003 Journal of Virtual Reality and Broadcasting (www.jvrb.org)
- 2009 Cooperation with Vizrt

MIXED REALITY

- So what is XR?
- What makes the difference?
- The ratio of generated and scanned pixels?



[MiKi1994]

Augmented Reality for Studio Broadcast Systems

- from Live Video Switching using Contextual Information to Configuration and Control of Studio Equipment
- Accepted to the International Conference on eXtended Reality (XR Salento) 2026

[BHHe2026]

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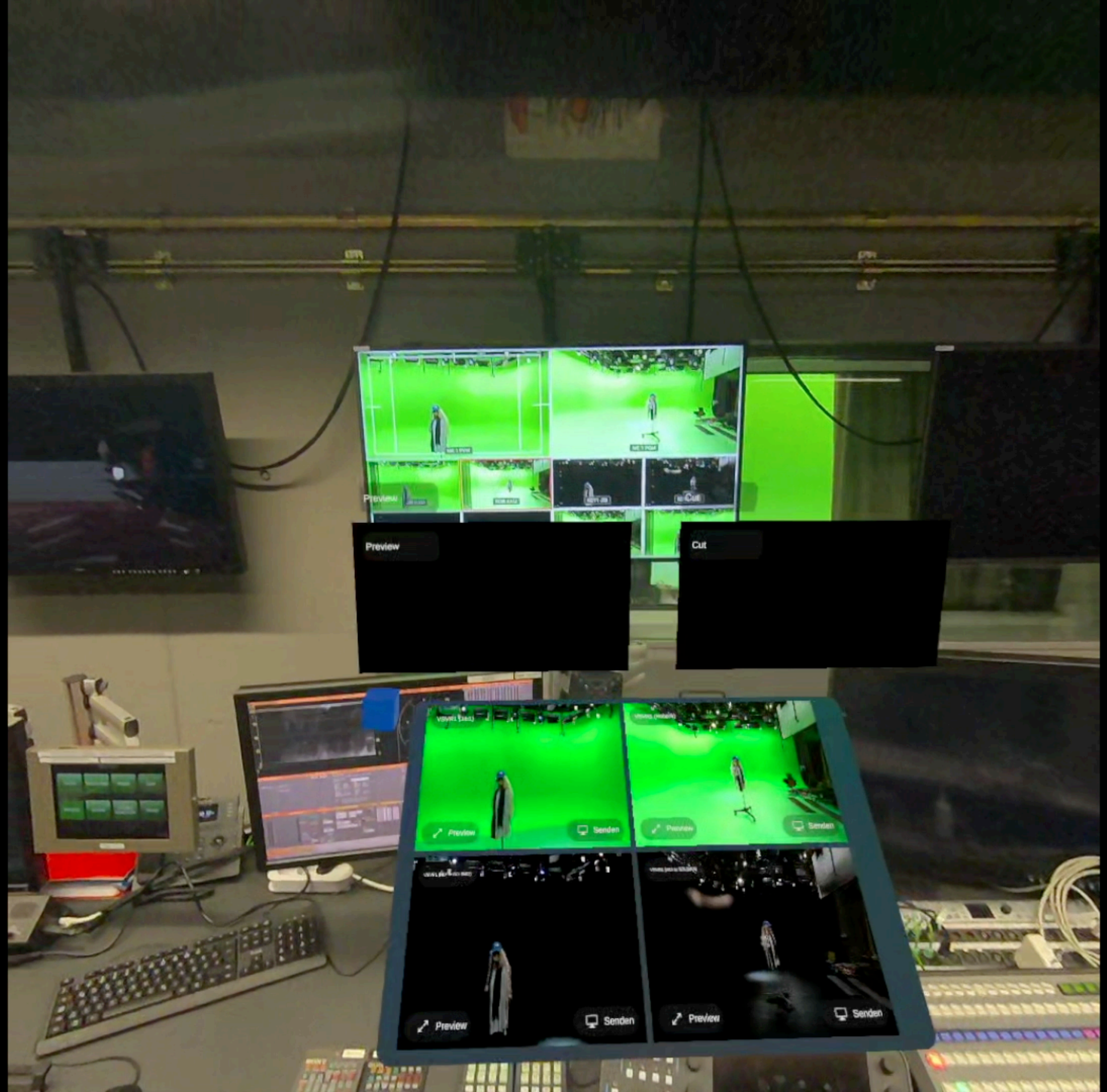
00:53
00:53
03:03
00:53
PGM
00:53
00:53
00:53
00:53
KEY1 JIB
KEY2 ROB
00:54
HANDCAM
1 BA Multiviewer
[Intro - Moderator befindet sich in die Mitte]
Guten T
PRMPT
For educational use on
NDI
OSC HOST
STOP
Kameras und Tracking
JIB und PickMe Button
Capture
Motion Capture
Relevanz Virtuelles Studio
AR-Bildmischer
Abspann
[Balt2026]


