

Srinath (Sri) Kailasa

Summary: I am a PhD Candidate at University College London (UCL). I work on **high performance software, numerical methods & algorithms** for simulating **problems in science and engineering**. I'm active in the open-source community (GitHub: @skailasa), and currently interested in projects that promote Rust for high-performance computing.

EDUCATION

University College London

London, United Kingdom

PhD Mathematics & MSc Scientific Computing (MSc with Distinction)

September 2018 - September 2024

Thesis: "Towards Exascale Multiparticle Simulations". Advisor: Professor Timo Betcke

My PhD thesis is concerned with the design and implementation of highly-parallel open-source software for the **dense matrix** computations that arise in the discretisation of **boundary integral equations** designed for the next generation of supercomputers.

During my Master's I took courses across applied mathematics and computer science, including:

- High Performance Computing, Machine Learning, Functional Programming, Integral Equations, Finite Element Methods, Bayesian Statistics, Software Engineering, Parallel & Distributed Computing.
- Results from my Master's thesis were published in Computing in Science and Engineering [3].
- **I achieved the top mark in my cohort, graduating with an average of 83%.**

Durham University

Durham, United Kingdom

MPhys Physics (Upper Second Class Honours)

October 2013 - May 2017

Thesis: "Adaptive Signal Processing for Nystagmus". Advisors: Professor Gordon Love, Dr Andrew Kirby.

I specialised in mathematical and computational physics, with courses taken across computer science (scientific computing, software engineering, data structures and algorithms) applied mathematics (differential equations, linear algebra, analysis & complex analysis) and theoretical physics (quantum computing, atomic physics, condensed matter physics).

My undergraduate thesis was in computer science, where I developed a Kalman filter inspired algorithm for eye-tracking in headsets. The application being the correction of vision due to eye-oscillations, called Nystagmus, in real time.

PROFESSIONAL EXPERIENCE

DeGould Automotive

Remote

Software Engineer

November 2021-January 2022

- I worked primarily in **Python**, building ML Ops infrastructure, using **Kubernetes** and **Docker** in order to productionize research outputs.

Cytora

London, United Kingdom

Software Engineer

September 2017-January 2019

- I lead a team of three to develop greenfield **natural language processing software**, to process data from unstructured and structured source data, using **Python** with **Flask**, **ElasticSearch**, **PostgreSQL**, and **CircleCI**, **Docker** and **GCP** for deployment.

INTERNSHIP EXPERIENCE

Flatiron Institute - Simons Foundation

New York, United States of America

Research Intern

June 2022-August 2022

- I worked on new mathematical methods to accelerate a broad class of dense matrix computations, specifically their fast inversion in $O(N)$ as opposed to $O(N^3)$ using Gaussian Elimination, and associated open-source software.
- This work is now being applied to the rapid solution of partial differential equations, and next generation solvers with applications from virus simulation, to future battery and solar cell architectures [1].

Enthought

Cambridge, United Kingdom

Scientific Software Engineer Intern

April 2019-September 2019

- I developed **computer vision software** for a client in the semiconductor industry to automate manufacturing defect detection using **Python** with **SciKit-Image**, **Keras** and **PyQT** for development, and **TravisCI** and **Docker** for the build environment.
- I contributed to popular Python open source projects (**Traits**, **Envisage**, **Chaco**), under the guidance of CPython devs.

Cambridge Quantum/Honeywell

Cambridge, United Kingdom

Research Intern

June 2017-September 2017

- I was a summer researcher studying algorithms for the next generation of quantum computers where I collaborated with researchers from the University of Cambridge.
- I designed algorithms for compiling simple quantum algorithms on emerging quantum hardware topologies, inspired by classical sorting networks.

Humboldt University of Berlin

Berlin, Germany

Research Intern

June 2016-September 2016

- I was a summer researcher in computational neuroscience, working on models for olfaction in insect brains.
- I implemented neural-data analysis software in Python, and presented the outputs of my work at the Bernstein Conference for Computational Neuroscience.

PUBLICATIONS

- [1] Rachh, M. **Kailasa, S.** Proxy Compression Techniques for A $O(N)$ Fast Solver for Helmholtz Scattering, Manuscript in Preparation (2022).
- [2] **Kailasa, S.** & Betcke, T. Rust for Computational Science, Manuscript in Preparation (2022).
- [3] **Kailasa, S.**, Wang, T., Barba, L. A. & Betcke, T. "PyExaFMM: an exercise in designing high-performance software with Python and Numba". In: To Appear in Computing in Science and Engineering 24.4 (2022)

PRESENTATIONS & POSTERS

- [1] **Kailasa, S.** Fast Direct Solvers for Helmholtz Scattering Problems, SIAM Computational Science and Engineering (2023)
- [2] **Kailasa, S.** Scientific Computing with Rust, Rust at Imperial (2022)
- [3] **Kailasa, S.** Towards Fast Direct Solvers for Helmholtz Scattering Problems, UCL-Imperial Numerics & Acoustics Workshop (2022)
- [4] **Kailasa, S.** Mostly Painless Scientific Computing with Rust, Supercomputing (2022).
- [5] **Kailasa, S.**, Betkiewicz, R., Bardos, V., Kloppenburg, P. & Nawrot, M. P. Single Neuron Model Description and Intrinsic Properties of Different Neuron Types in the Cockroach Antennal Lobe. Bernstein Conference (2016).

TEACHING

[2020-2022] PHAS0102 - Techniques of High Performance Computing. Teaching Assistant.

I ran tutorial sessions for multithreaded and GPGPU programming, I graded homework, and assisted students in help classes.

AWARDS

- [2022] G-Research PhD Grant, \$425.
- [2020] UKRI Doctoral Training Prize, Full PhD Fees and Stipend.
- [2019] UCL Enterprise Startup Battlefield, 3rd Place £1500.
- [2017] Durham University Hackathon 'Durhack', Best Use of Data £50.
- [2016] DAAD Scholarship, Summer Research Prize £2000.
- [2014] BP STEM Scholarship, undergraduate funding £20,000.

PERSONAL

Date of Birth: 26 April 1994

Nationality: United Kingdom

Telephone: +447871865951

Email: srinathkailasa@gmail.com | ucapska@ucl.ac.uk

GitHub: @skailasa