

Performance Capture and Real-Time Avatar Synchronization

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Outline

- SHARESPACE - Embodied Social Experiences in Hybrid Shared Spaces
- From Motion Capture to Avatar Animation
- Towards Ego-Vision System
- Conclusion

Remote collaboration / sharing the same space



Source: <https://www.worldviz.com/post/vr-for-remote-collaboration>

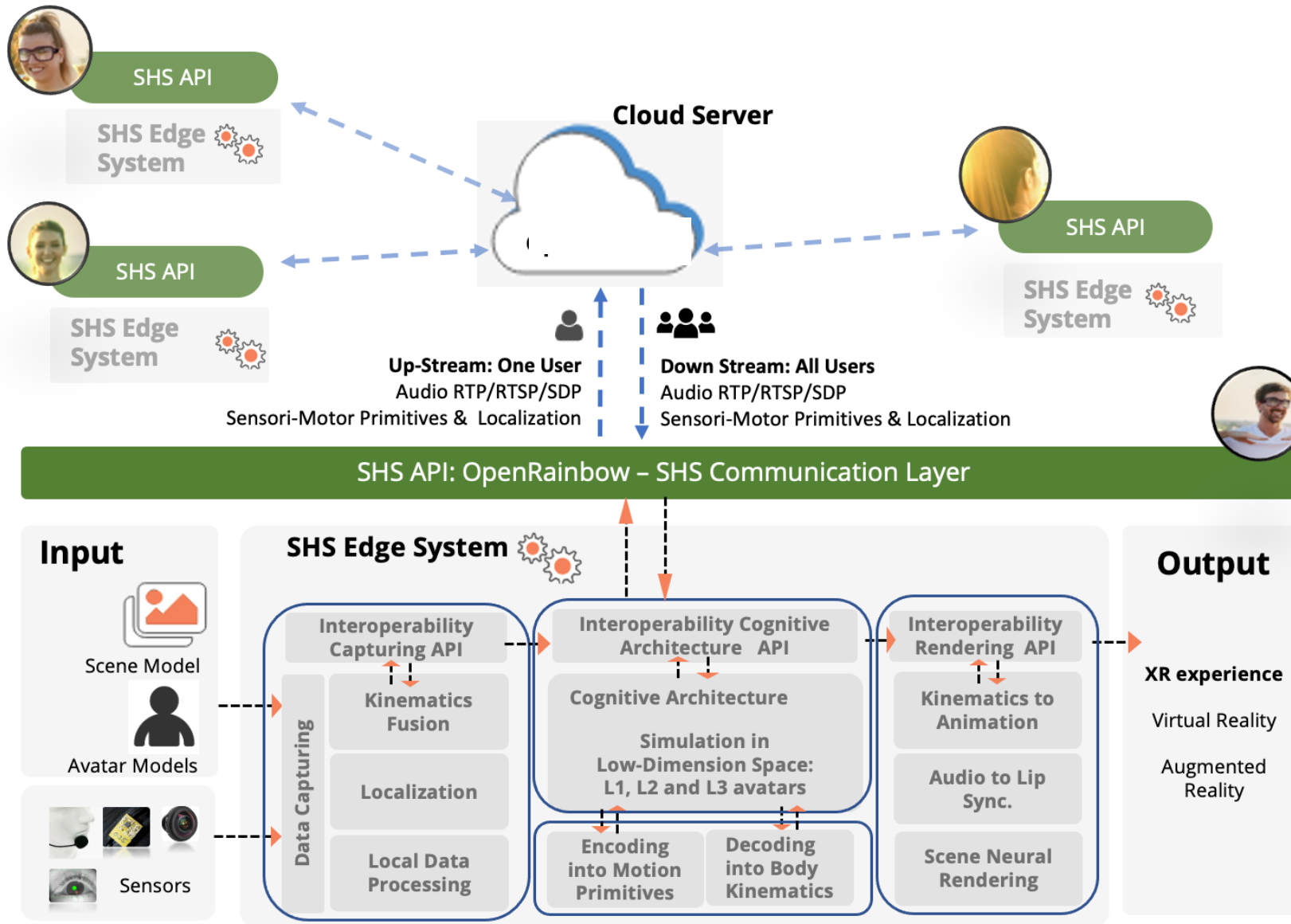
SHARESPACE



Embodied Social Experiences in Hybrid Shared Spaces

SHARESPACE will enable people in remote locations to interact in a shared sensorimotor space to prepare future inclusive hybrid societies.

