Wiete Fehner

f.wiete@wustl.edu |wifehn.github.io | LinkedIn | Google Scholar
PhD Candidate in Imaging Science | Computational Neuroimaging & HD-DOT

PhD candidate in Imaging Science with a background in philosophy, neuroscience, and engineering. I develop methods for semantic decoding and functional mapping using fiber-based and wearable high-density diffuse optical tomography (HD-DOT), enabling naturalistic brain imaging beyond traditional laboratory settings.

Skills

Neuroimaging: HD-DOT, fNIRS, fMRI data collection & analysis; experimental paradigms & stimulus development.
Computation & Modeling: Ridge regression, dimensionality reduction (PCA, Clustering), cross-validation & bootstrapping.
Programming: Python (NumPy, SciPy, scikit-learn, h5py, matplotlib, PyTorch), MATLAB (NeuroDOT), Bash, Docker.
Data & Signal Processing: Filtering/artifact correction, large-scale data handling (HDF5/SNIRF), reproducible pipelines.
Tools: NeuroDOT, FreeSurfer, fMRIPrep, BIDS, Git/GitHub, Adobe Illustrator, Jupyter/Colab, Linux.

Education

Washington University in St. Louis | PhD in Imaging Science *08/2021 – 05/2026*
Washington University in St. Louis | MS (no thesis) in Electrical Engineering *08/2021 – 12/2023*
University of Turku | MS (thesis) in Human Neuroscience *08/2019 – 05/2021*
Carl von Ossietzky University of Oldenburg | BS (thesis) in Philosophy and Gender Studies *10/2014 – 06/2017*

Research Experience

PhD Research | NeuroPhoto Lab | PI: Dr. Joseph P. Culver *01/2022 – 05/2026*
- Develop encoding/decoding models using HD-DOT with >1,000-dim semantic spaces.
- Build reproducible pipelines (Python/MATLAB) for time-series analysis, PCA, and clustering.
- Design and run naturalistic neuroimaging experiments using fiber-based and wearable HD-DOT.
- Lead wearable HD-DOT validation (localizers, movie mapping; N=17).
- Mentor multiple graduate and undergrad researchers; lead onboarding and training.

Graduate Research Assistant | Ances Bioimaging Laboratory | PI: Dr. Beau Ances *09/2021 – 01/2022*
- DTI preprocessing and statistical modeling of Alzheimer's and Down syndrome cohorts (Freesurfer, FSL, R).

Graduate Research Assistant | TBMC Optical Imaging Lab | PI: Dr. Teemu Rinne *10/2019 – 05/2021*
- Designed auditory fNIRS studies; built optical imaging lab infrastructure.

Teaching & Mentoring Experience

Graduate Student Mentoring | NeuroPhoto Lab *01/2025 – present*
Undergraduate Student Mentoring | NeuroPhoto Lab 09/*2023 – present*
fNIRS Summer School Organizer *01/2025 – 08/2025*
Graduate Teaching Assistant | Practicum in Computational Imaging (ESE 5934) *01/2024 – 05/2024*

Grants & Fellowships (Selected)

Imaging Science Pathway Fellowship (NIH T32) | Washington University in St. Louis, USA *01/2023 – 10/2024*

Awards & Honors (Selected)

SPIE Photonics West travel grant | San Francisco, USA 11/2025
SfN Trainee Professional Development Award| San Diego, USA 08/2025
Trainee Travel Award for the Neuroscience of the Everyday World Conference 2025 | Boston, USA 06/2025
1st Place Poster Award at Imaging Science Pathway Retreat 2024 | St. Louis, USA 04/2024
Imaging Science Outstanding Leadership Award 05/2024
Nominated by WashU for the Google PhD Fellowship 04/2024

Professional Leadership & Service (Selected)

Communications Committee SfNIRS *01/2025 - present*

President/Vice President, Association of Graduate Engineering Students (AGES) *05/2022 – 05/2024*
Graduate Ambassador, McKelvey School of Engineering *05/2022 – present*

PUBLICATIONS

In Review

1. Fogarty, M., Sherafati, A., Markow, Z.E., **Fehner, W.**, Camacho, M.C., Tang, J., Huth, A.G., Anastasio., M.A., Culver, J.P., (In Review). Leveraging large-scale fMRI datasets to simulate and evaluate the potential performance of human optical neuroimaging systems. Imaging Neuroscience.

