Anirudh Satheesh

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Education

University of Maryland College Park, MD
Bachelor of Science in Computer Science and Applied Mathematics (GPA: 4.00/4.00) *August 2023 – May 2026*

- Relevant Coursework: Algorithms, Machine Learning, Natural Language Processing, Signal Processing, Data Science, Artificial Intelligence, Computer Vision

Research Experience

Machine Learning and Quantum Computing (CLAN) Labs Apr 2025 –
Advised by Prof. Vaneet Aggarwal (Purdue) *College Park, MD (Remote)*

- Designed a self-paced curriculum that improved episodic returns by 11.8% and 1.9x over nominal baselines, and separately developed the first primal-only actor–critic method for robust constrained average-cost MDPs with sample complexity $O(\epsilon^{-4})$ under slackness and $O(\epsilon^{-6})$ otherwise.

University of Maryland Department of Mathematics Dec 2024 –
Advised by Prof. Radu Balan (UMD) *College Park, MD*

- Created an unsupervised physics-informed coreset algorithm, reducing data annotation cost by 78%.

Data Mining and Reinforcement Learning (DaRL) Group Nov 2024 – Sept 2025
Advised by Prof. Hua Wei (ASU) *College Park, MD (Remote)*

- Built a diffusion-based framework for cross-domain adaptation in RL under dynamics mismatch, and separately developed an LLM-guided curriculum learning system to improve RL generalization and prevent mode collapse.

University of Maryland Institute for Advanced Computer Studies May 2023 –
Advised by Prof. Furong Huang (UMD) *College Park, MD*

- **Curriculum and evaluation:** Created mathematical reasoning video tasks for MORSE-500, ran curriculum RL experiments for MORSE-Infinity, and validated MORSE-Agent performance.
- **LLM performance:** Developed a log-likelihood selection framework and a weak-to-strong AdaBoost system, improving accuracy on GSM8K, MMLU, ARC, and Quartz datasets.
- **Robustness and security:** Implemented BEAST and PAIR-adjacent attacks, applied pruning for unlearning and adversarial evaluation, and co-organized a NeurIPS invisible watermark stress-test benchmark.
- **Data augmentation:** Built bi-level augmentation optimization for medical, tabular, and diffusion data, outperforming CutMix.

Publications

[1] **Satheesh, A.**, Khandelwal, A., Ding, M., & Balan, R. (2025). PICore: Physics-Informed Unsupervised Coreset Selection for Data Efficient Neural Operator Training. *Transactions on Machine Learning Research.*
[2] Ding, M., An, B., Rabbani, T., Deng, C., **Satheesh, A.**, Chakraborty, S., … Huang, F. (2025). A Technical Report on "Erasing the Invisible": The 2024 NeurIPS Competition on Stress Testing Image Watermarks. In *The Thirty-Ninth Annual Conference on Neural Information Processing Systems Datasets and Benchmarks Track.*
[3] Agrawal, A., Aralikatti, R., **Satheesh, A.**, Chakraborty, S., Bedi, A. S., & Huang, F. (2025). Uncertainty-Aware Answer Selection for Improved Reasoning in Multi-LLM Systems. *The 2025 Conference on Empirical Methods in Natural Language Processing.*
[4] **Satheesh, A.**, Powell, K., & Wei, H. (2025, November). cMALC-D: Contextual Multi-Agent LLM-Guided Curriculum Learning with Diversity-Based Context Blending. In *Proceedings of the 34th ACM International Conference on Information and Knowledge Management* (pp. 5213-5217).
[5] **Satheesh, A.**, & Powell, K. (2025). A constrained multi-agent reinforcement learning approach to autonomous traffic signal control. *Journal on Autonomous Transportation Systems.*
[6] Che, Z., Casper, S., Kirk, R., **Satheesh, A.**, Slocum, S., McKinney, L. E., …, Hadfield-Menell, D. (2025). Model Tampering Attacks Enable More Rigorous Evaluations of LLM Capabilities. *Transactions on Machine Learning Research.*
[7] Ding, M., An, B., Xu, Y., **Satheesh, A.**, & Huang, F. SAFLEX: Self-Adaptive Augmentation via Feature Label Extrapolation. In *The Twelfth International Conference on Learning Representations (ICLR).*