SHARESPACE: architecture



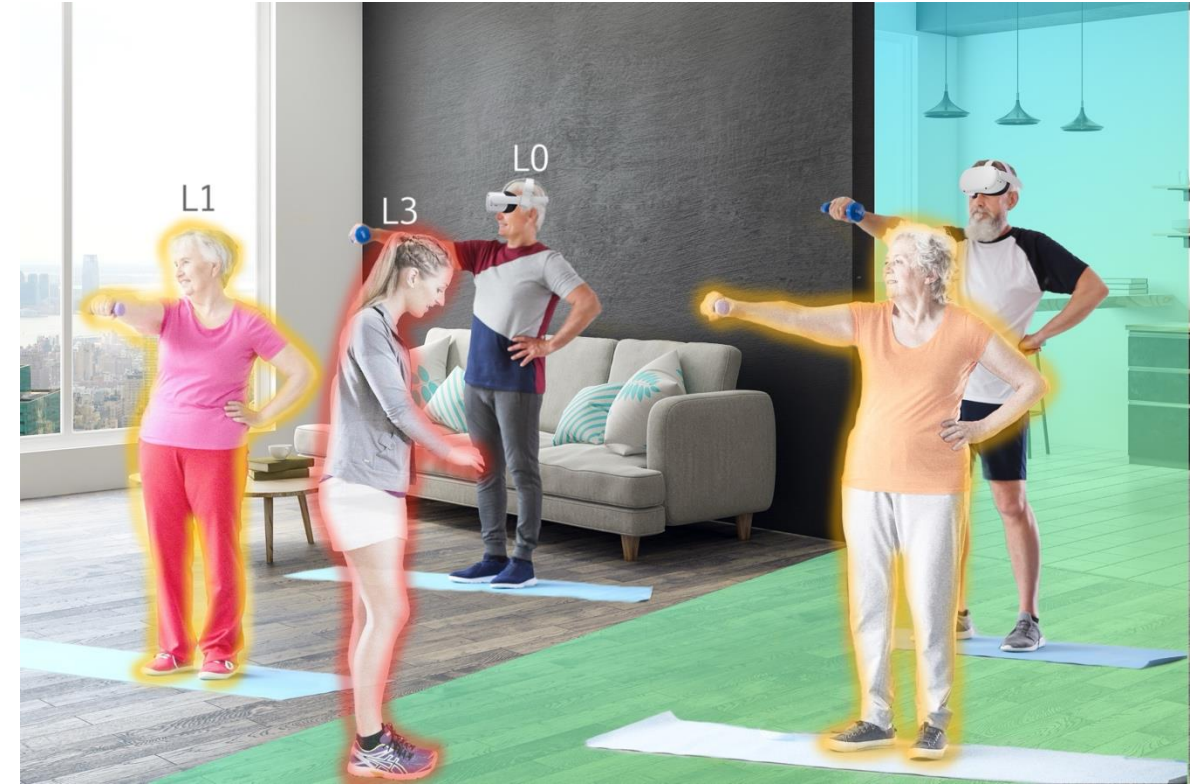
Three Levels of Autonomy of the Avatars:

L1: avatars directly driven by remote human agents and simply reproducing the sensorimotor primitives.

L2: interaction with semi-autonomous avatars where amplification and adaptation of the avatar motion is applied.

