Aadesh Madnaik

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Education

Ph.D. in Electrical and Computer Engineering *May 2027 (expected)*
Georgia Institute of Technology *Atlanta, GA, USA*
Advisor: Dr. Karthikeyan Sundaresan

M.S. in Electrical and Computer Engineering *May 2024 (expected)*
Georgia Institute of Technology *Atlanta, GA, USA*
Advisor: Dr. Karthikeyan Sundaresan
GPA: 4.0/4.0

B.Tech. with *Honors* in Electrical Engineering *May 2022*
Indian Institute of Technology Bombay *Mumbai, India*
Advisor: Dr. Sharayu Moharir
Minor: Computer Science and Engineering
GPA: 9.31/10

Research Interests

5G/6G: Reconfigurable Intelligent Surfaces (RIS), Dynamic Spectrum Access, Machine Learning approaches to Integrated Sensing and Communication (ISAC)

Publications

Madnaik, A., Matson, N. C. and Sundaresan, K., "Scalable Network Tomography for Dynamic Spectrum Access," *IEEE INFOCOM 2024 - IEEE Conference on Computer Communications*, arXiv:2403.03376

Madnaik, A., Moharir, S., Karamchandani, N., "Renting Edge Computing Resources for Service Hosting", *EAI VALUETOOLS 2022*, doi:10.1007/978-3-031-31234-2_17

Research Experience

Reconfigurable Intelligent Surfaces (RIS) *Jun '23 – Present*
Advised by Dr. Karthikeyan Sundaresan, MĀRGA, Georgia Tech
- Working on integrating RIS with commodity mmWave radars

Dynamic Spectrum Access (DSA) *Aug '22 – Jun '23*
Advised by Dr. Karthikeyan Sundaresan, MĀRGA, Georgia Tech
Accepted to Infocom 2024, presented at CRIDC 2024 Poster Competition
- Developed a scalable network tomography framework to maximize resource utilization in unlicensed, high-interference environments
- Proposed an algorithm to infer multi-channel interference statistics by transforming clients into spectrum sensors with linear overheads

Backscatter for Low-power IoT Environmental Sensing *Aug '23 – Present*
Advised by Dr. Ashutosh Dhekne, Georgia Tech
Supported through the CDAIT Student IoT Innovation Challenge ($3000)
- Building an ultra low-power battery-free backscatter tag to communicate over long distances through spread-spectrum and ECC techniques

Online Decision Making for Edge Computing *Aug '21 – Jun '22*
Advised by Dr. Sharayu Moharir, IIT Bombay
- Proposed an online algorithm to decide the state of an edge computing system incurring switching costs under stochastic and adversarial environments

Awards & Achievements

- Project support by **CDAIT Student IoT Challenge** (Spring '24) ($3000)
- Awarded the **ECE Student Travel Grant** (Spring '24) ($500)
- Recipient of the **M & H Bourne Fellowship** (Fall '22 & Spring '23) ($3000)
- **All-India-Rank 114** in JEE Main 2018 amongst 1.14 million candidates
- **Top 0.5 percentile** in JEE Advanced 2018 amongst 230,000 candidates
- **Top 1 percentile** in National Examination for Physics and Chemistry, 2017
- Awarded **Passing Out Color** by EE department, IIT Bombay

Other Research

Learning Unsupervised Representations for Sensing Humans
Advised by Dr. Amirali Aghazadeh, Georgia Tech *Aug '23 – Dec '23*
- Built an unsupervised framework to compress spatio-temporal features
- Reduced the training data requirements of downstream tasks by a factor of 50

Topological Methods for Data-Driven Analysis *May '20 – Feb '21*
Advised by Dr. Debasish Chatterjee, IIT Bombay
- Applied persistent homology to analyse high-dimensional data using topological data analysis, to motor control, gait dynamics, and neurodegenerative diseases

Work & Teaching Experience

Oracle Cloud Infrastructure, Oracle India Pvt. Ltd. *May '21 – Jul '21*
Extended a full-time offer following remarkable internship performance
- Integrated a methodology to record order payloads into pre-existing pathways
- Developed an i/o interface to visualise and record submissions to Jira

Teaching Assistant (MA108: Differential Equations) *May '21 – Jul '21*

SunEdison Infra (Solar PV Company) *Jul '20 – Aug '20*

Positions of Responsibility

Course Structure Organizer, Teaching Assistant *Jul '20 – Feb '21*
with Prof. Mairal, Director, Stanford Byers Center for Biodesign
- Organized a two-phase design-thinking course aimed towards identifying need statements and innovative solutions for the under-served communities

Course Structure Organizer *Nov '20 – Mar '21*
Making and Prototyping at MakerSpace of IIT Bombay
- Designed the course content, structure, delivery mechanisms and logistics for a new elec-mech-prototyping course for all undergraduates at IIT Bombay

Manager, Tinkerers' Laboratory *May '20 – Apr '21*
Nominated head of 'makerspace', led a team of 8
- Designed a five-year plan for self-sustenance and industry partnerships
- Secured the expansion of the lab through pitches to alumni donors

Volunteer, ACM SIGMETRICS / IFIP PERFORMANCE 2022 *Jun '22*
- Contributed to event organization and the logistics of conference tracks

Relevant Coursework

Communication Networks, RF: Wireless Networks, Advanced Wireless Networks, Personal and Mobile Communications, Advanced Data Networks, Mobile Computing and IoT, Wireless Communications, Microwave Design
Machine Learning: Generative and Geometric Deep Learning, Foundations of Intelligent and Learning Agents, Deep Learning for NLP
Probability & Statistics: Random Processes, Stochastic Optimization, Stochastic Control, Advanced Probability and Random Processes
Signal Processing: Advanced Digital Signal Processing, Image Processing, Radar Signal Processing