Submitted

1. **W. Fehner,** M. Fogarty, A. Bajracharya, Z.E. Markow, D. Wilhelm, J. Tang, A. Hines, J. Trobaugh, A. G. Huth, J. P Culver, (Submitted). Semantic Visual Encoding and Identification of Naturalistic Movies via Very High-Density Diffuse Optical Tomography.

In prep (First Author Manuscripts)

3 manuscripts (precision multi-session imaging with HD-DOT, wearable HD-DOT system paper, semantic decoding with wearable HD-DOT).

LECTURES AND SEMINARS

1. **Fehner, W.** "Naturalistic Semantic Mapping with HD-DOT" (lecture); fNIRS Summer School 2025, July 2025.
2. **Fehner, W.** "Head Model Validation and Post-Processing" (hands-on); fNIRS Summer School 2025, July 2025.
3. J.P Culver, **W. Fehner**, M. Fogarty, "From fMRI to Optical Imaging: A Paradigm Shift in Naturalistic Cortical Mapping", Symposia Organizers, Organization for Human Brain Mapping, June 25, 2025, Brisbane, Australia.

CONFERENCE TALKS (SELECTED)

1. **Fehner, W.**, Fogarty, M., Bajracharya, A., Markow, Z. E., Wilhelm, D., Tang, J., Trobaugh, J. W., Huth, A. G., & Culver, J. P. (2025). Semantic mapping of visual object categories in movies using very high-density diffuse optical tomography. Neural Imaging and Sensing 2025, 20. https://doi.org/10.1117/12.3041378
2. **Fehner, W.**, Markow, Z., Fogarty, M., Bajracharya, A., Wilhelm, D., Huth, A. G., Culver, J. P. (2024). "Towards Semantic Visual Decoding of Naturalistic Movies with High-Density Diffuse Optical Tomography." Invited talk for the MIR Research Symposium 2024, St. Louis, USA, May 2024.
3. **Fehner, W**., Fogarty, M., Anastasio, M. A., & Culver, J. P. (2023). "Evaluation of multivariate approaches to functional connectivity mapping with fNIRS." In Proceedings of SPIE PC12365, Neural Imaging and Sensing 2023, PC123650C (17 March 2023).
4. **W. Fehner**, M. Fogarty, M.A. Anastasio, J.P. Culver. (2023). "Comparison of Multivariate and Bivariate Functional Connectivity Approaches using High-Density Diffuse Optical Tomography for Human Brain Mapping." Invited talk presented at the Imaging Science Pathway Retreat 2023, St. Louis, USA (30 March 2023).

CONFERENCE POSTER PRESENTATIONS (SELECTED)

1. **W. Fehner**, M. Fogarty, A. Bajracharya, Z.E. Markow, D. Wilhelm, J. Tang, A. Hines, J. Trobaugh, A. G. Huth, J. P Culver, "Decoding of Naturalistic Movie Clips with a Semantic Model using HD-DOT", Neuroscience of the Everyday World, July 2025, Boston, USA.
2. W.T. Hamic, **W. Fehner**, M. Fogarty, A.S. Agato, H.E. DeVore, S.M. Rafferty, D. Wilhelm, A.C. O'Sullivan, C.F. Svoboda, J.W. Trobaugh, A.T. Eggebrecht, E.J. Richter, J.P. Culver, "Wearable High-Density Diffuse Optical Tomography in Naturalistic Environments", Neuroscience of the Everyday World, July 2025, Boston, USA.
3. **W. Fehner**, M. Fogarty, A. Bajracharya, Z.E. Markow, D. Wilhelm, J. Trobaugh, J. Tang, A. Hines, A.G. Huth, J.P. Culver, "Advancing Semantic Mapping for Naturalistic Settings with High-Density Diffuse Optical Tomography", Organization of Human Brain Mapping, June 2025, Brisbane, Australia.
4. **Fehner, W.,** Fogarty, M., Bajracharya, A., Markow, Z.E., Wilhelm, W., Trobaugh, J., Huth, A. G., Culver, J. P. (2024). "Towards Semantic Encoding of Visual Content in Movies via High-Density Diffuse Optical Tomography." Poster at Society for fNIRS Conference 2024, Birmingham, GB (10 September 2024).