L3: autonomous avatars

SHARESPACE: scenarios

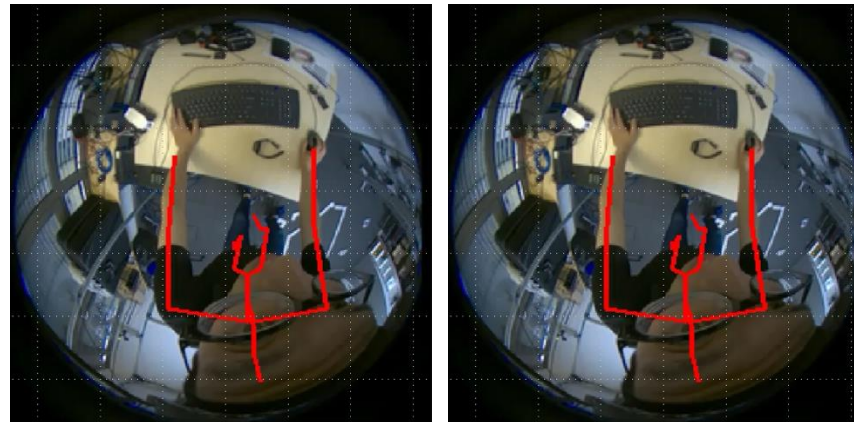


HEALTH: Shared Remote Group Physical Exercises

Human-Digital Twin

Egocentric Body Tracking

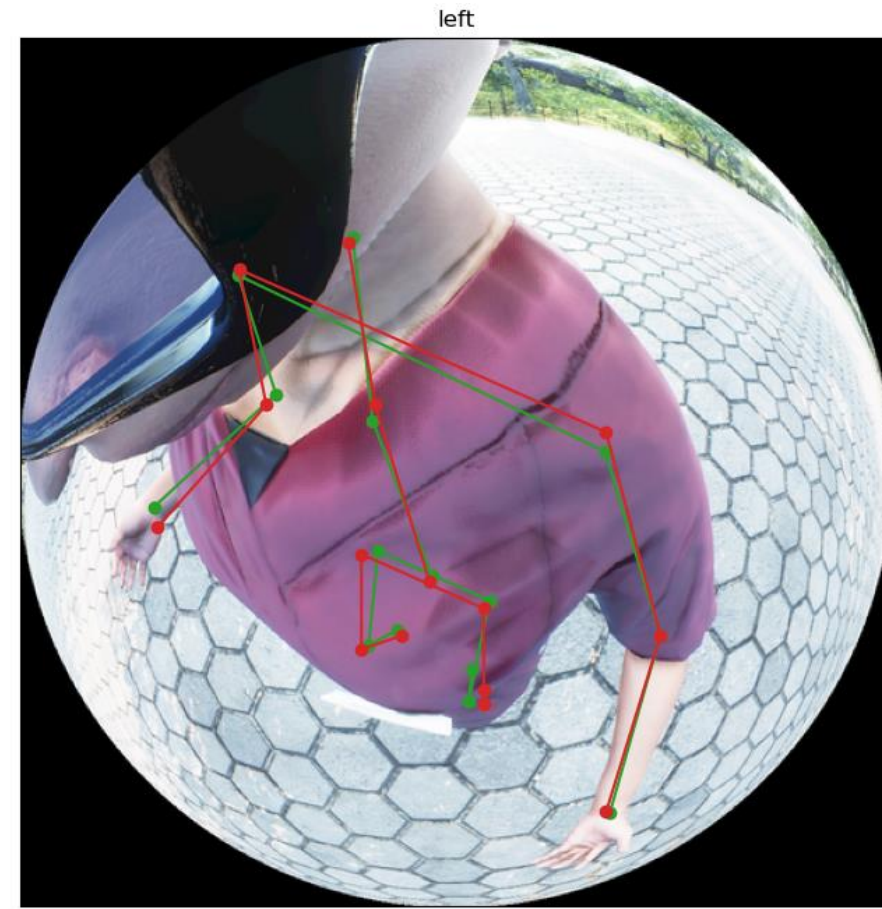
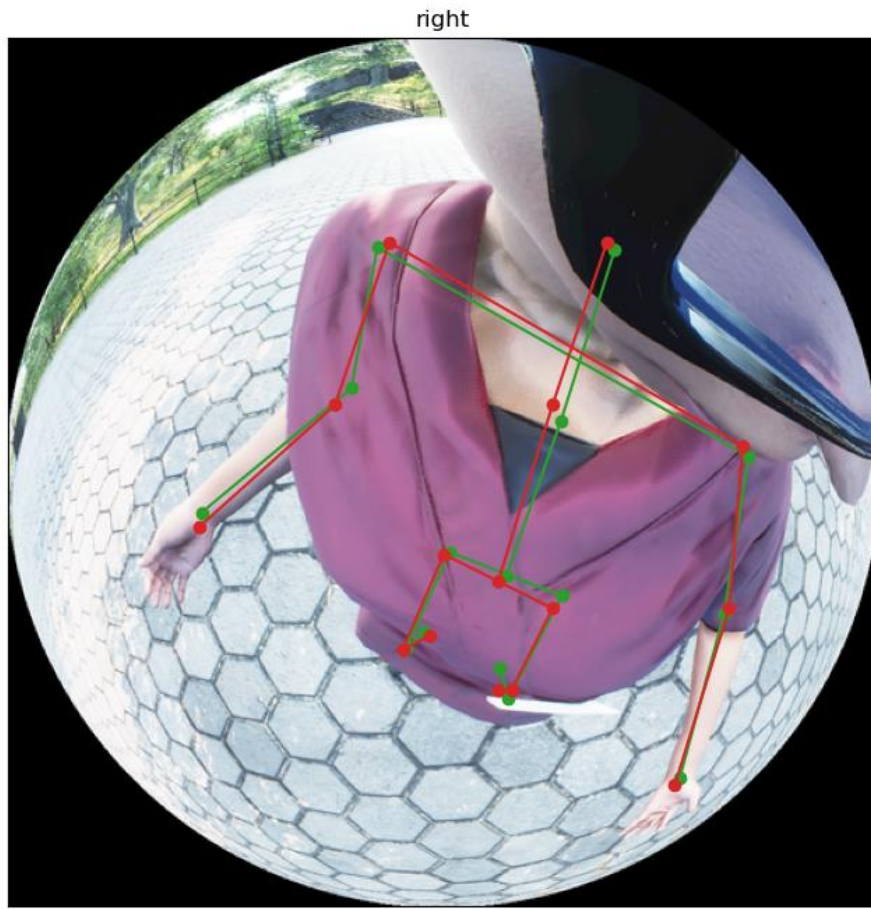
Ego 180° stereo vision