Preview
Cut
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[Hoel2026]

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[Hoel2026]

3DGS GAUSSIAN SPLATS

- PortalCam from Xgrids
- Lidar and 4 Cameras
- 500 GB Memory
- Scanning 7-70 Minutes
- Processing 1-4 Hours


[Pre2026]

GAUSSIAN SPLATS FOR LIGHT AND SCHADOWS

- Tobias Preuss, Master thesis
- Many high resolution pictures are used for generation the Gaussian Splats
- HDR Gaussiann Splats for light simulation necessary
- Gaussian Splats receiving light and shadow, rendering using raytracing
- Rendering with Houdini / Redshift

GAUSSIAN SPLATS

- NeRFs (Neuronal Radiance Fields)
  - Machine Learning
- Effizient directional color coding using spherical harmonics

$$\mathcal{N}(\mu, \sigma^2) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right)$$

3DGS WORLD MODELS

- from image
- from prompts
- SpAItial.ai
  - Echo-2

GAUSSIAN SPLATS

- Easy scanning and fast rendering
- AI can be used for generating Gaussian Splats
  - from small number of images
  - from prompts
- Easy Digital Twins as Sets

PRESENTING VR IN A VIRTUAL STUDIO

DER HAUSHALTS-CHECK MIT YVONNE WILLICKS

- Haushalt, Wandfarbe für zuhause: Preis, Qualität und Wirkung! Der Haushalts-Check, 13.05.2026, 44:11 Min., WDR
- Produced partly at the Virtual Studio HSD
- Synchronisation of two tracked cameras and two HMDs

ARD MEDIATHEK

– https://www1.wdr.de/fernsehen/haushalts-check/sendungen/wandfarbe-hhc-104.html


WDR


WDR

AUTOMATIC CAMERA CONTROL

– Using marker less motion tracking

Automatic Positioning and Zooming

Mode: 2 Persons

[Hoe2026]

Automatic Positioning and Zooming

Mode: 2 Persons

[Hoe2026]

CAMERA CONTROL

- Global view for good automatic control
- The virtual scene should be used **also** for the automatic camera control
- Easy cinematic control
- Scene understanding


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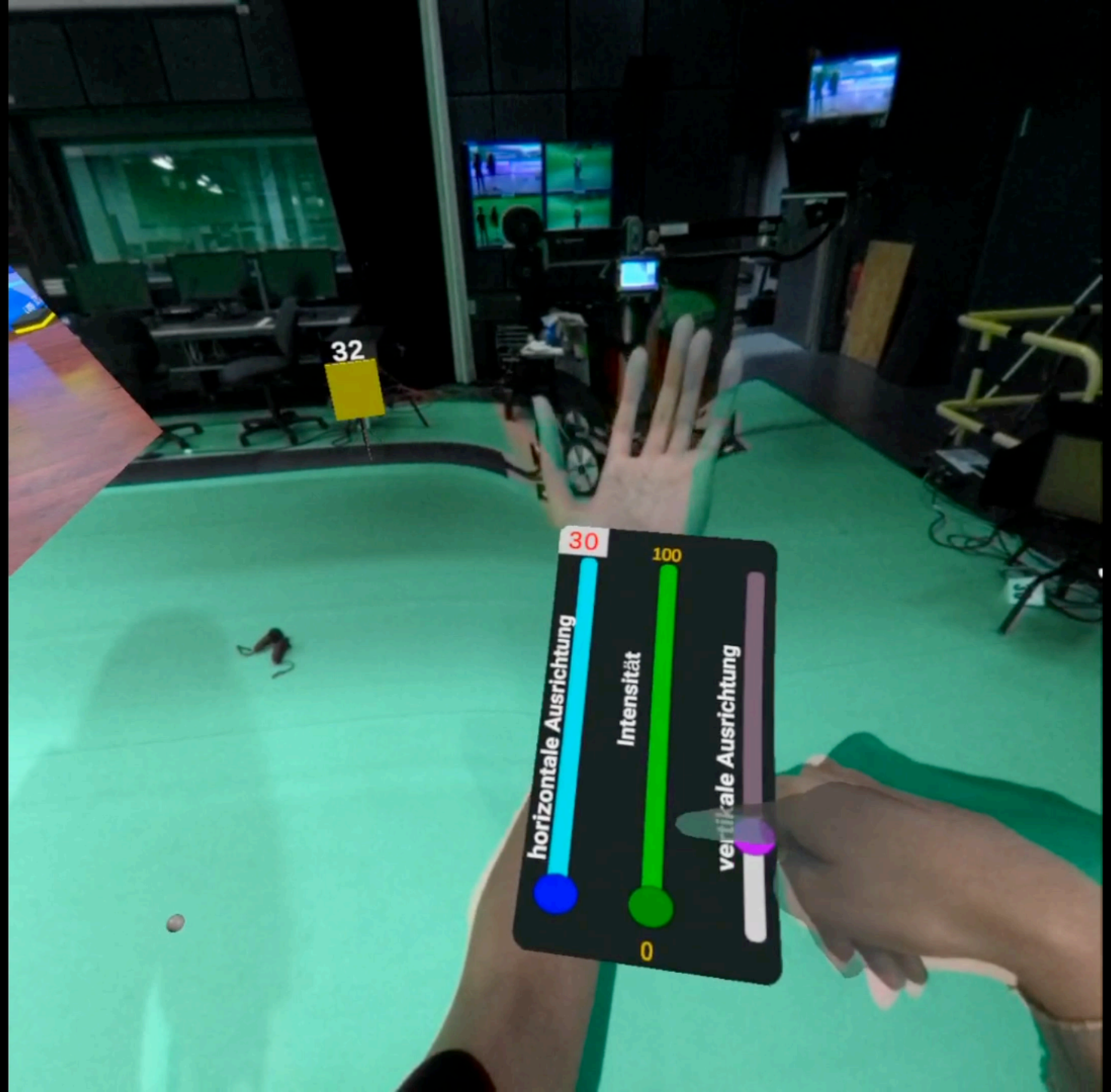
UNIVERSITÄT SIEGEN
VS VR
KOSTENEFFEKTIVE, VOLUMETRISCHE ERFASSUNG VON BAUGRUBEN UNTER VERWENDUNG VON AR
M.Sc. Mathias Langmann, Prof. Jens Herder, Dr. Eng. / Univ. of Tsukuba
Hochschule Düsseldorf, Labor für Virtuelles Studio / Virtuelle Realität
Univ.-Prof. Dr.-Ing. Monika Jarosch
Lehrstuhl für Praktische Geodäsie u. Geoinformation, Universität Siegen
DDGI
9. DEUTSCHES GEOFORUM 2021
Bedeutung der Geoinformation für Gesellschaft und Wirtschaft I 25. November 2021
[LHJ2021]


