

SIMON DRÄGER

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EDUCATION

M.S. Computer Science

University of California, Davis

GPA: 3.96/4.0. Research in machine learning and multimodal perception.

Jan 2023 – Mar 2025

Davis, CA, USA

B.Sc. Computer Science

University of Düsseldorf

Thesis grade: 1.0, highest possible grade.

Oct 2019 – Sep 2022

Düsseldorf, Germany

SELECTED PUBLICATIONS

- **S. Dräger**. “Task-Restricted Symmetries in Recurrent Weight Space.” *ICML 2026 Workshop on Weight-Space Symmetries: from Foundations to Practical Applications*.
- C. Lainscsek, P. Salami, **S. Dräger**, A. R. Bulsara, S. S. Cash, and T. J. Sejnowski. “Causal Dynamic Resonance.” Accepted to the *Proceedings of the National Academy of Sciences (PNAS)*. Preprint: arXiv:2508.16733, 2025.
- X. Xiang, **S. Dräger**, and J. Zhang. “3DiffusionDet: Diffusion Model for 3D Object Detection with Robust LiDAR-Camera Fusion.” *ICASSP 2026*.
- X. Xiang, **S. Dräger**, and J. Zhang. “EffiPerception: A Plug-and-Play Efficiency Enhancement Framework for 2D and 3D Perception Models.” *PRICAI 2025*.
- **S. Dräger** and J. Dunkelau. “Evaluating the Impact of Loss Function Variation in Deep Learning for Classification.” Preprint: arXiv:2210.16003, 2022.

RESEARCH EXPERIENCE

Jr Scientific Programmer

Salk Institute for Biological Studies

Computational Neurobiology Laboratory, Terrence Sejnowski

Apr 2025 – Present

La Jolla, CA, USA

- Developed Schur-coordinate ablations of recurrent neural networks to identify which weight changes preserved memory and sequence generation across tasks and trained models. Authored the resulting ICML 2026 WSS workshop paper.
- Coauthored Causal Dynamic Resonance, accepted to PNAS, on identifying false causal links through noise perturbations, with evaluations on coupled dynamical systems and intracranial EEG.
- Led development of DDALAB, a Python/Qt/Rust application for nonlinear analysis of neurophysiological time series, integrating data import, analysis execution, interactive visualization, and reproducible analysis records.

Visiting Scholar

Salk Institute for Biological Studies

Computational Neurobiology Laboratory, Terrence Sejnowski

Jun 2024 – Sep 2024

La Jolla, CA, USA

- Built and presented the initial DDALAB prototype, turning analysis scripts into an application for data selection, computation, and visualization; refined the workflows through feedback from researchers.
- Mentored students in computational neurobiology, scientific programming, and data analysis.

Graduate Student Researcher

University of California, Davis

Supervisor: Jiawei Zhang

Apr 2023 – Apr 2024

Davis, CA, USA

- Developed training, evaluation, and ablation pipelines for diffusion-based 3D object detection and LiDAR-camera fusion in 3DiffusionDet (ICASSP 2026).
- Collaborated on model development and reproducible experiments for EffiPerception (PRICAI 2025), a framework for improving accuracy, speed, and memory trade-offs in 2D and 3D perception.

SELECTED RESEARCH SOFTWARE

DDALAB

Python, Qt, Rust

- Developed a desktop application and command-line interface for Delay Differential Analysis (DDA), with electrophysiology file support, BIDS integration, waveform and result visualization, and analysis history. Integrated remote computation through the Neuroscience Gateway.  GitHub

DelayDifferentialAnalysis.jl

Julia

- Developed a Julia package that exposes DDA through typed results and reusable analysis workflows. Implemented native CPU and CUDA-backed regression, interfaces to the established DDA binary, and resumable model and delay selection.  GitHub

dda-py

Python

- Developed a Python package for DDA on NumPy arrays and MNE recordings, with batch processing, BIDS workflows, pandas export, and plotting. Integrated native computation backends with Python result types and statistical comparisons.  GitHub

TEACHING AND SERVICE

Workshop Reviewer

2026

NeurIPS 2026

- Interpretability as a Science; Interpretability for Discovery; Symmetry and Geometry in Neural Representations (NeurReps).

Workshop Organizer

Aug 2025

Delay Differential Analysis (DDA)

- Organized a virtual workshop for 25 participants on DDA methods and software, and supported researchers learning DDALAB workflows. Workshop page

Teaching Assistant

Summer 2022

University of Düsseldorf

Düsseldorf, Germany

- Developed course materials, exams, and problem sets for undergraduate Statistical Data Analysis; supported students through weekly office hours.

PRESENTATIONS

Poster Presentation

2024

Dynamics Days

Davis, CA, USA

- The Importance of Architecture Choice in Deep Learning for Climate Applications.

TECHNICAL SKILLS

Programming: Python, Julia, Rust, C, TypeScript, JavaScript.

Scientific computing: PyTorch, TensorFlow, scikit-learn, Hugging Face, NumPy, MNE; recurrent-network analysis, controlled ablations, nonlinear time-series analysis.

Research software: Qt, FastAPI, Next.js, Docker, Git, SQLite, PostgreSQL, REST APIs, MinIO/S3-compatible storage.