Ego-Centric View to Game Engine

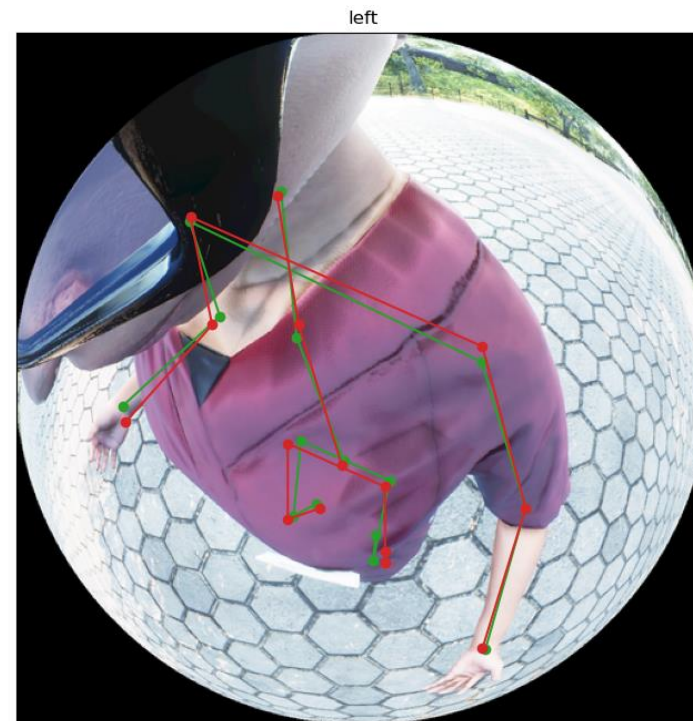
Results on Unreal-Ego dataset [2023]

- **Custom Model** (modified Unreal-Ego architecture)



Results on Unreal-Ego dataset [2024]

- **Accuracy:**
- 2D:
 - Average accuracy: 89.68% → 93.24%
- 3D:
 - mPJPE (Mean Per Joint Position Error): 34.9 mm → 32.03 mm
 - PA mPJPE: 32.3 mm → 29.24 mm

