

BHAVYA VASUDEVA

Email: bvasudeva@ucsd.edu, Website: estija.github.io



APPOINTMENTS

University of California San Diego (UCSD)

2026 - Present

Postdoctoral Scholar, Halıcıoğlu Data Science Institute

Advisors: Prof. Mikhail Belkin and Prof. Dmitriy Drusvyatskiy

EDUCATION

University of Southern California (USC)

2021 - 2026

Ph.D. in Computer Science

Advisor: Prof. Vatsal Sharan

Research Interests: Theoretical ML, Optimization, Science of Language Models

Indian Institute of Technology (IIT) Roorkee

2016 - 2020

B. Tech. in Electronics and Communication Engineering (GPA: 9.362/10, Rank: 3/84)

Thesis: Compressive Sensing MRI Reconstruction using GANs

Advisors: Prof. Saumik Bhattacharya & Prof. P. M. Pradhan

SELECTED PUBLICATIONS AND PREPRINTS

(* DENOTES EQUAL CONTRIBUTION)

Theoretical ML and Optimization

1. In-Context Benign Overfitting: A Feature-Selection Model in In-Context Linear Regression

P. Deora, [B. Vasudeva](#), C. Thrampoulidis

In Submission

2. How Muon's Spectral Design Benefits Generalization: A Study on Imbalanced Data

[B. Vasudeva](#), P. Deora, Y. Zhao, V. Sharan, C. Thrampoulidis

ICLR 2026

3. The Rich and the Simple: On the Implicit Bias of Adam and SGD

[B. Vasudeva](#), J. W. Lee, V. Sharan, M. Soltanolkotabi

NeurIPS 2025

4. Implicit Bias and Fast Convergence Rates for Self-attention

[B. Vasudeva](#)*, P. Deora*, C. Thrampoulidis

TMLR 2025

Science of Language Models

5. Understanding Contextual Recall in Transformers: How Finetuning Enables In-Context Reasoning over Pretraining Knowledge

[B. Vasudeva](#), P. Deora, A. Bietti, V. Sharan, C. Thrampoulidis

In Submission

6. Latent Concept Disentanglement in Transformer-based Language Models

G. Hong*, [B. Vasudeva](#)*, V. Sharan, C. Rashtchian, P. Raghavan, R. Panigrahy

ICLR 2026

7. In-Context Occam's Razor: How Transformers Prefer Simpler Hypotheses on the Fly

P. Deora, [B. Vasudeva](#), T. Behnia, C. Thrampoulidis

COLM 2025 (Oral at MOSS Workshop, ICML'25)

8. **Transformers Learn Low Sensitivity Functions: Investigations and Implications**

B. Vasudeva^{*}, D. Fu^{*}, T. Zhou, E. Kau, Y. Huang, V. Sharan

ICLR 2025

Other Work

9. **Mitigating Simplicity Bias in Deep Learning for Improved OOD Generalization & Robustness**

B. Vasudeva, K. Shahabi, V. Sharan

TMLR 2024

10. **Fast Test Error Rates for Gradient Methods on Separable Data**

P. Deora^{*}, B. Vasudeva^{*}, V. Sharan, C. Thrampoulidis

ICASSP 2024

11. **Compressed Sensing MRI Reconstruction with Co-VeGAN: Complex-Valued Generative Adversarial Network**

B. Vasudeva^{*}, P. Deora^{*}, S. Bhattacharya, P. M. Pradhan

WACV 2022

12. **LoOp: Looking for Optimal Hard Negative Embeddings for Deep Metric Learning**

B. Vasudeva^{*}, P. Deora^{*}, S. Bhattacharya, U. Pal, S. Chanda

ICCV 2021

13. **Structure Preserving Compressive Sensing MRI Reconstruction using GANs**

P. Deora^{*}, B. Vasudeva^{*}, S. Bhattacharya, P. M. Pradhan

CVPR Workshops 2020

14. **Multi-Phase Locking Value: A Generalized Method for Determining Instantaneous Multi-frequency Phase Coupling**

B. Vasudeva, R. Tian, D. H. Wu, S. A. James, H. H. Refai, L. Ding, F. He, Y. Yang

Biomedical Signal Processing and Control (Elsevier)

