Srinivasan Kidambi

B.Tech in Electrical Engineering
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Research Interests

Mechanistic Interpretability, Data Science, Embodied AI, Reinforcement Learning, Computer Vision

Education

Indian Institute of Technology, Madras *2021–25*
Bachelor of Technology in Electrical Engineering, Minor in Artificial Intelligence and Machine Learning— *CGPA : 9.29/10*

Publications

1. **S. Kidambi**, G. Vashishtha, RPJC. Bose "InferNet: Next Likely Action Prediction in Business Processes", accepted in *International Conference on Service-Oriented Computing, (ICSOC '24)*
2. **S. Kidambi**, P. Nair "Plug-and-Play Linear Attention for Pre-trained Image and Video Restoration Models", submitted in *IEEE Signal Processing Letters* (**under review**)

Professional Experience

Skan AI

Data Scientist I (Agentic AI) *Current*

- Finetuned a proprietary action discovery model on open source Qwen3-VL and Mistral-2.4, using **GRPO** with a mixture of expert rewards to achieve action-level process discovery from execution clickstreams.
- Designed a training-free **multimodal RAG system** for high-precision clickstream localization. Achieved **96% @5recall and 100% @10recall** for clickstream localization despite significant UI variability (layout, resolution, and text density).
- Currently building a vision-language-action model for **robotic process automation** using the generated playbook from the discovery pipeline with guardrails to meet enterprise process requirements.

Data Scientist Intern *Summer 2024*

- Developed a Bayesian Network architecture to model business processes, with a focus on next activity prediction.
- Achieved **83% avg accuracy** across 6 large volume client databases, with **more than 200 unique prediction classes**.
- Outperformed state-of-the-art white-box models and **matched or surpassed deep learning models** across multiple BPI logs while retaining complete **interpretability** and non-parametrized learning.

Cummins Inc

Machine Learning Intern *Winter 2023*

- Built a neural network model to estimate phase currents of a controlled PMSM motor, with **0.001% MSE error**.
- Optimized the network for real-time inference by pruning layers and quantizing weights to **4 bit precision**.
- Engineered hardware using SystemVerilog for FPGA to run the model with sub-**1** μ**-second inference** time while keeping effective cost under $300 as opposed to currently used $9000 Speedgoat real-time simulator.

Research Projects

Plug-and-Play Linear Attention for Vision Models

Guide: Dr. Pravin Nair | Dept. of Electrical Engineering, IIT Madras *2025*

- Designed PnP-Nystra, a Nyström-based plug-and-play attention module to replace quadratic MHSA, achieving up to **4× GPU** and **5× CPU** speed-up with $<$**1.5 dB** PSNR loss across diverse restoration tasks.
- Integrated PnP-Nystra into SwinIR, Uformer-B, and RVRT with up to **3.8×/4.5×** GPU/CPU speed-up on image restoration ($\leq$0.8 dB PSNR drop) and up to **4.6×/5.3×** on video super-resolution ($\leq$1.2 dB loss).
- Provided error bounds linking approximation quality to the decay of singular values of attention maps, and empirically validated this decay across restoration tasks—offering formal guarantees on output fidelity.

Prior conditioned 3DGS for sparse input views

2024-25

Guide: Dr. Rajiv Soundarajan | Department of Electrical Communication Engineering, IISC Bangalore

- Investigated several geometric priors such as depth maps, normal surfaces, and pose conditioning to improve the performance of vanilla 3D gaussian splatting (3DGS) on sparse input views.

- Modified the pruning mechanism in vanilla 3DGS to **increase SSIM by 0.18** and **decrease LPIPS by 0.16** on scenes from the LLFF dataset with **3 input views**.

Natural Language Explanations for RL Agent Trajectories *2024*

Guide: Dr. Balaram Ravindran | Dept. of Data Science and AI, IIT Madras

- Developed an attention attribution approach to attribute state information to actions for multi-agent trajectories by modeling policy and environment using a **transformer** model inspired by Trajectory Transformer (Janner et al).
- **Finetuned GPT2** (NanoGPT) to generate natural language explanations using the state-action attribution.

Microprocessor Modeling with RNNs: A Hippocampal Analogy Approach *2023*

Guide: Dr. V Srinivasa Chakravarthy | Dept. of Biotechnology, IIT Madras

- Studied similarities between the biology of the hippocampus and mathematical models with neural networks.
- Programmed a transformer variant to mimic stack memory with **85% accuracy** on sequential recollection tasks.

Scholastic Achievements

- Secured All India Rank **713** in Joint Entrance Examination Advanced 2021 out of 250,000+ aspirants [2021]
- Secured All India Rank **565** in Joint Entrance Examination Mains 2021 out of 1M+ aspirants [2021]
- Awarded the **KVPY fellowship**, a research fellowship by the Indian Institute of Science, Bengaluru [2021]

Other Projects and Competitions

Improving robotic path planning with distance aware goal generation *2024*

Course project in Recent Advances in RL | Instructor: Prof. Balaram Ravindran

- Built an open source codebase for the HiGOC framework for path planning from the paper *"Hierarchical Planning Through Goal-Conditioned Offline Reinforcement Learning", Li et. al*
- Investigated improvements to low level planner by replacing CQL with IQL and TD3+BC. This makes reproduction of the pipeline much less cumbersome while improving performance.
- Improved the high level planner by adding a scaled distance term to value formulation and enforced one subgoal reduction per planning step. Improvements speed up planning and generate more relevant subgoals.

Phaseless Direction of Arrival Estimation for 6G Applications *2024*

Course project in Undergraduate Research course | Instructor: Prof. Uday Khankhoje

- Developed a **novel IRS algorithm** to estimate direction of arrival of 6G signals using only incident power.
- Designed a phased antenna array sensor system for precise DoA estimation, achieving an average error of **0.3°** over a **180° range** of arrival directions, with a **resolution of 0.1°**, using only **5 antenna elements**.

Convolve Inter-IIT ML Hackathon *2023*

Competition by Cisco

- First place among more than 400 teams in an all-India ML hackathon conducted by various IITs and Cisco.
- Finetuned a Twitter RoBERTa encoder with rigorous pre-processing for feedback sentiment with 98.8%.

Inter IIT Tech Meet 11.0 - ISRO Moon Mapping Challenge *2023*

Competition by Indian Space Research Organization

- Secured a bronze medal in the ISRO Moon Mapping Challenge among teams from 23 IITs.
- Trained the OGSRN (optically guided SR network) to super resolve lunar images from the Chandrayaan satellite 16x.
- Built a partial lunar map utilizing the super-resolved images and leveraging QGIS for geographical mapping.

Teaching Assistant

Applied Programming Lab

Teaching Assistant | Prof. Nitin Chandrachoodan *2025*

- Conducted sessions to **teach python programming** through applications to electrical engineering problems.
- Conducted bi-weekly tutorial sessions. **Graded assignments** and **examinations** taken by course applicants.

Courses Undertaken

Computer Science	Pattern Recognition and Machine Learning, Fundamentals of Deep Learning, Reinforcement Learning, Multi-Armed Bandits, Recent Advances in RL, Tools in Data Science
Electrical/Mathematics	Probability Foundations, Linear Algebra, Control Systems, Information Theory, Incentive Centered Design, Microprocessors Theory + Lab

Extracurriculars

- **Organized events** to promote classical music as part of **Classical Arts Club**. Playing Indian classical violin for 8 years.
- **Led** a team of 5 members to build a natural language image editing model as **project lead in the AI club**.
- **Conducted sessions** to teach the basics of GANs to the student body as part of the Analytics club and techfest.