ROHIT VARTAK

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EDUCATION

Duke University — Durham, NC, USA
*Master of Science in Computer Science (Grade : **3.883/4.0**)* — 2024 – (expected) 2026
Indian Institute of Technology Bombay — Mumbai, India
B.Tech. in Electrical Engineering
*M.Tech. in Artificial Intelligence and Data Science (Cumulative Grade : **9.02/10.0**)* — 2019 – 2024

PUBLICATIONS

▶ Akshay Paruchuri, Maryam Aziz, **Rohit Vartak**, and Ayman Ali, Best Uchehara, Xin Liu, Ishan Chatterjee, Monica Agrawal; **"What's Up, Doc?": Analyzing How Users Seek Health Information in Large-Scale Conversational AI Datasets**; *EMNLP Findings 2025(accepted)*   arXiv ○

▶ Raghav Singhal*, Kaustubh Ponkshe*, **Rohit Vartak***, and Praneeth Vepakomma; **ABBA-Adapters: Efficient and Expressive Fine-Tuning of Foundation Models**; *ES-FOMO @ ICML 2025 (**spotlight**); ICLR 2026 (accepted)*   arXiv ○

▶ Raghav Singhal*, Kaustubh Ponkshe*, **Rohit Vartak**, and Lav R. Varshney, Praneeth Vepakomma; **Fed-SB: A Silver Bullet for Extreme Communication Efficiency and Performance in (Private) Federated LoRA Fine-Tuning**; *ES-FOMO @ ICML 2025(accepted); TMLR 2026 (under review)*   arXiv ○

▶ Praneeth Vepakomma, **Rohit Vartak**, Allan Zea, Subha Nawer Pushpita, and Vikrant Singhal, **Several All-Pairs Distance Statistics with Node Differential Privacy including Several Moments and Distance Covariance.** (2025)   [paper]

▶ **Rohit Vartak**, Vivek Saraswat, and Udayan Ganguly; **Robustness to Variability and Asymmetry of In-Memory On-Chip Training**; *ICANN 2023*   [paper]

RESEARCH EXPERIENCES

Health Information-Seeking Patterns in Conversational AI — Mar 2025 - May 2025
Guide: Prof. Monica Agrawal, Duke University
- Designed initial data filtering pipelines to extract health-related queries from large conversational datasets
- Helped in dataset annotation and taxonomy design, contributing to creation of the HealthChat-11k dataset

Highly Expressive Hadamard Product Adaptation for Large Language Models — Mar 2025 - Apr 2025
Guide: Prof. Praneeth Vepakomma, MIT & MBZUAI
- Innovated ABBA, a novel PEFT architecture that reparameterizes updates as a Hadamard product of two low-rank matrices to achieve significantly higher expressivity under the same parameter budget
- Showed consistent gains across reasoning tasks, with 2x fewer parameters as SOTA; provided theoretical guarantees for training stability, different initialization schemes and memory-efficient reformulation

Extremely Efficient Federated LoRA Fine-Tuning — Jan 2025 - Mar 2025
Guide: Prof. Praneeth Vepakomma, MIT & MBZUAI
- Proposed Fed-SB, a federated fine-tuning method for LLMs that ensures exact local updates and exact averaging across clients, reducing communication cost and enabling scalable adaptation.
- Demonstrated superior performance across commonsense reasoning, mathematical reasoning and language understanding tasks, reducing communication costs by up to 230x-even beating pareto-frontier

Full Fine-Tuning Like Hadamard Adaptation — Jun 2025 - Aug 2025
Guide: Prof. Praneeth Vepakomma, MIT & MBZUAI
- Extended ABBA LoRA with full fine-tuning like updates by projecting Adam's first and second moments into ABBA's Hadamard-factorized subspace, aligning optimizer dynamics close to full-model training
- Developed code and conducted preliminary evaluations, establishing a foundation for further optimization

Mix-up and Knowledge Distillation | M.Tech Thesis — Jan 2024 - Jul 2024
Coguides: Dr. Pradeep Shenoy, Google DeepMind India & Prof. Ganesh Ramakrishnan, IIT Bombay
- Investigated several different mix-up strategies in KD, achieving ∼**1%** accuracy gain over vanilla KD
- Developed an exploratory optimization framework for adaptive mix-up using student uncertainty and similarity regularization; though empirically limited, the work clarified key challenges

Differentially private two-party hypothesis testing — Mar 2024 - Aug 2024
Guide: Prof. Praneeth Vepakomma, MIT & MBZUAI
- Developed a privacy-preserving scheme to compute sum of distances measure in a private setting
- Formulated a decomposition formula to bound the differentially private distance covariance statistic

On-Chip Training under Variability & Asymmetry | B. Tech Thesis — Jan 2022 – Apr 2023
Guide: Prof. Udayan Ganguly, IIT Bombay
- Proposed Weight Perturbation to reduce the resource requirements of training neural networks on-chip
- Innovated a new update rule improving performance of an on-chip neural network by 9% points

ACHIEVEMENTS & ACADEMIC EXPERIENCES

- Awarded the **Undergraduate Research Award** for an **exceptional bachelor's thesis**
- Secured **All India Rank 1580** in **JEE (Advanced)-2019** among 1.5 million+ students
- Graduate TA for EE746: Neuromorphic Engineering for Fall 2023