Muralikrishnna G. Sethuraman

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SUMMARY

Ph.D. candidate in Electrical & Computer Engineering at Georgia Tech (expected May 2026), specializing in causal discovery, probabilistic modeling, and machine learning. Strong background in algorithm design, optimization, and statistical inference with publications at Top AI conferences (NeurIPS, AISTATS). Open to both Summer 2026 internship and full-time opportunities, with flexibility to adjust graduation date if needed.

EDUCATION

Georgia Institute of Technology | **Ph.D. in Electrical & Computer Engineering** — Atlanta, GA
Research: Causal Discovery, Probabilistic Modeling, and Machine learning — (Expected) May 2026
Thesis: Differentiable Learning of Structural Causal Models with Feedback Loops

Georgia Institute of Technology | **MS in Electrical and Computer Engineering** — *Atlanta, GA*
Focus: Machine Learning & Digital Signal Processing — *May 2020*

National Institute of Technology | **B.Tech in Electronics and Communication Engineering** — *Trichy, India*
Thesis: Deep Learning Based Super-resolution for Video Data — *May 2018*

TECHNICAL SKILLS

Programming: Python (PyTorch, Tensorflow, NumPy, Scikit-learn, SciPy, Pandas), C/C++, LaTeX, Bash, MATLAB
Machine learning: Causal Discovery, Interpretable ML, Deep Learning, Generative Modeling, Graphical Models
Tools & Platforms: CUDA, Git, Linux, Jupyter, Slurm

WORK EXPERIENCE

Genentech | **AI & ML / Cell and Tissue Genomics Intern** — *South San Francisco, CA*
Biology Research | AI Development Team, gRED — *May 2022 - Aug 2022*

- Improved causal discovery accuracy by 80% through likelihood maximization-based algorithm using residual normalizing flows for cyclic graphs, enabling clear understanding of gene regulatory networks, presented work at AISTATS 2023
- Enhanced model robustness on Perturb-CITE-seq data through collaborative feedback from AIML & genomics researchers
- Predicted intervention effects on scRNA-seq with uncertainty-aware models, achieving 7% accuracy improvement

Tech: Python, PyTorch, NumPy, Pandas, ScanPy, Causal discovery algorithms

KLA Corporation | **Machine Learning and Computer Vision Intern** — *Milpitas, CA*
Algorithms Team — *May 2021 - Aug 2021*

- Achieved 74% accuracy in unsupervised anomaly detection for silicon dye images using deep learning models
- Developed pixel wise image segmentation algorithm to differentiate anomalous and normal pixels in Si dye images
- Benchmarked VAE, Normalizing flows, and GAN architectures for defect characterization, identifying the most effective model for production use through systematic analysis of learned representations

Tech: Python, PyTorch, OpenCV, Generative modeling

RESEARCH EXPERIENCE

SENTINAL Lab, Georgia Tech | **Graduate Research Assistant** — *Atlanta, GA*
Advisor: Faramarz Fekri — *May 2020 - Present*

- Built a Transformer-based Visual Q&A solver leveraging scene graphs and formal logic statements, achieving 99.6% accuracy on the CLEVR dataset with full transparency into reasoning processes
- Designed and implemented comprehensive compressed sensing system using a novel density evolution framework via message-passing for learning sparse causal graphs, achieving 38% improvement in MAE over baseline methods
- Developed robust differentiable causal discovery framework for learning nonlinear structural causal models under challenging conditions including feedback loops, unmeasured confounders, and complex MNAR missing data patterns
- Collaborated with a biochemical engineering team to develop 13 biosensors for miRNA change detection, optimizing design to reduce device count by 74% and enable low-cost sensing solutions, and efficient biosensor design

Transportation Lab, Georgia Tech | **Graduate Research Assistant** *Atlanta, GA*
Advisor: James Tsai *May 2019 - Dec 2019*

