

Dr. Saurav Prakash

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Research Interests

- Distributed Optimization and Federated Learning
- Trustworthy, Secure, and Privacy-Preserving AI
- Learning and Control of Networked Dynamical Systems
- Resource-Efficient AI and Edge Intelligence
- Information and Coding Theory

Education

- 2016 – 2022 **M.S./Ph.D. in Electrical Engineering**
University of Southern California, Los Angeles, CA, USA
Advisor: Prof. Salman Avestimehr
- 2012 – 2016 **B.Tech. in Electrical Engineering**
with Minor in Artificial Intelligence in Computer Science and Engineering
Indian Institute of Technology Kanpur, Kanpur, UP, India
Advisor: Prof. Aditya K. Jagannatham

Positions Held

- Nov. 2024 – **Assistant Professor**
present *Electrical Engineering (EE) Department, IIT Madras*
- Jan. 2025 – **Principal Investigator**
present *Centre for Responsible AI (CeRAI), IIT Madras*
- Aug. 2024 – **Visiting Researcher**
Oct. 2024 *Machine Learning (ML) Department, Mohamed bin Zayed University of Artificial Intelligence*
- Aug. 2023 – **Postdoctoral Fellow**
Jul. 2024 *Institute for Genomic Biology (IGB), University of Illinois Urbana-Champaign*
- Jul. 2022 – **Postdoctoral Researcher**
Jul. 2023 *Coordinated Science Laboratory (CSL), University of Illinois Urbana-Champaign*
- Aug. 2016 – **Graduate Research Assistant**
May 2022 *vITAL Lab, University of Southern California, Los Angeles, CA*
- May – Aug. **Graduate Technical Intern**
2018 & 2019 *Intel Labs, Santa Clara, CA*
- Jun. 2021 – **Applied Scientist Intern**
Aug. 2021 *Alexa AI, Amazon, Cambridge, MA*
- May 2015 – **International Visiting Student**

- Jul. 2015 *IUSSTF-Viterbi Program*, Los Angeles, CA
Aug. 2013 – **Undergraduate Research Assistant**
Apr. 2016 *MWN Group*, IIT Kanpur
May 2013 – **Undergraduate Research Intern**
Jul. 2013 *Summer Undergraduate Research Grant for Excellence (SURGE)*, IIT Kanpur

Selected Honors and Awards

- 2025 Invited Talk in ANRF PMECRG Lightning Talk Series
2025 Early Career Highlights Seminar, IKDD CODS 2025
2023 Carl R. Woese Postdoctoral Fellowship
2021 Qualcomm Innovation Fellowship
2019 Qualcomm Innovation Fellowship Finalist
2019 Most Novel Research Project Award, EE-599 (Deep Learning course, USC)
2016 USC Annenberg PhD Fellowship
2016 Princeton Gordon Wu PhD Fellowship Offer
2015 Viterbi-India Internship
2014 Summer Undergraduate Research Grant for Excellence at IIT Kanpur
2015 Shri Singhasan Singh Scholarship at IIT Kanpur
2015 Institution of Engineering and Technology (IET) Scholarship

Research Funding

- MeitY 6G Research and Standardization
17.86 crores INR, 30/03/2026–29/03/2028, co-PI
WSAI Privacy Audits for Synthetic Text Generation
9 lakhs INR, *Exploratory Research Proposal Funding*, 27/10/2025–26/10/2026, co-PI
WSAI Federated Digital Twins
9.6 lakhs INR, *Exploratory Research Proposal Funding*, 27/10/2025–26/10/2026, PI
ANRF Empowering Edge Users with Privacy-Preserving and Efficient Solutions for On-Device Artificial Intelligence and Machine Unlearning
70.96 lakhs INR, *Prime Minister Early Career Research Grant*, 04/06/2025–03/06/2028, sole-PI
IITM Integrated Machine Unlearning Techniques for Federated Learning at the Edge
5 lakhs INR, *New Faculty Initiation Grant*, 04/12/2024–03/12/2026, sole-PI

Publications

[Link to Google Scholar](#)
(* denotes joint authorship)

