Katharina Alina Kötter

Edinburgh, UK

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Computational Neuroscientist (PhD) specializing in machine learning, computer vision, and behavioral and neural signal processing. Expert in Python-based image analysis pipelines, microscope development, and closed-loop behavioral systems.

EDUCATION

Technical University of Munich, Munich, Germany 09/2019 – 03/2025
PhD in Computational Neuroscience

Thesis: "A behavioural setup for capturing fine-grained coordinated movements of zebrafish larvae", with R. Portugues. Developed a closed-loop behavioural acquisition setup and pipeline for image processing using machine learning and modelling of behavioural data for the study of motor coordination.

Karolinska Institutet, Stockholm, Sweden 09/2016 – 08/2018
MSc in Biomedicine

Thesis: "RNA single molecule imaging in large areas", with S. Linnarsson. Designed probes to increase the effectiveness of single-molecule fluorescent in situ hybridization (smFISH) for high-throughput microscopy.

University of Heidelberg, Heidelberg, Germany 10/2012 – 07/2016
BSc in Bioscience

Thesis: "Biomimicry of axon bundles for the study of axon navigation", with E. Pollerberg. Tested combinations of CAMs for axonal growth on embryonal cell cultures with micro-fluidic patterns.

EXPERIENCE

Research Operations Assistant 07/2025 – present
Metajoin Ltd., Edinburgh, UK
Part-time research position implementing an open source local LLM RAG approach on private data.

Research Assistant 05/2019 – 09/2019
Max Planck Institute for Biological Intelligence, Munich, Germany
Research position in Computational Neuroscience with R. Portugues running and analysing zebrafish behaviour and imaging experiments using Light Sheet Microscopy.

Research Assistant 02/2019 – 05/2019
Center for Psychosocial Medicine, University of Heidelberg, Germany
A clinical research position with O. Gruber, investigating depression through Genome Wide Association Analysis with `plink`, and fMRI imaging.

Erasmus Internship 09/2017 – 03/2018
Institute for Medical Psychiatry, University of Heidelberg, Germany
A clinical research internship to establish and optimise an Eye-Tracker Method in a social safety learning study with M. Eckstein using `SPSS` and psychological questionnaires.

SKILLS

Programming & Development: Python (Expert: OpenCV, TensorFlow, PyTorch, scikit-learn, Signal processing, modeling), R (Statistical analysis, data visualization), Git version control, GPU-accelerated computing

Machine Learning & Data Science: Deep learning, Computer vision, Neural networks, Time series analysis, Statistical modeling, Data visualization, Image processing, Feature extraction, Predictive analytics, Large-scale data analysis

Neuroscience & Image Analysis: Neural signal acquisition, Computational neuroscience, Neural signal processing, DeepLabCut (Pose estimation), Light sheet microscopy, Confocal microscopy, Image segmentation, Behavioral analysis, Closed-loop systems, Zebrafish locomotion research

Hardware & Systems Integration: Microscope interfacing, TTL pulse generation, Linear stage controllers, Circuit design, Arduino programming, Real-time data acquisition, Control systems, Hardware-software integration

Research & Communication: Analytical thinking, Experimental design, Cross-disciplinary collaboration, Scientific writing, Student supervision, Open-source development (Stytra contributor), Project management

Professional Development & Achievements

Summer Schools & Specialist Courses

Experimental Neuroscience Bootcamp, No Black Boxes (2025): Building a self-driving robot, Arduino, Raspberry Pi, Real-time Computer Vision.
Deep Learning, Neuromatch Academy (2025): Modern techniques in deep neural networks for neuroscience.
Electronics for Neuroscience, Nencki OpenLab (2025): Circuit design, Arduino, and `Bonsai-RX` for neurophysiology.
Advanced Modelling of Behaviour (BAMB), Barcelona School (2024): Bayesian inference, reinforcement learning, neural networks in Python.

Certificates
FELASA certificate in Laboratory Animal Science (EU legislation)
International Zebrafish and Medaka Course (IZMC)

PERSONAL

Natural Languages: German (native), English (fluent), Russian (conversation).

Hobbies and Volunteering: Excited about bouldering, painting, and photography. Exchange student in Hong Kong with AFS 2009-2010. Actively participated in multiple volunteering efforts, such as organizing and giving seminars for AFS.

PUBLICATIONS

1. *A Behavioural Setup for Capturing Fine Grained Coordinated Movements of Zebrafish Larvae.*

   T. Soares Mullen, Y. Farouj, O. Prat, N. van Beelen, M. Orger, R. Portugues, K. Koetter.

   Poster at FENS 24, Preprint

   To address the knowledge gap in motor coordination w.r.t. pectoral fins behaviour, I built a high-precision setup allowing us to track freely swimming zebrafish larvae while acquiring high-resolution images of their whole body, including fins, eyes, and tail. I described fin dynamics using Laplacian embedding and time series analysis. The pipeline consisted of image annotation with `DeepLabCut`, automatic segmentation, and tail-based behavioural classification.