Rajalaxmi Rajagopalan

📱 217-200-1375   •   ✉ rmirra@gmail.com   •   🌐 rrajalaxmi.web.illinois.edu

Education

University of Illinois, Urbana-Champaign   **Fall 2021 - Present**
PhD, ECE.   Expected Graduation: May 2026   *GPA 4.0*
Relevant Coursework - Optimization, vector space signal processing, Random processes
Machine Learning for Signal Processing, Information Theory, Statistical Inference

National university of Singapore   **Fall 2018 - Spring 2020**
Master of Science   *GPA 4.45/5*
Department of Electrical & Computer Engineering

CEG, Anna University, India   **Fall 2012 - Spring 2016**
Bachelors in Engineering   *GPA 9.75/10*
Department of Electrical & Computer Engineering

Publications

[1] **R. Rajagopalan**, Y.L. Wei, and R.R. Choudhury, "Sample-Constrained Black Box Optimization for Audio Personalization", **AAAI**, February 2024.

[2] **R. Rajagopalan**, Y.L. Wei, and R.R. Choudhury, "Audio Personalization through Human-in-the-loop Optimization", **NeurIPS Workshop on ML for Audio**, December 2023.

[3] Y.L. Wei, **R. Rajagopalan**, B. Islam, and R.R. Choudhury, "Self-supervised Speech Enhancement using Multi-Modal Data", **NeurIPS Workshop on ML for Audio**, December 2023.

[4] **R. Rajagopalan** and C. K. Tham, "Active Learning for IoT Data Prioritization in Edge Nodes Over Wireless Networks," IECON 2020 The 46th Annual Conference of the IEEE Industrial Electronics Society, Singapore, 2020.

Honors and Awards

Exceptional Academics Award	National University of Singapore	Spring 2020
Silver Medal- Department second rank award	CEG, Anna University	Spring 2016
Gold Medal- Excellence in Mathematics	CEG, Anna University	Spring 2013

Research Experience

Graduate Student Researcher   Fall 2021 - Present
Signals & Inference Research Group (SiNRG)   UIUC
o Sample Constrained Black-Box Optimization using techniques
  like **Bayesian Optimization Gaussian Process Regression** for
  Human-in-the-loop personalization of content: audio, images, etc.
o Multi-modal speech enhancement through self-supervised learning.
o Other projects in acoustic signal processing and earable computing.

Graduate Student Researcher   Fall 2018 - Spring 2021
Wireless Networking Group   NUS, Singapore
o **Distributed modeling** and **Bayesian statistical inference** in resource-constrained
  large-scale distributed parallel computing areas: wireless sensor networks and IoT.

Undergraduate Student Researcher   Spring 2014 - Spring 2016
Integrated Systems Lab (ISL)   CEG, India
o ANUSAT-2 satellite (QB50 European Research Mission)
  https://www.qb50.eu/index.php/news.html

Work Experience

Teaching Assistant   Spring 2023
UIUC
o Teaching assistant of Mobile Computing and Algorithms for IoT courses.
o Design and grade lab assignments and tutorial sessions.

Research Assistant   Fall 2021 - Present
SiNRG, UIUC
o Conducting research in acoustic signal processing and earables.

Teaching Instructor   Spring 2020 - Spring 2021
NUS   Singapore
- o Curated lecture content and conducted lectures for introductory courses in
  the Department of ECE: Signals & Systems, Introduction to Probability & Statistics,
  Machine Learning, and Introduction to Communication Networks.
- o Conducted workshops on AWS DeepRacer and mentored teams participating in
  AWS DeepRacer challenges in 2020 and 2021.

Network Planner - Assistant manager   June 2016 - July 2018
Airtel   Gurgaon, India
- o Implementation of IMS (IP Multimedia Subsystem) architecture like VoLTE
  and basic SDN structures for IP/MPLS backhaul networks.
- o Monitoring and Improvement of live network KPI like PRB Utilization of 4G,
  CPICH power adjustments on 3G, the latency of core network nodes like SGSN,
  GGSN, and frame loss reduction on packet backhaul.
- o Developed a tool that automates link budgets of microwave paths for last-mile
  RF sites that ensures maximum throughput per site and shortest path termination
  to a fiber node meeting interference standards and LOS criteria.
- o Holistic analysis of E-Band Microwave solution for future backhaul solutions
  for bandwidth-intensive applications like IoT
- o Planning and expansion of 4G LTE/LTEA BTS sites with MIMO, OFDM,
  and carrier aggregation for ubiquitous 4G coverage.

Skills

- o **Languages :** Python, R, C, C++, VHDL, MATLAB, VBA
- o **Hardware Platforms :** USRP, Raspberry PI, BlackFin BF609, BladeRF, SDR, Cyclone –II FPGA, Stratix-III FPGA, TIVA.
- o **Certifications:** Cisco Network Master
- o **Languages:** English, Tamil, Hindi, French, Japanese
- o **Extracurriculars:** Trained Indian classical violinist

Selected Projects

Sample Constrained Black-Box Optimization for Personalization   *2021-Present*
Prof Dr. Romit Roy Choudhury - SiNRG, UIUC
- o We consider the problem of personalizing content to a user's taste. Content could be audio signals in a hearing aid, customized images, a salad cooked for the user, etc. Given the content, we intend to adjust it with a linear filter h. Our goal is to find the optimal filter h that will maximize the user's personal satisfaction $f(h)$.
- o Finding h is difficult as the function $f(h)$ is unknown; it is embedded somewhere inside the perceptual regions of the brain. Optimizing $f(h)$ using the human in the loop, while constrained by the number of samples (user feedback) available is a sample-efficient black-box optimization problem. We build on the Bayesian Optimization framework. Our techniques are extended to other black-box problems in many areas beyond personalization.

Self Supervised IMU-based Speech Enhancement   *2021-Present*
Prof Dr. Romit Roy Choudhury - SiNRG, UIUC
- o Extracting compact representations of personalized speech features like base frequencies using representation models like autoencoders from captured surface vibrations over the face from the speakers' throat by IMUs in earphones, to perform personalized denoising of speech corrupted by over-the-air interference.

Master's Thesis: Active Learning for IoT Data Prioritization in Edge nodes over Wireless Networks   *2019*
Prof Dr. Chen-Khong Tham - WICOMM, NUS
- o Developed Active learning-based and Bayesian ML-based techniques to improve the robustness of distributed deep learning models in the presence of practical wireless communication channel issues for the application of predictive maintenance of industrial machines.
- o Setup a distributed predictive maintenance testbed with the goal of inferring a global parameter like machine state using distributed machine learning models with message passing strategies.

Design of Anusat-2 Nano-Satellite (QB50 European Research Mission)   *2015*
Prof Dr. P. V. Ramakrishna - ISL, CEG
- o Designed end-to-end protocol stack including the telecommand and telemetry packet structure for communication with the OBC (On-Board Computer) and FIPEX payload of the satellite and ground station.
- o Designed the MCD (Mission control data center) that creates a repository of all payload data, periodic housekeeping data, and Whole Orbit Data, runs scheduled scripts to send periodic commands to the satellite for monitoring the status of various modules.
- o Calibration and testing of the ADCS (Attitude Detection and Control System) responsible for stabilizing the satellite in its orbit. Coding the OBC to control the various modules like ADCS, FIPEX payload, solar panels, comms system, etc., and error handling procedures.