# Mohit Kulkarni

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## Education

**Harvard University** *2024 – 2025*
*Masters Thesis, Applied Mathematics*

**ETH Zurich and University of Zurich** *2023 – 2025*
*M.Sc, Neural Systems and Computation*

**Indian Institute of Technology, Kanpur** *2019 – 2023*
*B.S, Mathematics and Scientific Computing. Minor in Machine Learning*

## Publications

**Kulkarni, M.***, Chaudhry, H.*, Pehlevan, C. "Test-time scaling meets associative memory: Challenges in subquadratic models." `ICLR workshop on New Foundations in Associative Memory, 2025`

Daie, K., . . . , **Kulkarni, M.**, Botvinick, M.M., Svoboda, K. "Optical brain computer interface for measuring circuit plasticity during learning.", `In preparation`

## Experience

**Teaching Fellow, SEAS, Harvard University** *2025 – Present*

**Research Fellow, SEAS, Harvard University** *2024 – Present*
Prof. Cengiz Pehlevan

- Explored efficiency versus reasoning trade-offs in linear attention and hybrid architectures. Pre-trained, fine-tuned and scaled inference for sub-quadratic models of size 1B, 3B, and 7B using `flash-linear-attention` and `vLLM`.

**Research Assistant, Allen Institute for Neural Dynamics** *2020 – 2023*
Dr. Karel Svoboda, Dr. Kayvon Daie

- Built a scalable and efficient data analysis pipeline on `GCP` using `DataJoint`. Developed `RNN` models to understand learning in biological and artificial networks, comparing model predictions with experimental `2-Photon` recordings.

**Visiting Researcher, Imperial College London** *2021*
Prof. Dan Goodman and Dr. Friedemann Zenke (FMI, Basel)

- Created `SNUFA100` and `SNUFA100_sentence` datasets for evaluating Spiking Neural Networks; implemented baseline with surrogate gradient descent.

## Selected Projects

**GPU-accelerated Terminal Emulator** | *Personal Project* *GITHUB*

- Developed a C++/OpenGL based terminal emulator with support for colors, advanced text rendering (`ANSI X3.64`) and ligatures; now integrating LLM function calling for seamless in-terminal AI capabilities.

**Sign Language Segmentation** | *Course Project, NLP*

- Generated features from videos using `I3D`, combined them with subtitle features, and passed them through an `MS-TCN` model. Achieved an F1 score of 32%, state of the art for temporal segmentation of Indian sign language.

## Honors and Awards

**Heyning-Roelli Foundation Scholarship** | For Masters Thesis at Harvard *2024*

**Brain Computation and Learning Workshop Travel Grant** | IISc Bangalore *2023*

**Cosyne 2022, Undergraduate Travel Grant** | Lisbon, Portugal *2022*

**INSPIRE Scholarship** | Awarded throughout Bachelors *2019 – 2023*

**All India Rank 637** | JEE Advanced *2019*

## Skills

**Programming** | Python, C++, C, CUDA C
**Tools** | PyTorch, vLLM, OpenRLHF, DeepSpeed, Ray