Preprints

[1] **Satheesh, A.**, Sathish, S., Ganesh, S., Powell, K., & Aggarwal, V. (2025). Primal-Only Actor Critic Algorithm for Robust Constrained Average Cost MDPs. arXiv preprint arXiv:2511.05758. (Submitted to AISTATS 2026)
[2] **Satheesh, A.**, Powell, K., & Aggarwal, V. (2025). Distributionally Robust Self Paced Curriculum Reinforcement Learning. arXiv preprint arXiv:2511.05694. (Submitted to AAMAS 2026)
[3] Chen H., **Satheesh, A.**, Da L. & Wei, H. (2025). Leveraging Generative Trajectory Mismatch for Cross-Domain Policy Adaptation. Submitted to The Fourteenth International Conference on Learning Representations.
[4] Cai, Z., Wang, A., **Satheesh, A.**, Nakhawa, A., Jae, H., Powell, K., ... Others. (2025). MORSE-500: A Programmatically Controllable Video Benchmark to Stress-Test Multimodal Reasoning. Submitted to The Fourteenth International Conference on Learning Representations.

Workshops

[W1] **Satheesh, A.**, Khandelwal, A., Ding, M., & Balan, R. (2025). PICore: Physics-Informed Unsupervised Coreset Selection for Data Efficient Neural Operator Training. NeurIPS 2025 AI for Science Workshop.
[W2] **Satheesh, A.**, & Powell, K. (2025). A Constrained Multi-Agent Reinforcement Learning Approach to Autonomous Traffic Signal Control. NeurIPS 2025 Constrained Optimization for Machine Learning Workshop.
[W3] **Satheesh, A.**, Powell, K., & Wei, H. (2025). cMALC-D: Contextual Multi-Agent LLM-Guided Curriculum Learning with Diversity-Based Context Blending. ICML 2025 Workshop on Multi-Agent Systems in the Era of Foundation Models: Opportunities, Challenges and Futures.
[W4] Che, Z., Casper, S., **Satheesh, A.**, Gandikota, R., Rosati, D., Slocum, S., ... Hadfield-Menell, D. (2024). Model Manipulation Attacks Enable More Rigorous Evaluations of LLM Unlearning. Neurips Safe Generative AI Workshop 2024.
[W5] Agrawal, A., Ding, M., Che, Z., Deng, C., **Satheesh, A**., Langford, J., & Huang, F. (2024). EnsemW2S: Can an Ensemble of LLMs be Leveraged to Obtain a Stronger LLM? Neurips Safe Generative AI Workshop 2024.

Talks

[T1] A Constrained Multi-Agent Reinforcement Learning Approach to Traffic Management (AAAI 2025 MALTA Workshop Talk)
[T2] A Constrained Multi-Agent Reinforcement Learning Approach to Traffic Management (Invited Talk to Laboratory for Telecommunication Systems)

Professional Experience

iEnvizion (Contracted to Audeze LLC) Jan 2025 – Present
Machine Learning Research Intern *Remote (USA)*

- Developed a flow-matching transformer for voice cloning with Fourier-aware quantization, reducing memory consumption and latency by up to 50%.

Sony Interactive Entertainment (Audeze LLC) Jun 2024 – Aug 2024
Machine Learning Research Intern *Remote (USA)*

- Built ML models to enhance real-time gaming audio using a synthetic dataset of 360,000+ samples, achieving 20% improvement over open-source baselines and reducing memory to 0.4 MB and inference time to 0.1s via pruning and quantization.

Awards

- CRA Outstanding Undergraduate Researcher Award 2025 (Honorable Mention)
- Daniel Sweet Undergraduate Research Fellowship (2025) ($2500)

Other Experiences

- Reviewed papers submitted to ICLR 2026, NeurIPS 2025 SafeGenAI Workshop, AAAI 2025 MARW Workshop, and ICML 2025 MAS Workshop.