



Christoph Leuze

Casual - Non-Exempt, Rad/Body Imaging

Bio

BIO

Dr. Christoph Leuze is director of the Visualization Core at the Stanford Wu Tsai Institute where his research focuses on data visualization, data processing and user interaction. His goal is to leverage Artificial Intelligence and Augmented Reality to automate creation of guidance and training applications by learning from expert users. He taught the first Stanford course on medical mixed reality development and founded the Stanford Medical Mixed Reality program, an institute-wide initiative to bring together academia, clinic and industry to establish and improve mixed reality applications for patient care.

Dr. Leuze has received multiple prizes for his work in Augmented Reality including the IEEE VR People's choice award for the best AR demo, the TechConnect Award for one of the most promising technological innovations for national security and the prize for the best 3D video at the Ars Electronica Art and Science Festival. Dr. Leuze has studied at Leipzig and Chiba University and received the Otto Hahn medal of the Max Planck Society for his PhD thesis at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig.

HONORS AND AWARDS

- Stanford Neuroscience Institute Interdisciplinary Scholar Awards, Stanford Neuroscience Institute (2015)
- Otto-Hahn-Medal, Max Planck Society (2014)

EDUCATION AND CERTIFICATIONS

- Postdoc, Stanford University , Radiology (2017)
- PhD, Max Planck Institute for Human Cognitive and Brain Sciences & University of Leipzig , Physics (2013)
- MS, University of Leipzig , Physics (2008)

PROJECTS

- BrainVR (5/2016 - 10/2016)
- Ars Electronica (7/2013 - 9/2013)

LINKS

- Medical Mixed Reality Lab: <http://med.stanford.edu/immers.html>

Publications

PUBLICATIONS

- **VR MRI Training for Adolescents: A Comparative Study of Gamified VR, Passive VR, 360° Video, and Traditional Educational Video**
Yang, Y., Guo, M., Wu, Y., Niu, W., Corona, E., Daniel, B., Leuze, C., Baik, F.

2025

- **HoloDIEP-Faster and More Accurate Intraoperative DIEA Perforator Mapping Using a Novel Mixed Reality Tool.** *Journal of reconstructive microsurgery*
Necker, F. N., Cholok, D. J., Fischer, M. J., Shaheen, M. S., Gifford, K., Januszyk, M., Leuze, C. W., Scholz, M., Daniel, B. L., Momeni, A.
2024
- **Leveraging the Apple Ecosystem: Easy Viewing and Sharing of Three-dimensional Perforator Visualizations via iPad/iPhone-based Augmented Reality.** *Plastic and reconstructive surgery. Global open*
Necker, F. N., Cholok, D. J., Shaheen, M. S., Fischer, M. J., Gifford, K., El Chemaly, T., Leuze, C. W., Scholz, M., Daniel, B. L., Momeni, A.
2024; 12 (7): e5940
- **The Reconstructive Metaverse - Collaboration in Real-Time Shared Mixed Reality Environments for Microsurgical Reconstruction.** *Surgical innovation*
Necker, F. N., Cholok, D. J., Shaheen, M. S., Fischer, M. J., Gifford, K., El Chemaly, T., Leuze, C. W., Scholz, M., Daniel, B. L., Momeni, A.
2024: 15533506241262946
- **Suture Packaging as a Marker for Intraoperative Image Alignment in Augmented Reality on Mobile Devices.** *Plastic and reconstructive surgery. Global open*
Necker, F. N., Cholok, D. J., Shaheen, M. S., Fischer, M. J., Gifford, K., Le Castillo, C., Scholz, M., Leuze, C. W., Daniel, B. L., Momeni, A.
2024; 12 (6): e5933
- **Increasing DIEA Perforator Detail in 3D Photorealistic Volume Rendering Visualizations with Skin-masking and Cinematic Anatomy.** *Plastic and reconstructive surgery*
Necker, F. N., Cholok, D. J., Shaheen, M. S., Fischer, M. J., Gifford, K., El Chemaly, T., Leuze, C. W., Scholz, M., Daniel, B. L., Momeni, A.
2024
- **An orexigenic subnetwork within the human hippocampus.** *Nature*
Barbosa, D. A., Gattas, S., Salgado, J. S., Kuijper, F. M., Wang, A. R., Huang, Y., Kakusa, B., Leuze, C., Luczak, A., Rapp, P., Malenka, R. C., Hermes, D., Miller, et al
2023
- **An orexigenic subnetwork within the human hippocampus** *NATURE*
Barbosa, D. A. N., Gattas, S., Salgado, J. S., Kuijper, F., Wang, A. R., Huang, Y., Kakusa, B., Leuze, C., Luczak, A., Rapp, P., Malenka, R. C., Hermes, D., Miller, et al
2023
- **Stereoscopic calibration for augmented reality visualization in microscopic surgery.** *International journal of computer assisted radiology and surgery*
El Chemaly, T., Athayde Neves, C., Leuze, C., Hargreaves, B., H Blevins, N.
2023
- **Spatial Fidelity of Microvascular Perforating Vessels as Perceived by Augmented Reality Virtual Projections.** *Plastic and reconstructive surgery*
Cholok, D. J., Fischer, M. J., Leuze, C. W., Januszyk, M., Daniel, B. L., Momeni, A.
2023
- **Virtual Resection Specimen Interaction Using Augmented Reality Holograms to Guide Margin Communication and Flap Sizing.** *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*
Necker, F. N., Chang, M., Leuze, C., Topf, M. C., Daniel, B. L., Baik, F. M.
2023
- **The Impact of Occlusion on Depth Perception at Arm's Length.** *IEEE transactions on visualization and computer graphics*
Fischer, M., Rosenberg, J., Leuze, C., Hargreaves, B., Daniel, B.
2023; 29 (11): 4494-4502
- **Augmented Reality for Medical Training in Eastern Africa**
Oduor, P., Mushila, L., Cheta, D., Kageha, L., Daniel, B., Nyachiro, L., Okwiri, D., Ogana, S., Ng'abwa, T., Rosenberg, J., Arudo, J., Sum, T., Leuze, et al
IEEE COMPUTER SOC.2023: 891-892