- Developed YOLO-based deep learning models for traffic sign detection, achieving 97% accuracy on US signs
- Developed traffic sign annotation software, reducing annotation time by 60%
- Implemented computer vision techniques for geo-location of signs based on automatic detection and feature analysis

School of ECE, Indian Institute of Science | **Research Intern** *Bangalore, India*
Advisor: KVS Hari *May 2017 - Jul 2017*

- Developed a novel algorithm for sparse signal recovery, achieved 80% improvement in support recovery performance
- Analyzed the effects of sparse representations for the enhancement of speech signals corrupted with noise

SELECTED PROJECTS

Causal Discovery under Confounders and Missing data | **Georgia Tech** *Jun 2024 - Feb 2025*

- Developed expectation-maximization-based algorithm for learning causal graph under MNAR missing data
- Employed implicit normalizing flow network to model structural causal models with unmeasured latent confounders
- Achieved 39% improvement in predicting perturbation effects in gene regulatory systems by modeling gene dropout

Visual Question Answering based on Transformers and Formal Logic | **Georgia Tech** *May 2020 - Dec 2020*

- Developed highly interpretable VQA system using formal logic framework, converting images to logical facts via scene graphs and questions to first-order predicate logic clauses with transformer-based models
- Achieved 99.6% accuracy on CLEVR dataset with complete transparency in reasoning through satisfiability checks
- Demonstrated data efficiency with 99.1% accuracy using 10% of training data, showcasing symbolic reasoning advantages

SELECTED PUBLICATIONS

M. G. Sethuraman, F. Fekri. "Differentiable Cyclic Causal Discovery Under Unmeasured Confounders". *Advances of Neural Information Processing Systems (NeurIPS) (Spotlight—top 4% of submissions)*. 2025. (Paper)

M. G. Sethuraman, M. McSweeney, M. Styczynski, F. Fekri. "Construction of an Array of Biosensors using Density Evolution for MicroRNA Monitoring". *IEEE Trans. on Molecular, Biological, and Multi-Scale Comms*. 2025. (Paper)

M. G. Sethuraman, R. Nabi, F. Fekri. "Learning Cyclic Causal Graphs from Incomplete Data". *(In review) Transactions of Machine Learning Research*. 2025. (Paper)

M. G. Sethuraman, R. Lopez, R. Mohan, F. Fekri, T. Biancalani, J. Hütter. "NODAGS-Flow: Nonlinear Cyclic Causal Structure Learning". *AISTATS*. 2023. (Paper)

M. G. Sethuraman, H. Zhang, F. Fekri. "A Density Evolution Framework for Recovery of Covariance and Causal Graphs from Compressed Measurements". *Fifty Ninth Annual Allerton Conference*. 2023. (Paper)

M. G. Sethuraman, A. Payani, F. Fekri, J. Kerce. "Visual Question Answering based on Formal Logic". *20th IEEE International Conference on Machine Learning and Applications (ICMLA)*. 2021. (Paper)

LEADERSHIP & TEACHING EXPERIENCE

Asha Atlanta | **Athletics Cooridnator** *Apr 2024 - Present*

- Led a 12-week running programs, coaching participants toward 5K, 10K, and half marathon goals
- Organized campus-wide races, achieving record participation of 70+ runners, raising $1500+ for education initiatives

Graphical Models for ML (ECE 7751) | **Head Graduate Teaching Assistant** *Jan 2021 - Present*

- Provided academic support for 100+ students via office hours and online forums
- Designed and graded homework assignments, ensuring alignment with course objectives

Circuits and Electronics (ECE 3710) | **Course Instructor** *Jan 2020 - Aug 2020*

- Lectured and conducted labs twice a week for a class of 45 students, providing instruction in key course concepts
- Designed and graded quizzes, worksheets, and midterm problems to reinforce learning objectives

Spider R&D Club, NIT Trichy | **President** *Jul 2017 - May 2018*

- Launched the first project showcase at Pragyan, NIT Trichy's premier technical festival, highlighting club innovations