Conference/Workshop Proceedings

- C10 O. Tupe, M. Hartman, L. R. Varshney, **S. Prakash**, “Federated Nonlinear System Identification,” to appear in *Proceedings of American Control Conference (ACC)*, May. 2026

- C9 Y. Niu, R. E. Ali, **S. Prakash**, S. Avestimehr, “All Rivers Run to the Sea: Private Learning with Asymmetric Flows,” *The IEEE/CVF Conference on Computer Vision and Pattern Recognition 2024 (CVPR)*, Apr. 2024
- C8 C. Pan*, J. Sima*, **S. Prakash***, V. Rana, O. Milenkovic, “Machine Unlearning of Federated Clusters,” *The Eleventh International Conference on Learning Representations (ICLR)*, Jan. 2023
- C7 **S. Prakash***, A. Reisizadeh*, R. Pedarsani, S. Avestimehr, “Hierarchical coded gradient aggregation for learning at the edge,” in *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, Aug. 2020
- C6 S. Dhakal, **S. Prakash**, Y. Yona, S. Talwar, N. Himayat, “Coded federated learning,” in *Proceedings of IEEE Globecom Workshops (GC Wkshps)*, Mar. 2020
- C5 S. Kundu*, **S. Prakash***, H. Akrami, P. Beerel, K. Chugg, “pSConv: A pre-defined sparse kernel based convolution for deep CNNs,” in *Proceedings of IEEE 57th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, Dec. 2019
- C4 S. Dhakal*, **S. Prakash***, Y. Yona, S. Talwar, N. Himayat, “Coded computing for distributed machine learning in wireless edge network,” in *Proceedings of IEEE 90th Vehicular Technology Conference (VTC2019-Fall)*, Nov. 2019
- C3 A. Reisizadeh*, **S. Prakash***, R. Pedarsani, S. Avestimehr, “Tree gradient coding,” in *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, Sep. 2019
- C2 **S. Prakash***, A. Reisizadeh*, R. Pedarsani, S. Avestimehr, “Coded computing for distributed graph analytics,” in *Proceedings of IEEE International Symposium on Information Theory (ISIT) Conference*, Aug. 2018
- C1 A. Reisizadeh, **S. Prakash**, R. Pedarsani, S. Avestimehr, “Coded computation over heterogeneous clusters,” in *Proceedings of IEEE International Symposium on Information Theory (ISIT) Conference*, Aug. 2017

Journal Papers

- J9 S. Lee, T. Zhang, Y. Niu, **S. Prakash**, S. Avestimehr, “Embracing Federated Learning: Enabling Weak Client Participation via Partial Model Training,” *IEEE Transactions on Mobile Computing*, Apr. 2024.
- J8 **S. Prakash***, J. Sima*, C. Pan*, E. Chien, O. Milenkovic, “Federated Hyperbolic Classification via Secure Aggregation of Convex Hulls,” *Transactions on Machine Learning Research*, Jan. 2024.
- J7 Y. Niu*, **S. Prakash***, S. Kundu, S. Lee, S. Avestimehr, “Federated Learning of Large Models at the Edge via Principal Sub-Model Training,” *Transactions on Machine Learning Research*, Oct. 2023. *Partly presented at the NeurIPS Workshop on Recent Advances and New Challenges in Federated Learning (FL-NeurIPS), 2022.*
- J6 S. Babakniya, S. Kundu, **S. Prakash**, Y. Niu, S. Avestimehr, “Federated Sparse Training: Lottery Aware Model Compression for Resource Constrained Edge,” *Transactions on Machine Learning Research*, Sep. 2023. *Partly presented at the NeurIPS Workshop on Recent Advances and New Challenges in Federated Learning (FL-NeurIPS), 2022.*
- J5 A. R. Elkordy, **S. Prakash**, S. Avestimehr, “Basil: A fast and Byzantine-resilient approach for decentralized training,” *IEEE Journal on Selected Areas in Communications*, volume 40, issue 9, pages 2694–2716, Sep. 2022. *Part of it was presented at the NeurIPS Workshop on Privacy in Machine Learning, 2021*