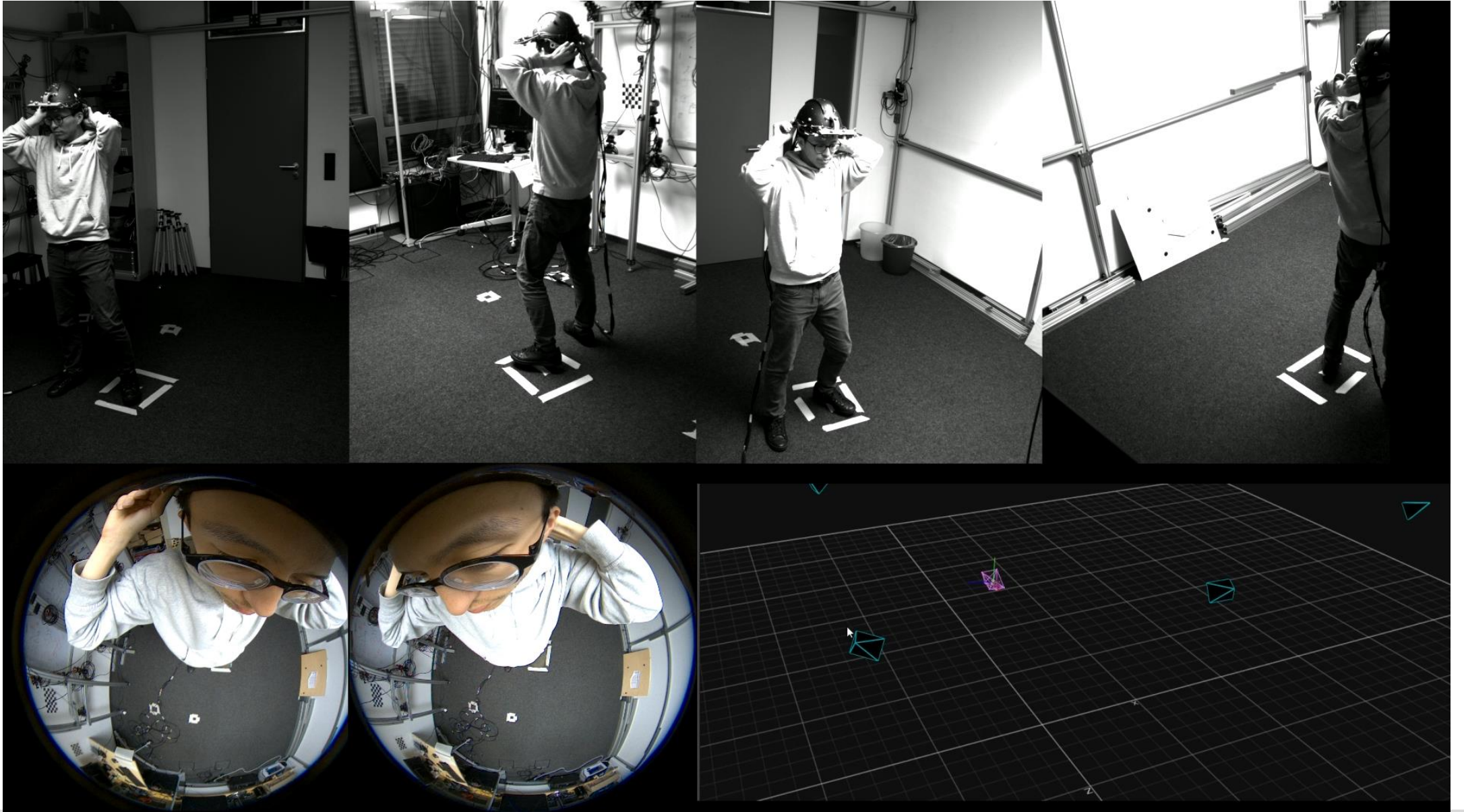


Motion Capturing Lab: Real-World Data

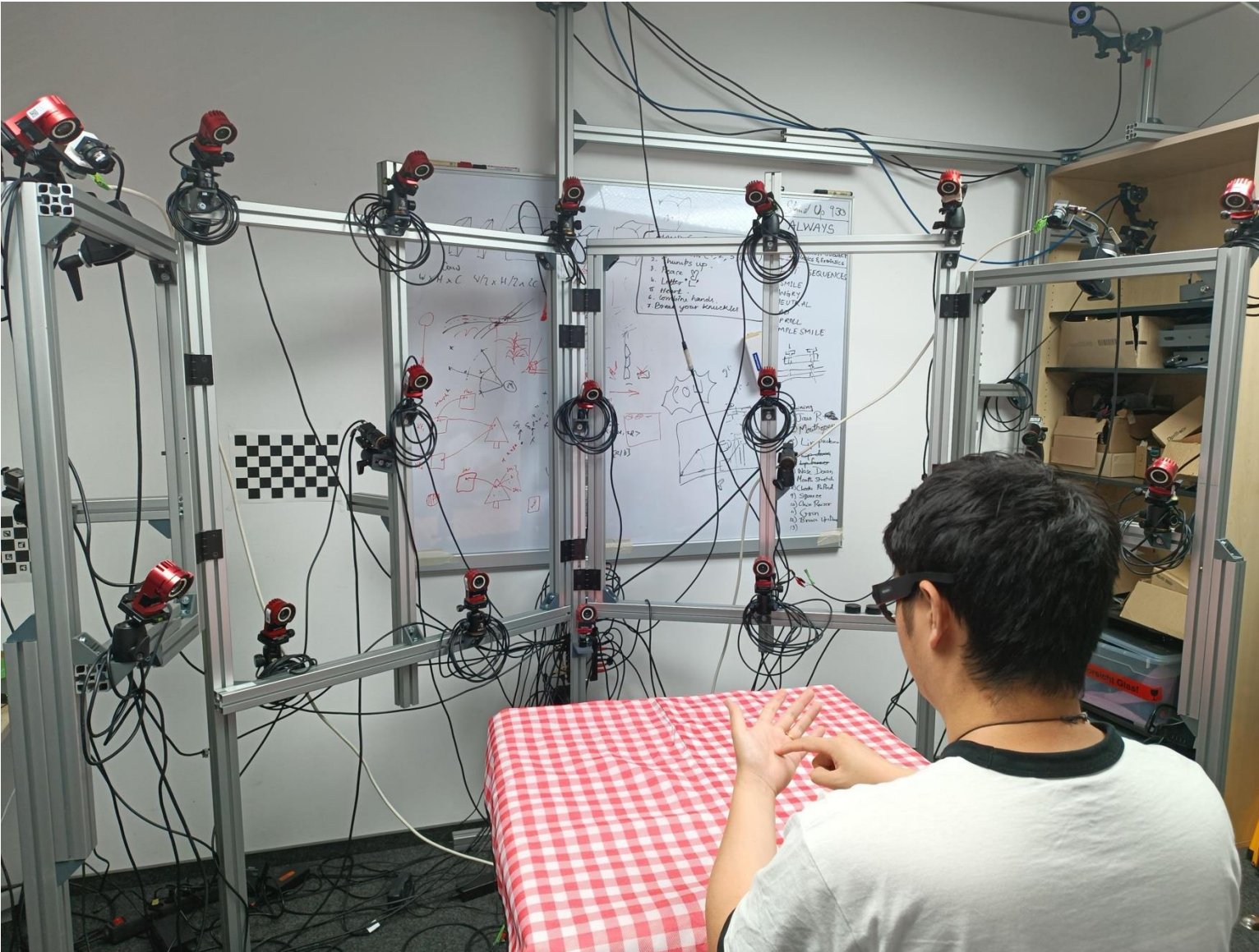