- **Audiovisual augmentation for coil positioning in transcranial magnetic stimulation** *COMPUTER METHODS IN BIOMECHANICS AND BIOMEDICAL ENGINEERING-IMAGING AND VISUALIZATION*
Schutz, L., Weber, E., Niu, W., Daniel, B., McNab, J., Navab, N., Leuze, C.
2022
- **Remote Training for Medical Staff in Low-Resource Environments Using Augmented Reality.** *Journal of imaging*
Hale, A., Fischer, M., Schutz, L., Fuchs, H., Leuze, C.
2022; 8 (12)
- **Changes In The Cerebello-thalamo-cortical Network After MR-guided Focused Ultrasound Thalamotomy.** *Brain connectivity*
Thaler, C., Tian, Q., Wintermark, M., Ghanouni, P., Halpern, C., Henderson, J., Airan, R., Zeineh, M., Goubran, M., Leuze, C., Fiehler, J., Butts Pauly, K., McNab, et al
2022
- **Evaluation Challenges for the Application of Extended Reality Devices in Medicine.** *Journal of digital imaging*
Beams, R., Brown, E., Cheng, W., Joyner, J. S., Kim, A. S., Kontson, K., Amiras, D., Baeuerle, T., Greenleaf, W., Grossmann, R. J., Gupta, A., Hamilton, C., Hua, et al
2022
- **Phantom study of SPECT/CT augmented reality for intraoperative localization of sentinel lymph nodes in head and neck melanoma.** *Oral oncology*
Nakamoto, R., Zhuo, J., Guja, K. E., Duan, H., Perkins, S. L., Leuze, C., Daniel, B. L., Franc, B. L.
1800; 125: 105702
- **Augmented Reality for Retrosigmoid Craniotomy Planning** *JOURNAL OF NEUROLOGICAL SURGERY PART B-SKULL BASE*
Leuze, C., Neves, C. A., Gomez, A. M., Navab, N., Blevins, N., Vaisbuch, Y., McNab, J. A.
2021
- **Nanostructure-specific X-ray tomography reveals myelin levels, integrity and axon orientations in mouse and human nervous tissue.** *Nature communications*
Georgiadis, M., Schroeter, A., Gao, Z., Guizar-Sicairos, M., Liebi, M., Leuze, C., McNab, J. A., Balolia, A., Veraart, J., Ades-Aron, B., Kim, S., Shepherd, T., Lee, et al
2021; 12 (1): 2941
- **Augmented Reality Visualization Tool For The Future of Tactical Combat Casualty Care.** *The journal of trauma and acute care surgery*
Leuze, C., Zoellner, A., Schmidt, A. R., Fischer, M. J., Cushing, R. E., Joltres, K., Zientara, G. P.
2021
- **Comparison of diffusion MRI and CLARITY fiber orientation estimates in both gray and white matter regions of human and primate brain.** *NeuroImage*
Leuze, C., Goubran, M., Barakovic, M., Aswendt, M., Tian, Q., Hsueh, B., Crow, A., Weber, E. M., Steinberg, G. K., Zeineh, M., Plowey, E. D., Daducci, A., Innocenti, et al
2020; 228: 117692
- **Application of holographic augmented reality for external approaches to the frontal sinus.** *International forum of allergy & rhinology*
Neves, C. A., Vaisbuch, Y. n., Leuze, C. n., McNab, J. A., Daniel, B. n., Blevins, N. H., Hwang, P. H.
2020
- **Evaluation of Different Visualization Techniques for Perception-Based Alignment in Medical AR**
Fischer, M., Leuze, C., Perkins, S., Rosenberg, J., Daniel, B., Martin-Gomez, A., IEEE COMP SOC
IEEE COMPUTER SOC.2020: 45-50
- **Comparison of head pose tracking methods for mixed-reality neuronavigation for transcranial magnetic stimulation** *SPIE Medical Imaging*
Sathyanarayana, S., Leuze, C., Hargreaves, B., Daniel, B. L., Wetzstein, G., Etkin, A., Bhati, M. T., McNab, J. A.
2020
- **Landmark-based mixed-reality perceptual alignment of medical imaging data and accuracy validation in living subjects** *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*
Leuze, C., Sathyanarayana, S., Daniel, B. L., McNab, J. A.
2020

