Sriram Gopalakrishnan

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Education

University of Waterloo – Master of Science in Physics 2023
Indian Institute of Technology Madras – Bachelor of Technology in Engineering Physics (rank: 4/28) 2020

Skills

Physics Simulation, Dynamical Systems, Convex Optimization, Numerical Methods, Generative AI, Device Architecture, Device Physics, Finite Element Methods, Statistics, Data Analysis, Object Oriented Programming
Languages: Python, C++, MATLAB, LaTeX, Markdown, English, Hindi, Tamil
Design & Simulation: COMSOL RF Module, AWR Microwave Office (Cadence), LTSpice
Libraries & Frameworks: Git, C++ STL, NumPy, SciPy, Matplotlib, CUDA, R, SQL, Gmsh
Beginner Proficiency: PyTorch, XGBoost, Scikit-Learn, Docker

Experience

Resident Ph.D. Student, Perimeter Institute for Theoretical Physics — Waterloo, Canada 2021–23
- Modeled the spatial energy distribution in quantum systems at thermal equilibrium: Git repo, report
- Framed the evolution of local marginals with temperature as an initial value problem
- Simulated the model in Python using the generalized RK4 algorithm for coupled differential equations

Thesis: Vector 3D FEM for Electromagnetics, NEMO Group @ IIT Madras — Chennai, India 2019–20
- Formulated from first principles, and implemented in C++ (using Object Oriented Design) a vector-based 3D Finite Element Method for electromagnetic scattering in remote sensing : Git repo, report, thesis
- Meshed a 3D domain tetrahedrally using Gmsh; parsed the mesh output in C++ to create node and element data structures; implemented a novel algorithm for edge creation with linear-time deduplication
- Implemented Mie scattering in C++ and MATLAB as a verification benchmark for FEM performance
- Formulated, implemented, and verified in C++ a dyadic Green's function formalism to propagate FEM near-fields to the far-field limit—a crucial capability in remote sensing software

Research Intern, QuMaC Lab @ Tata Institute of Fundamental Research — Mumbai, India 2019
- 2021: Publication in Physical Review Applied with coverage in Nature [PDF]
- Won the Best Project Award out of 7 interns in condensed matter physics: presentation, report
- Optimized the design of a novel ring resonator architecture for superconducting qubits
- Simulated microwave scattering data for 6 relative angles in the architecture using COMSOL RF Module
- Translated scattering data into useful inter-qubit coupling data using AWR Microwave Office
- Discovered optimal angles and qubit frequencies that maximize the scalability of the architecture

Convex Optimization CVX Experience (EE5121), EE @ IIT Madras — Chennai, India 2019
- Piece-wise constant signal recovery from noisy measurements (via second-order-conic-programming)
- Revenue maximization (via linear-programming)
- Low-rank matrix completion (via semi-definite-programming)

Research Intern & NIUS Scholar, Homi Bhabha Centre for Science Education — Mumbai, India 2017–20
- 2020: First-authored publication in Superlattices and Microstructures [PDF]
- Modeled and simulated in Python the energy levels of a 2D Quantum Dot in a magnetic field: Git repo
- Found good agreement with experiments on InGaAs-GaAs Quantum Dots
- Attended the NIUS Physics camp; co-authored a report on quantum many-body theory: report

Independent Learning — Waterloo, Canada 2024
- Implemented color-to-grayscale conversion and Gaussian blurring of images using CUDA: Git repo
- Certified in generative AI with LLMs (by AWS and DeepLearning.AI): verification
- Wrote 20+ blog posts related to machine learning, distributed computing, and databases
- Helping teach a virtual course series (15+ enrolled) on foundations of quantum algorithms

Volunteering

Steering Committee Member, QIndia — Remote 2021–Present
General Executive, UWaterloo Table Tennis Club — Waterloo, Canada 2022
Department Legislator, Physics, IIT Madras — Chennai, India 2019–20