AWARDS AND ACADEMIC ACHIEVEMENTS

· USC Viterbi Best Research Assistant Award (one per department)	2026
· Information Theory and Applications (ITA) Workshop Sea Award for Graduation Day Talk	2026
· Conference on Parsimony and Learning (CPAL) Rising Stars Award	2026
· Selected for KAUST Rising Stars in AI Symposium (Declined)	2026
· Financial Assistance award for attending ICLR'25	2025
· USC WiSE/GSG travel grant for attending ICML'23, NeurIPS'24, COLM'25/ITA'26	2023-2026
· Selected for EEML and CMMRS Summer Schools	2021
· Singhal's Tech. for Society Award for best undergraduate thesis at institute level, IIT Roorkee	2020
· Viney K. and Sunita Jain Award for academic excellence, IIT Roorkee	2020
· 3AI Pinnacle Student of the Year Award for undergraduate thesis	2020
· S. N. Bose Scholars Program , among 50 students selected across India for an internship in the US	2019
· Third position, International Robotics Challenge at Techfest'17, IIT Bombay	2017
· Secured IIT JEE Advanced All India Rank 978 , 99.5 percentile	2016
· Secured IIT JEE Mains All India Rank 336 among 1.2 million candidates	2016
· Awarded Kishore Vaigyanik Protsahan Yojana (KVPY) science fellowship by IISc Bangalore	2015
· Awarded National Talent Search Examination (NTSE) scholarship by the Government of India	2014

SERVICE

- **Co-Organizer:** Workshop on Methods and Opportunities at Small Scale (MOSS) at COLM 2026
- **Top Reviewer:** NeurIPS 2025, NeurIPS 2023
- **Notable Reviewer:** ICLR 2025
- **Silver Reviewer:** ICML 2026
- **Reviewer (Conferences):** NeurIPS (2023-2025), ICLR (2024-2026), ICML (2024-2026), COLM (2025-2026), AISTATS (2025), COLT (2026; External Reviewer)
- **Reviewer (Journals):** Transactions on Machine Learning Research (TMLR), Mathematical Foundations of Machine Learning (Springer)
- **Reviewer (Workshops):** ICLR'26 (SciForDL), ICML'25 (MOSS, HiLD), ICLR'25 (XAI4Science), NeurIPS'24 (M3L), ICML'24 (TF2M, HiLD), ICML'23 (SCIS)
- **Volunteer:** ICML 2021, ICLR 2021

SELECTED TALKS

- **How Muon's Spectral Design Benefits Generalization: A Study on Imbalanced Data**
Rising Stars Talk at Conference on Parsimony and Learning (CPAL), Tübingen March 2026
- **Towards Demystifying Modern DL: From Optimization & Architecture to Emergent Abilities**
University of California San Diego (UCSD) Feb 2026
Graduation Day Talk at Information Theory and Applications (ITA) Workshop, San Diego Feb 2026
Microsoft Research NYC (Remote) Nov 2025
- **The Rich and the Simple: On the Implicit Bias of Adam and SGD**
ICTP 6th Youth in High-Dimensions Workshop (Remote) July 2025
- **Transformers Learn Low-Sensitivity Functions: Investigations and Implications**
Seminars on Formal Languages and Neural Networks (FLaNN) (Remote) June 2025
EnCORE Workshop on Theoretical Perspectives on LLMs at UCSD March 2025

RESEARCH EXPERIENCE

- UC Berkeley** | Visiting Graduate Student, Simons Institute Fall 2024
Program on Modern Paradigms in Generalization
- NTT Research at Harvard University** | Research Intern, PHI Lab and CBS May'24 - Aug'24
Mentor: Dr. Hidenori Tanaka
- ISI Kolkata** | Visiting Researcher, CVPR Unit June'20 - June'21
Mentors: Prof. Saumik Bhattacharya & Prof. Umapada Pal
- Northwestern University** | Undergraduate Intern, SN Bose Scholar May'19 - July'19
Mentor: Prof. Yuan Yang

TEACHING AND MENTORING EXPERIENCE

- **Teaching**
 - Teaching Assistant for CSCI699: Theory of Machine Learning in Fall'23 at USC
 - Teaching Assistant for CSCI567: Machine Learning in Fall'22 at USC
- **Mentoring**
 - Alex Reyes Aranda (USC BS'27): CURVE'25-26 research fellowship
 - Vincent-Daniel Yun (USC MS'27)
 - Jung Whan Lee (USC MS'24): led to publication [3] (NeurIPS'25)
 - Youqi Huang (USC BS-MS'26): led to publication [8] (ICLR'25); SURE'23 and CURVE'23-24 fellowship

- Elliott Kau (USC BS-MS'24): led to publication [8] (ICLR'25) → SWE at Google
- Kameron Shahabi (USC BS-MS'24): led to publication [9] → UW CS PhD student (Fall'24)
- Devin Martin (USC BS/BBA'24): SURE'22 summer research program → Co-founder at Pickle
- Luke Pratt (K-12 STEM outreach): SHINE'22 summer research program for high school students → undergraduate at Harvey Mudd College