- 16 x DSLR Cameras
- 3 Directional + 2 Diffuse Lights
- 1080p at 30 FPS

Human Body Capture



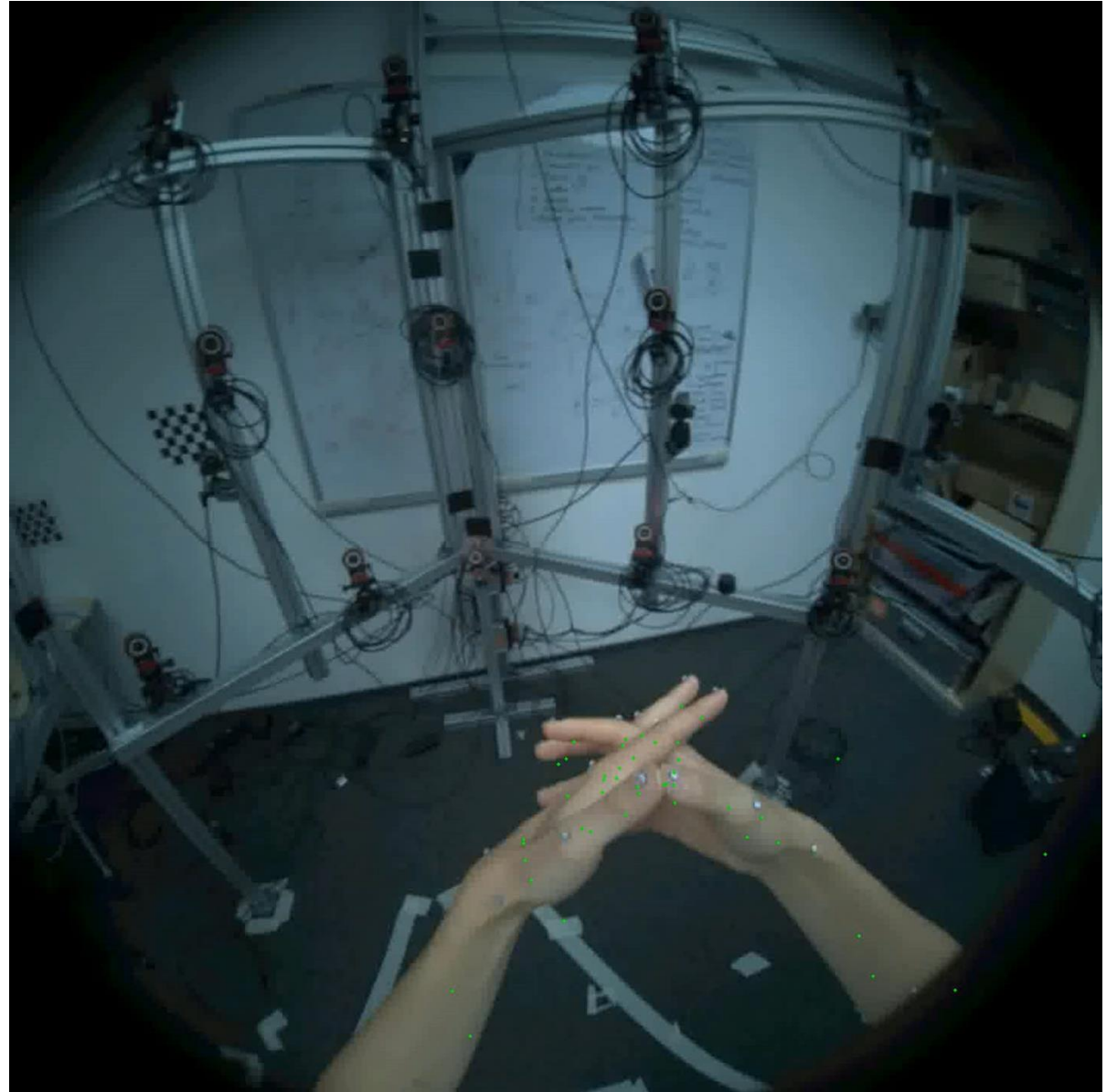