- J4 **S. Prakash**, S. Dhakal, M. Akdeniz, Y. Yona, S. Talwar, S. Avestimehr, N. Himayat, “Coded computing for low-latency federated learning over wireless edge networks,” *IEEE Journal on Selected Areas in Communications*, volume 39, issue 1, pages 233–250, Jan. 2021. *Was partly presented at the FL-ICML Workshop on User Privacy and Data Confidentiality, 2020*
- J3 A. Reiszadeh*, **S. Prakash***, R. Pedarsani, S. Avestimehr, “CodedReduce: A fast and robust framework for gradient aggregation in distributed learning,” *IEEE/ACM Transactions on Networking*, volume 30, issue 1, pages 148–161, Feb. 2022. *Was partly presented at the ICML Workshop on Coding Theory for Large-Scale Machine Learning (CodML), 2019*
- J2 **S. Prakash***, A. Reiszadeh*, R. Pedarsani, S. Avestimehr, “Coded computing for distributed graph analytics,” *IEEE Transactions on Information Theory*, volume 66, issue 10, pages 6534–6554, Oct. 2020
- J1 A. Reiszadeh, **S. Prakash**, R. Pedarsani, S. Avestimehr, “Coded computation over heterogeneous clusters,” *IEEE Transactions on Information Theory*, volume 65, issue 7, pages 4227–4242, Jul. 2019

Preprints

- P5 N. P. Shankar, S. Lahiri, S. Kalyani, **S. Prakash**, “Federated Learning of Binary Neural Networks: Enabling Low-Cost Inference,” *arXiv:2603.15507*, Mar. 2026.
- P4 G. S. Santhosh, **S. Prakash**, B. Ravindran, “SWAN: Sparse Winnowed Attention for Reduced Inference Memory via Decompression-Free KV-Cache Compression,” *arXiv:2511.18936*, Nov. 2025.
- P3 G. S. Santhosh, **S. Prakash**, B. Ravindran, “AQUA: Attention via QUery mAGnitudes for Memory and Compute Efficient Inference in LLMs,” *arXiv:2509.11155*, Sep. 2025.
- P2 Y. Niu, **S. Prakash**, S. Avestimehr, “ATP: Enabling Fast LLM Serving via Attention on Top Principal Keys,” *arXiv:2403.02352*, Mar. 2024.
- P1 **S. Prakash**, H. Hashemi, Y. Wang, M. Annavaram, S. Avestimehr, “Secure and Fault Tolerant Decentralized Learning,” *arXiv:2109.07706*, Sep. 2022. *Partly presented at the Enclaved AI/ML Workshop 2021, Private AI Research Institute.*

Patents

- 2022 **S. Prakash**, S. Dhakal, Y. Yona, N. Himayat, S. Talwar, “Technologies for distributing iterative computations in heterogeneous computing environments,” *Patent No. US-11423254-B2*
- 2022 **S. Prakash**, S. Dhakal, Y. Yona, N. Himayat, S. Talwar, “Technologies for distributing gradient descent computation in a heterogeneous multi-access edge computing (MEC) networks,” *Patent No. US-11244242-B2*
- 2021 M. R. Akdeniz, A. Anand, N. Himayat, A. S. Avestimehr, R. Balakrishnan, P. Bhardwaj, J. Choi, Y.-S. Choi, S. Dhakal, B. G. Edwards, **S. Prakash**, A. Solomon, S. Talwar, Y. E. Yona, “Systems and methods for distributed learning for wireless edge dynamics,” *Patent App. No. US-20230068386-A1*

Mentorship Experience

PhD Students

- 2025–present **Wanmathy D.** (co-guide: Pravin Nair)
- 2025–present **Shailendra Kumar** (co-guide: Rahul Meshram)

- 2024–present **Sazid Hasan** (co-guide: Ansam Khraisat, Adnan Aziz), *Deakin-IITM Joint PhD MS Students*
- 2026–present **Wasif Raza** (co-guide: Arvind Rameshwar)
- 2026–present **Pardha Saradhi**
- 2024–present **Omkar Tupe** (co-guide: Nandan Sudarsanam)
- DDP Students**
- 2025–2026 **Karthick Krishna** (co-guide: Krishna Pillutla)

