



Christoph Leuze

Physical Science Research Scientist, Rad/Radiological Sciences Laboratory

Bio

BIO

Dr. Leuze is working on techniques for visualization of MRI data using virtual and augmented reality devices. He has developed an MRI viewer for the Samsung Gear VR and has presented projects on MRI data volumetric visualization and registration to the real world using the Microsoft HoloLens and the Intel RealSense camera. Dr. Leuze is furthermore refining MRI techniques for measuring brain circuits by validation with tissue clearing and optical imaging methods.

HONORS AND AWARDS

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

EDUCATION AND CERTIFICATIONS

- 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

- **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., Joltes, 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
- **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. 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
- **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
- **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
- **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
- **The separate effects of lipids and proteins on brain MRI contrast revealed through tissue clearing.** *NeuroImage*
Leuze, C. n., Aswendt, M. n., Ferenczi, E. n., Liu, C. W., Hsueh, B. n., Goubran, M. n., Tian, Q. n., Steinberg, G. n., Zeineh, M. M., Deisseroth, K. n., 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
- **Layer-Specific Intracortical Connectivity Revealed with Diffusion MRI** *CEREBRAL CORTEX*
Leuze, C. W., Anwander, A., Bazin, P., Dhital, B., Stueber, C., Reimann, K., Geyer, S., Turner, R.
2014; 24 (2): 328-339
- **Myelin and iron concentration in the human brain: A quantitative study of MRI contrast.** *NeuroImage*
Stüber, C. n., Morawski, M. n., Schäfer, A. n., Labadie, C. n., Wähnert, M. n., Leuze, C. n., Streicher, M. n., Barapatre, N. n., Reimann, K. n., Geyer, S. n., Spemann, D. n., Turner, R. n.
2014
- **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