Hand Motion Capture



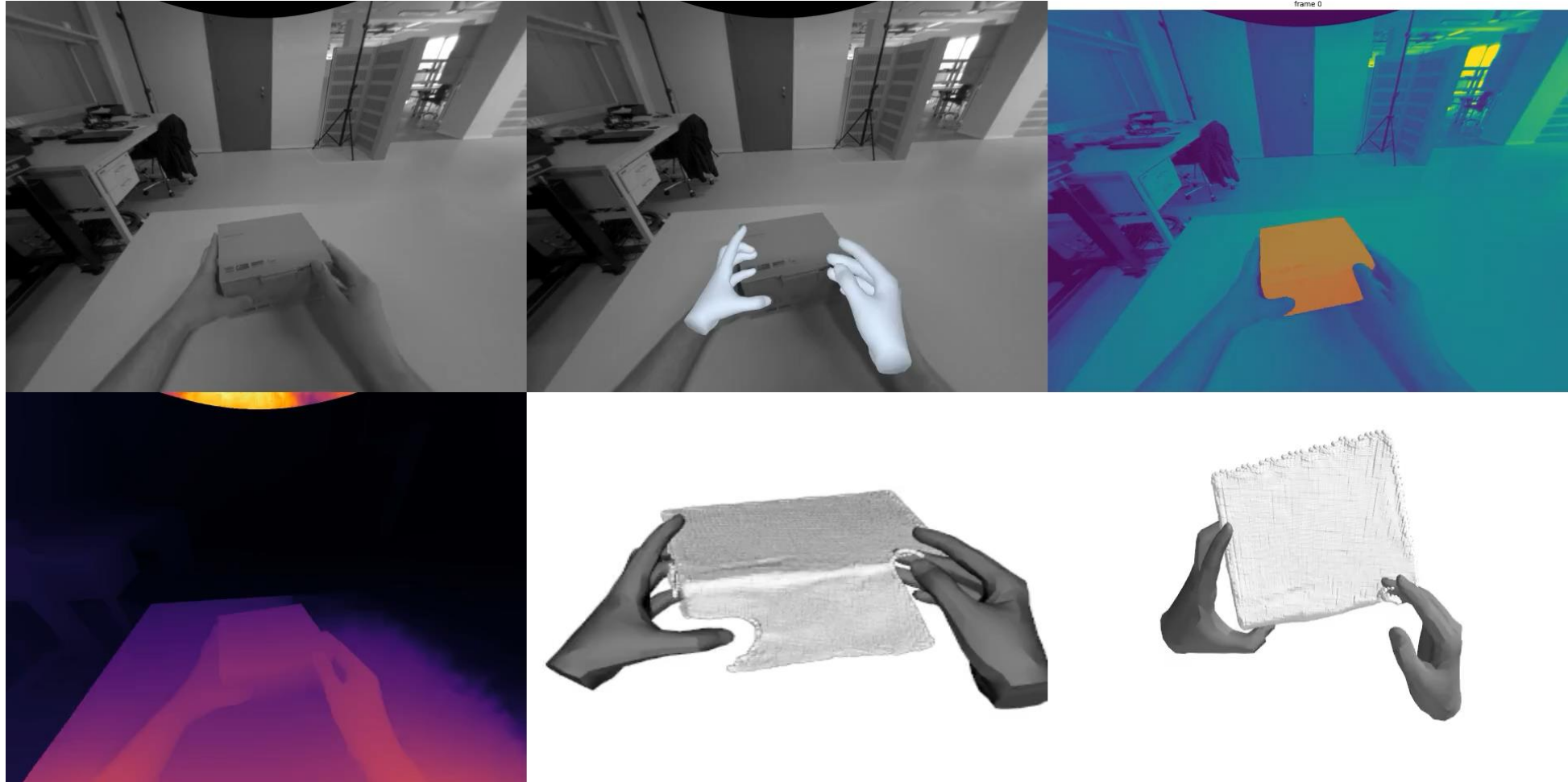
- 17 x OpiTrack Cameras.
- 4 x RGB Cameras
- Hardware Synchronised

