

SRAVAN KUMAR ANKIREDDY

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Education

- Ph.D., The University of Texas at Austin** Aug 21 – Dec 25 (expected)
Electrical and Computer Engineering GPA: 4.0/4.0
- B.Tech & M.Tech, Indian Institute of Technology Madras** Aug 14 – May 19
Electrical Engineering Bachelor's: 8.52/10 | Master's: 9.45/10

Research Interests

- **Machine Learning:** Foundation Models, Representation Learning, Deep Learning for Vision, Synthetic Datasets, Deep Learning for Tabular Data
- **Information Theory:** Source Coding, Channel Coding, Distributed Compression

Industry Experience

- **Apple Inc.**, Cupertino, CA - *Machine Learning Intern* May – Aug 24
Tabular generative models for synthetic data generation to model rare scenarios.
- **Samsung Research America**, Plano, TX - *AI Research Intern* May – Aug 23
Sequence modeling for design of polar codes with Transformers using policy gradient methods.
- **Qualcomm Research India**, Bangalore, India - *Research Engineer* Jul 19 – Jul 21
Developed and deployed multiple transceiver algorithms for next-generation WiFi chipsets.

Selected Research Projects

- **Ultra low-rate Neural Image Compression** Ongoing
 - Developed an ultra-low rate (<0.1 bpp) compression framework leveraging vision foundation models.
 - Designed a novel cross-attention aggregation technique to improve the alignment between input image and reconstructed image using textual captions as side information.
 - Improving realism-fidelity trade-off in reconstruction using RLHF guidance and preference datasets.
- **Synthetic Datasets using Tabular Generative Models** May 24 - Aug 24
 - Developed and trained a diffusion-based foundation model for RF calibration, focusing on synthetic data creation to model failures at the receiver.
 - Reduced data collection needs by over $10\times$ through the use of high-quality synthetic tabular datasets.
 - Improved regression performance by training on synthetic data, achieving $\sim 22\%$ reduction in MSE.
- **Improving In-Context Learning (ICL) in LLMs using structured noise** Jan 24 - Present
 - Developed techniques to enhance ICL performance by improving the separation of demonstrations.
 - Proposed a method to select the optimal separator by analyzing perplexity for each demonstration.
 - Formulated an explanation for the empirical observations using Bayesian inference.
- **Data Augmentation using Generative Models** Jan 23 – May 23
 - Explored parameter-efficient fine-tuning methods for text-to-image models for data augmentation.
 - Demonstrated gains of up to 3.4% in classification accuracy by augmenting the true datasets with synthetic images generated using low rank approximation (LoRA) with DreamBooth.
- **Construction of Polar codes using Sequence Modeling** May 23 – Jan 24
 - Modeled Polar code construction as a sequential decision making problem and designed a nested construction technique using transformer models and policy gradient methods.
 - Demonstrated significant gains (up to 0.8dB) compared to patented Polar code in 5G-NR standards.
- **Task-Aware Variable Rate Compression of Distributed Sources** Jul 22 – Sep 23
 - Designed distributed representation learning algorithm to optimize compression for downstream task.
 - Proposed a dimensionality reduction technique to encourage low-rank representations, allowing variable-rate compression using a single model.

Selected Publications

(see [8](#) for full list)

Machine Learning

- S. A. Hebbar*, **S. Ankireddy***, H. Kim, S. Oh, P. Viswanath, "DeepPolar: Inventing Nonlinear Large-Kernel Polar Codes via Deep Learning," **ICML, 2024** [↗](#)
- A. Saha*, S. Gupta*, **S. Ankireddy***, K. Chahine, J. Ghosh, "Exploring Explainability in Video Action Recognition," *Explainable AI for Computer Vision (XAI4CV) Workshop*, **CVPR, 2024 (Spotlight)** [↗](#)
- **S. Ankireddy***, P. Li*, R. Zhao, H. Mahjoub, E. Pari, U. Topcu, S. Chinchali, H. Kim, "Task-Aware Distributed Source Coding under Dynamic Bandwidth," **NeurIPS, 2023** [↗](#)

Information Theory

- **S. Ankireddy**, K. Narayanan, H. Kim, "LightCode: Light Analytical and Neural Codes for Channels with Feedback," *Journal on Selected Areas in Communications (JSAC)*, 2024 [↗](#)
- **S. Ankireddy**, S. A. Hebbar, H. Wan, J. Cho, C. Zhang, "Nested Construction of Polar Codes via Transformers," *International Symposium on Information Theory (ISIT)*, 2024 [↗](#)
- **S. Ankireddy**, S. A. Hebbar, Y. Jiang, H. Kim, P. Viswanath, "Compressed Error HARQ: Feedback Communication on Noise-Asymmetric Channels," *International Symposium on Information Theory (ISIT)*, 2023 [↗](#)
- **S. Ankireddy**, H. Kim, "Interpreting Neural Min-Sum Decoders," *International Conference on Communications (ICC)*, 2023 [↗](#)

Relevant Graduate Coursework

- **Mathematics and Machine Learning:** Generative Models, Topics in Unsupervised Learning, Fair and Transparent Machine Learning, Reinforcement Learning, Probability and Stochastic Processes, Applied Linear Algebra, Convex Optimization.
- **Information Theory:** Estimation Theory, Coding Theory, Information Theory.

Technical Skills

Python (NumPy, PyTorch), C, MATLAB

Academic Achievements

- Harry and Rubye Gaston Graduate Scholarship from the Cockrell School of Engineering 2024
- Finalist, **Qualcomm Innovation Fellowship** - North America (among 271 applicants) [↗](#) 2024
- Recipient of student travel awards to present research at NeurIPS, ISIT, and ICC 2023
- Wilson - Tayabali Family Fellowship from the Cockrell School of Engineering 2022
- George J. Heuer, Jr. Ph.D. Endowed Graduate Fellowship 2021
- Secured a national rank of 337 out of 150,000+ students in JEE Advanced 2014

Teaching Experience

- **Probability, Statistics and Random Processes**, UT Austin Fall 21, Spring 22
- **Introduction to Wireless Communications**, IIT Madras Fall 18, Spring 19

Academic Service/Review

- **Conferences:** IEEE ISIT, ITW, ICML Neural Compression Workshop 2023
- **Journals:** IEEE JSAC, JSAIT, TCOM, TCCN, TGCN

*Equal contribution.