32
30
100
horizontale Ausrichtung
Intensität
vertikale Ausrichtung
0

[MaHe2025]]

LIGHT ADJUSTMENT AT A VIRTUAL TV STUDIO USING AR

- Quest Pro with Passthrough (Video See Through)
- Reference coordinate system
  - manual setup (no spatial anchors)
- Controller vs. Hand Tracking
- Selection using Eye Tracking
- NDI video streaming


[IVS2022]


[Einh2025]

VIDEO PLAYER IN VR OR AR

- Large screens everywhere
- Better accessibility
- Sign language avatars

TAKEAWAY

- VR and AR
  - Overcome space and time
  - Ideal and efficient interaction
  - Ultimate display with no limits
  - Media consumer platform
  - Used for content creation
  - Accessibility can be improved using sign language avatars
- Scene understanding
  - Enable better and easy camera control
- 3DGS and AI
  - Easy content production, any place at any time

LINKS

- Virtual Sets and Virtual Environment Lab
  - https://vsvr.medien.hs-duesseldorf.de/
- Gaussian Splats of the Virtual Studio in a Browser
  - https://lcc-viewer.xgrids.com/pub/dbcyxq-hsd-vsvr-virtual-studio
- Vision Pro HMD at the Virtual Studio with Gaussian Splats
  - https://hsd.cloud.panopto.eu/Panopto/Pages/Viewer.aspx?id=2bf0a287-c7ff-4068-9411-b3f501495583
- [IVS2022] Interactive Virtual Studio - MoCap - Tech Demo „Bulletproof"
  - https://vsvr.medien.hs-duesseldorf.de/productions/ivs2022/

DEMO AT THE EXHIBITION

- PortalCam scan
  - in Viz Artist mit Unreal, cg objects
  - Vision Pro only 3DGS
- Quest 3 control of the Virtual Studio in Düsseldorf

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- [LHJ2021] Mathias Langmann, Jens Herder, Monika Jarosch, Kosteneffektive, volumetrische Erfassung von Baugruben unter Verwendung von AR, 9. DEUTSCHES GEOFORUM 2021, Bedeutung der Geoinformation für Gesellschaft und Wirtschaft, 25.11.2021.

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- [Einh2025] Joshua Lasse Einhoff, Immersive Design of Sign Language Avatars for Video Streams in VR: Analyzing the Impact of Visual Customization Elements, Hochschule Düsseldorf, Bachelorarbeit, 22.09.2025.
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- [Hoel2026] Jannik Hölper, Development of an AR application for controlling and configuring television studio components, Hochschule Düsseldorf - University of Applied Sciences, Master thesis, 24.03.2026.
- [Hoe2026] Lars Hötte, Development of an Automated Camera Control System for Virtual Production Using Real-Time Person Tracking, Hochschule Düsseldorf - University of Applied Sciences, Bachelor thesis, 24.02.2026.
- [Pre2026] Tobias Preuss, Integration of Computer-Generated Content in Gaussian Splatting Scenes: Shadow Catching and Hybrid Light Estimation, Master thesis, 5.05.2026