Hand Motion Capture

- Recorded using the Aria Glasses with Head Tracking
- Forward-facing camera.



Hand Interaction



- Two hands tracking
- Object detection and reconstruction (Not real-time!)

Detailed Facial and Upper Body Capture

Ground Truth

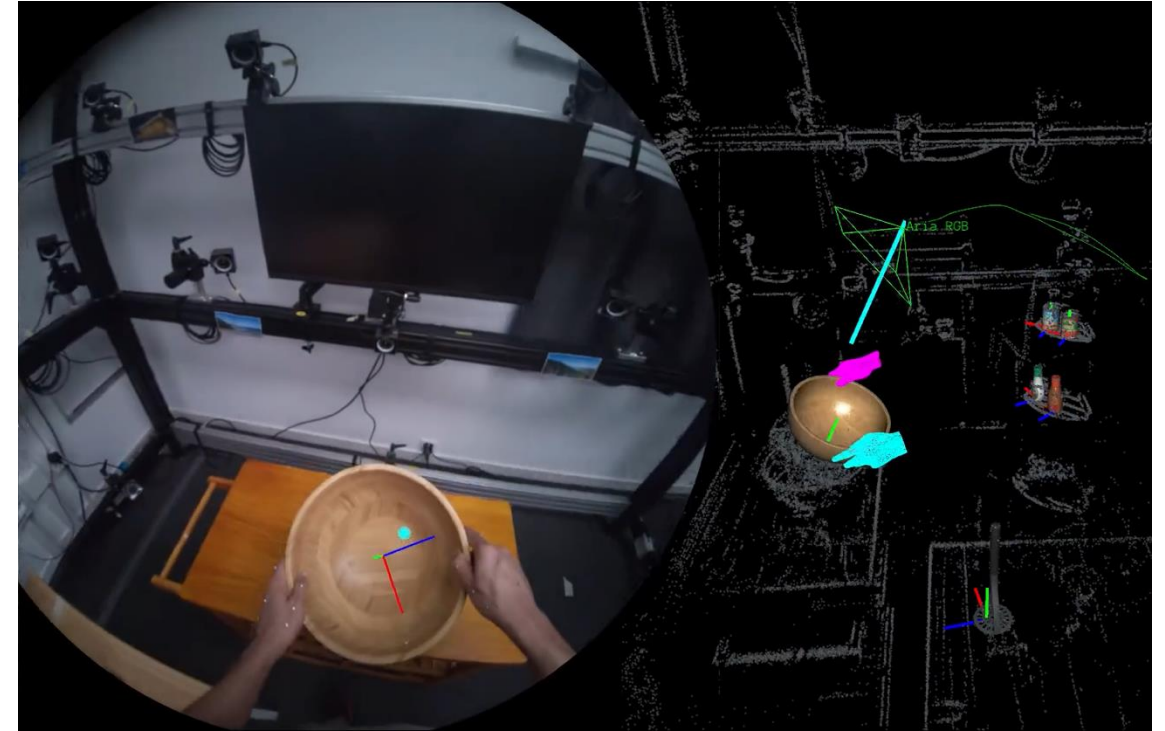


Ours



Conclusion and Outlook

- Reducing the gap between motion capturing and animation
- Many R&D questions are still existing:
 - From kinematics to bio-mechanics
 - Add object pose and appearance
 - To model object-hand interactions



HOT3D, Banerjee et al.

Thank you!



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Questions?