KAARTHIK ABHINAV BALAKRISHNAN

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PROFESSIONAL SUMMARY

PhD in Biophysics with expertise in computational neuroscience, machine learning, and statistical modeling. First-author publications on neural encoding and behavioral modeling, with advanced proficiency in Python, TensorFlow, and large-scale data analysis. Passionate about applying data-driven methods to advance brain-computer interfaces and AI-driven healthcare.

EDUCATION

The Ohio State University — Columbus, OH
PhD Interdisciplinary Biophysics Graduate Program — 2019 - 2025
Relevant coursework: Biophysics, Neuroscience, Image Processing, Network Science, Computer Vision

Indian Institute of Science Education and Research, Pune — Pune, India
BS-MS Dual Degree in Physics — 2014 - 2019
Relevant coursework: Non-linear dynamics, Statistical Physics, Graph Theory, Algorithms, Electronics

SKILLS

- **Domain Expertise:** Neuroscience, Biophysical techniques, Exploratory Data Analysis, Statistical modeling
- **Programming Languages**: Proficient in Python, C++, MATLAB, LaTeX, FORTRAN
- **Machine Learning**: Scikit-learn, TensorFlow, PyTorch
- **Software:** ImageJ, GitHub, PyCharm, AutoCAD, Illustrator

NEUROSCIENCE RESEARCH EXPERIENCE

The Ohio State University — Columbus, OH
Graduate Research Assistant — February 2022 - July 2025

- **Developed new hardware designs** and experimental paradigms to expand research scope in thermoregulation that **improved throughput of experiments by 50%**.
- **Built scalable Python pipelines** to characterize the behavior of larval zebrafish under different natural thermal environments and **identified 7 novel neural cell types** that encode sensory information.
- Identified key new insights in behavioral neuroscience, critically pertaining to longer timescales, and applied Markov models to accurately model stochastic behavior of larval zebrafish. [Current Biology, 2025]

MACHINE LEARNING RESEARCH EXPERIENCE

The Ohio State University — Columbus, OH
Graduate Research Assistant — June 2020 - July 2023

- Developed and published a novel **explainable ML framework** to link neural activity with behavior and stimuli, achieving a **40% improvement in predictive accuracy** compared to existing methods [eLife.83289 (2023)].
- Co-led research collaboration, contributing to **first-author equal credit publication** and presenting findings at national conferences (*SfN 2022, NIH BRAIN 2024*).

PUBLICATIONS

1. **Behavioral and circuit principles of temperature gradient navigation (2025)**
   Kaarthik A. Balakrishnan, Martin Haesemeyer
   bioRxiv 2025.03.17.643749; DOI: https://doi.org/10.1016/j.cub.2025.09.053 (Current Biology, 2025)
2. **Model discovery to link neural activity to behavioral tasks (2023)**
   Jamie Costabile*, Kaarthik A. Balakrishnan*, Sina Schwinn, Martin Haesemeyer (*=*equal contribution*)
   eLife 2023;12: e83289. DOI: https://doi.org/10.7554/eLife.83289 (eLife, 2023)

AWARDS AND LEADERSHIP

- Received $500 travel grant through Neuroscience Camp, 2023 at The Ohio State University
- Outstanding Poster award at the IGP Symposium, 2025 at The Ohio State University
- Selected for travel grant in the first AI & Healthcare Design workshop, 2024 at Tulane University
- Mimamsa IISER Pune 2017 (Overall Coordinator, 2016-17)- led a team of 50 people to conduct a nationwide competition across India with over 1000 participants.
- Karavaan IISER Pune 2016 (R&A Team head)- led a team of 10 students to research and bring sponsorship to the cultural event of the institute