

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, Device Architecture Optimization, Data Analysis

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

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), 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](#)

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

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