- **Multimodal characterization of the human nucleus accumbens** *NEUROIMAGE*
Cartmell, S. C. D., Tian, Q., Thio, B. J., Leuze, C., Ye, L., Williams, N. R., Yang, G., Ben-Dor, G., Deisseroth, K., Grill, W. M., McNab, J. A., Halpern, C. H.
2019; 198: 137–49
- **Generalized diffusion spectrum magnetic resonance imaging (GDSI) for model-free reconstruction of the ensemble average propagator** *NEUROIMAGE*
Tian, Q., Yang, G., Leuze, C., Rokem, A., Edlow, B. L., McNab, J. A.
2019; 189: 497–515
- **Multimodal image registration and connectivity analysis for integration of connectomic data from microscopy to MRI.** *Nature communications*
Goubran, M. n., Leuze, C. n., Hsueh, B. n., Aswendt, M. n., Ye, L. n., Tian, Q. n., Cheng, M. Y., Crow, A. n., Steinberg, G. K., McNab, J. A., Deisseroth, K. n., Zeineh, M. n.
2019; 10 (1): 5504
- **RNA-Sequencing Analysis Revealed a Distinct Motor Cortex Transcriptome in Spontaneously Recovered Mice After Stroke** *STROKE*
Ito, M., Aswendt, M., Lee, A. G., Ishizaka, S., Cao, Z., Wang, E. H., Levy, S. L., Smerin, D. L., McNab, J. A., Zeineh, M., Leuze, C., Goubran, M., Cheng, et al
2018; 49 (9): 2191–99
- **Double diffusion encoding MRI for the clinic** *MAGNETIC RESONANCE IN MEDICINE*
Yang, G., Tian, Q., Leuze, C., Wintermark, M., McNab, J. A.
2018; 80 (2): 507–20
- **Mixed-reality guidance for brain stimulation treatment of depression**
Leuze, C., Yang, G., Hargreaves, B., Daniel, B., McNab, J. A., IEEE
IEEE.2018: 377–80
- **The separate effects of lipids and proteins on brain MRI contrast revealed through tissue clearing.** *NeuroImage*
Leuze, C., Aswendt, M., Ferenczi, E., Liu, C. W., Hsueh, B., Goubran, M., Tian, Q., Steinberg, G., Zeineh, M. M., Deisseroth, K., McNab, J. A.
2017
- **The separate effects of lipids and proteins on brain MRI contrast revealed through tissue clearing.** *NeuroImage*
Leuze, C., Aswendt, M., Ferenczi, E., Liu, C. W., Hsueh, B., Goubran, M., Tian, Q., Steinberg, G., Zeineh, M. M., Deisseroth, K., McNab, J. A.
2017
- **Early Non-invasive Detection of Acute 1,2-Dichloroethane-induced Toxic Encephalopathy in Rats.** *In vivo*
Zhou, X., Cao, Y., Leuze, C., Nie, B., Shan, B., Zhou, W., Cipriano, P., Xiao, B. O.
2016; 30 (6): 787-793
- **Myelin and iron concentration in the human brain: A quantitative study of MRI contrast.** *NeuroImage*
Stüber, C., Morawski, M., Schäfer, A., Labadie, C., Wähnert, M., Leuze, C., Streicher, M., Barapatre, N., Reimann, K., Geyer, S., Spemann, D., Turner, R.
2014
- **Layer-Specific Intracortical Connectivity Revealed with Diffusion MRI** *CEREBRAL CORTEX*
Leuze, C. W., Anwender, A., Bazin, P., Dhital, B., Stueber, C., Reimann, K., Geyer, S., Turner, R.
2014; 24 (2): 328-339
- **Systematic changes to the apparent diffusion tensor of in vivo rat brain measured with an oscillating-gradient spin-echo sequence** *NEUROIMAGE*
Kershaw, J., Leuze, C., Aoki, I., Obata, T., Kanno, I., Ito, H., Yamaguchi, Y., Handa, H.
2013; 70: 10-20
- **Quantitative measurement of changes in calcium channel activity in vivo utilizing dynamic manganese-enhanced MRI (dMEMRI)** *NEUROIMAGE*
Leuze, C., Kimura, Y., Kershaw, J., Shibata, S., Saga, T., Chuang, K., Shimoyama, I., Aoki, I.
2012; 60 (1): 392-399

- **Marker-less co-registration of MRI data to a subject's head via a mixed reality device** *26th Annual meeting of the International Society for Magnetic Resonance in Medicine*
Leuze, C., Yang, G., Wetzstein, G., Mahendra, B., Etkin, A., McNab, J.
2018
- **Holographic Visualization of Brain MRI with Real-Time Alignment to a Human Subject** *25th Annual meeting of the International Society for Magnetic Resonance in Medicine*
Leuze, C., Subashini, S., Lin, M., Hargreaves, B., Daniel, B., McNab, J.
2017