Teaching Experience

- Jan. 2026 EE5143: Information Theory
- Jul. 2025 EE6180: Advanced Topics in Artificial Intelligence

Professional Service

Panel Member

- General Test Committee (GTC) of 4 MS Students
- Doctoral Committee (DC) of 4 PhD Students
- Project Execution Committee (PEC), TTDF Projects

Invited Journal Reviewer

- IEEE Signal Processing Letters
- IEEE ComMag
- IEEE Journal of Biomedical and Health Informatics
- Transactions on Machine Learning Research
- IEEE Journal on Selected Areas in Communications
- IEEE Transactions on Communications
- IEEE Journal on Selected Areas in Information Theory
- IEEE Transactions on Information Theory
- IEEE/ACM Transactions on Networking
- IEEE Transactions on Information Forensics and Security
- IEEE Transactions on Mobile Computing
- IEEE Internet of Things Magazine
- IEEE Open Journal of the Communications Society
- IEEE Open Journal of Signal Processing
- Journal of the Royal Statistical Society
- IEEE Transactions on Signal and Information Processing over Networks
- IEEE Communications Letters

Invited Conference/Workshop Reviewer

- Conference on Computer Vision and Pattern Recognition (CVPR)
- American Control Conference (ACC)
- International Conference on Data Science (CODS)
- Knowledge Discovery and Data Mining (KDD)

- Artificial Intelligence and Statistics (AISTATS)
- IEEE International Symposium on Information Theory (ISIT)
- IEEE Information Theory Workshop (ITW)
- Resource-Constrained Learning in Wireless Networks (RCLWN) @ MLSys 2023
- Federated Learning for Natural Language Processing (FL4NLP) @ ACL 2022

Others

- May 2026 Poster Evaluation, *WSAI Annual Research Showcase Event 2026, IIT Madras*
- Nov. 2025 Mentor, *ANRF PMECRG Proposal Writing*
- Jun. 2025 Session Chair, *Telecom Technology Development Fund (TTDF) Workshop*
- Mar 2025 Session Chair, *EE Research Symposium 2025, IIT Madras*
- Mar 2024 Poster Evaluation, *IGB Fellows Symposium 2024, UIUC*

Talks

- Jun. 2026 Invited Session in IndiaAI Capacity Support Programme for the Government on Artificial Intelligence
- Apr. 2026 Guest Lecture in Department of Electronics & Communications Engineering, NIT Durgapur
- Dec. 2025 Guest Lecture in Department of Electronics & Communications Engineering, IIIT Delhi
- Dec. 2025 Guest Lecture in Department of Computer Science and Engineering, SNU Delhi
- Dec. 2025 Early Career Highlights Seminar, IKDD International Conference on Data Science (CODS)
- Nov. 2025 Invited Talk at Computer Systems and Machine Learning (CSML) Workshop, IISc
- Oct. 2025 Invited Talk in ANRF PMECRG Lightning Talk Series
- Aug. 2025 Guest Lecture in Department of Computer Science and Engineering, PES University
- Aug. 2025 Invited Talk at Centre for Networked Intelligence (CNI), IISc
- Jul. 2025 Invited Talk at 2025 JTG/IEEE ITSoc Summer School
- Mar. 2025 Technical Seminars and Academic Outreach
 - Department of Electronics and Communication Engineering, SSN Chennai
 - Department of Electrical Engineering, IIT Tirupati
 - Department of Computer Science, IIIT Hyderabad
 - Electrical & Electronics Engineering, BITS Pilani (Hyderabad)
 - Department of Electrical Engineering, IIT Hyderabad
 - Department of Information Technology, NITK Surathkal
 - Department of Electronics and Communication Engineering, MIT Manipal
- Jan. 2025 Invited Faculty Talk at Wadhvani School of Artificial Intelligence (WSAI), IIT Madras
- Jan. 2025 Technical Seminars and Academic Outreach
 - Department of Information Technology, Jadavpur University
 - Department of Artificial Intelligence, IIT Kharagpur
 - Department of Electronics & Communication Engineering, NIT Jamshedpur
 - Department of Electronics Engineering, IIT/ISM Dhanbad
 - Department of Electronics & Communication Engineering, BIT Mesra