

#### Building Virtual Worlds with 3D Sensing and AI

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Deutsches Forschungszentrum für Künstliche Intelligenz German Research Center for Artificial Intelligence

# Meaningful Object-centric XR



Deep Multi-state Object Pose Estimation for Augmented Reality Assembly, Yongzhi Su, Jason Rambach, Alain Pagani and Didier Stricker IEEE International Symposium on Mixed and Augmented Reality ISMAR-2019 TGA: Two-level Group Attention for Assembly State Detection, Hangfan Liu, Yongzhi Su, Jason Rambach, Alain Pagani and Didier Stricker IEEE International Symposium on Mixed and Augmented Reality ISMAR-2020





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## Remote Support - Maintenance









## Object-centric applications







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#### **Object Pose Estimation**

**XR Application** 



Code prediction and 6DoF pose estimation

Y.Su, M.Saleh, T.Fetzer, J.Rambach, N.Navab, B.Busam, D.Stricker and F.Tombari. ZebraPose: Coarse to Fine Surface Encoding for 6DoF Object Pose Estimation, CVPR 2022





## The role of Perception



- XR should be possible **anywhere** Localization, SLAM, Reconstruction
- XR should be universally applicable Robust perception
- XR should understand the environment Semantics (Classification, Segmentation)
- XR should understand the user and interaction

Gestures, Hand-object interaction, Gaze

XR needs AI perception!







## Scaling Up - HumanTech







dfki Augmented Vision

### Scan-to-BIM











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## Semantic Segmentation









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## **Clustering and Primitive Fitting**









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## Wall closing - Merging







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### BIM in XR









## HumanTech – Al in construction



humantec

22 Partners, 10 Countries Research Institutes Innovative SMEs und large enterprises Construction companies

#### https://humantech-horizon.eu/





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tecnal:a sci-Track BER OF BASQUE RESEARCH



hypercliq 🙋 HOLO-LIGHT 😋 Catenda







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## Research Frontiers – Scan-to-CAD





SSMP

Di, Y., Zhang, C., Zhang, R., Manhardt, F., Su, Y., Rambach, J., ... & Tombari, F. (2023). U-RED: Unsupervised 3D Shape Retrieval and Deformation for Partial Point Clouds. In Proceedings of the IEEE/CVF International Conference on Computer Vision (pp. 8884-8895).



#### **Thank you! Questions?**

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More Information: DFKI: https://www.dfki.de/web DFKI Augmented Vision: <a href="https://av.dfki.de/">https://av.dfki.de/</a> Team Spatial Sensing and Machine Perception: <u>https://av.dfki.de/team-home/?team\_id=10</u>





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