Srinath Kailasa | srinathkailasa@gmail.com | srinath.kailasa.18@ucl.ac.uk

I am a PhD Researcher at UCL **working on high performance computing (HPC) software for simulating problems in science and engineering**. I'm interested in applying HPC to difficult scientific problems, and my research focuses on scaling boundary element solvers for wave propagation problems. I have significant software development experience in data science and machine learning, and have worked in different industries (Manufacturing, Insurance, Automotive). I am active in the open source software community, with contributions (small and large!) to numerous popular data science and numerical libraries, most significantly **ExaFMM, Traits, Envisage, Chaco, Numba, Scipy, Scikit-Learn** and more, including time being mentored by CPython and Numpy maintainers while an intern at Enthought.

EDUCATION

University College London London, United Kingdom
PhD Mathematics & MSc Scientific Computing (MSc with Distinction) September 2018 - September 2024
Focus: My area of research is **software systems** for large scale **simulation** in **Rust** and **Python**. I write software to take advantage of distributed and heterogeneous hardware (mixed CPU/GPU) for scientific and engineering problems. My research focuses on solutions to the integral and differential equations that arise out of wave-phenomena, for example in electromagnetism, acoustics and other related fields. The goal of my research is to develop simulation software for Maxwell's equations for electromagnetism that scales to petascale. I completed my MSc part time in order to fund my studies through working in the technology industry, and graduated top of my class.

Durham University Durham, United Kingdom
MPhys Physics (Upper Second Class Honours) October 2013 - May 2017
Focus: Condensed matter physics and scientific computing.

TECHNOLOGIES

Languages: Python (9 years), Matlab (4 years), Rust (3 years), C++/C , JavaScript (1 year), Miranda, Haskell, Go (< 1 year)
Tools: Data Science (Pandas, Numpy, SciPy, SKLearn, Numba) (9 years), **Distributed Computing (**MPI, OpenMP, Dask) (4 years), **Heterogeneous Computing** (CUDA, OpenCL) (4 years), **Databases** (Postgres, ElasticSearch, MongoDB) (2 years), **DevOps** (Docker, Singularity, TravisCI) (2 years), **Web Dev** (Flask, FastAPI, AWS, GCP) (1 year), **Deep Learning** (Tensorflow, Keras) (<1 year), **Frontend** (React, React-Native) (<1year)

PROFESSIONAL EXPERIENCE

My professional experience is split between academia and industry, mainly in tech startups. Startups have taught me how to be resourceful and manage multiple stakeholders under tight deadlines and shifting requirements. Academia has led me to a diverse set of research labs and disciplines, from studying near-term quantum computing architectures in Cambridge, to analysing neural data and building models of brain function in Berlin, with the underlying theme of applying computation to solve scientific problems.

Flatiron Institute - Simons Foundation New York, United States of America
PhD Intern & Guest Researcher June 2022-Present
- I am collaborating with researchers at the Flatiron Institute to work on cutting edge methods for electromagnetic simulation.
- I am working on new methods and open-source software for the rapid solution of partial differential equations, allowing for next generation solvers with applications from virus simulation, to studying future battery and solar cell architectures.

DeGould Automotive Remote
Software Engineer November 2021-January 2022
- I moonlighted as a software engineer at a computer vision startup alongside my PhD.
- I worked primarily in **Python**, building ML Ops infrastructure, using **Kubernetes** and **Docker** in order to productionize research outputs.

Enthought Cambridge, United Kingdom
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.

Cytora   London, United Kingdom
Software Engineer   September 2017-December 2018
- I took ownership of the development of mission critical projects, operating under ambiguity, and changing requirements.
- 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.

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.

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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)

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PRESENTATIONS
[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)

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POSTERS
[1] **Kailasa, S.** Mostly Painless Scientific Computing with Rust, Supercomputing (2022).
[2] **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).

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

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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.

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REFERENCES
[1] Timo Betcke, Professor of Computational Mathematics, University College London. t.betcke@ucl.ac.uk
[2] Manas Rachh, Research Scientist, Flatiron Institute - Simons Foundation. mrachh@flatironinstitute.org

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PERSONAL
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