

Arun I

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🌐 <https://aruni.systemreboot.net>

🔗 <https://github.com/arunisaac>

Work experience

- 2022–present **Postdoctoral research fellow in genetic privacy and cryptography**, *University College London*, London
Homomorphic encryption for genetic privacy and cryptography; pangenomics for genome wide association studies
- 2021–2022 **GeneNetwork**, *University of Tennessee Health Science Center*, Memphis, Tennessee
Setup of issue tracker and continuous integration services, migration of legacy database and code from GeneNetwork 2 to GeneNetwork 3

Education

- 2015–2021 **PhD (Computational Science)**, *Indian Institute of Science*, Bengaluru, 7.0/8
- 2013–2015 **MTech (Computational Science)**, *Indian Institute of Science*, Bengaluru, 6.4/8
- 2009–2013 **BE (Electronics and Communication Engineering)**, *PSG College of Technology*, Coimbatore, 9.39/10

PhD thesis

- title *Algorithms for Estimating Integrals in High Dimensional Spaces*
- description A new Monte Carlo sampling method to estimate n dimensional volumes and integrals that scales as $\mathcal{O}(n)$ in the number of samples required.

Master's thesis

- title *Numerical Evaluation of the Sommerfeld Integral*
- description A comparative analysis of the numerical advantages offered by five methods used to evaluate the Sommerfeld integral.

Bachelor's project

- title *Earth Station for Reception of Weather Satellite Images in the VHF Band*

description An earth station to receive Automatic Picture Transmission (APT) weather satellite images from NOAA weather satellites.

Programming languages & software skills

high proficiency C (10+ years), Emacs Lisp (5 years), Guile Scheme (5 years), Python (4+ years; NumPy, SciPy), \LaTeX typesetting, Git version control (7 years), GNU/Linux (11 years), shell scripting (11 years; bash, grep, sed, awk)

working proficiency C++, Common Lisp, Fortran, MATLAB, high performance computing (OpenMP, MPI and Cuda), Perl, R

Free software

GNU Guix Frequent contributor for 4+ years with over 500 commits; have been awarded commit access; Link to commits in public repo at <https://git.savannah.gnu.org/cgit/guix.git/log/?qt=author&q=arunisaac@systemreboot.net>

ccwl Author of ccwl, a concise syntax for the Common Workflow Language (CWL); Public repo at <https://github.com/arunisaac/ccwl>

guile-email Author of guile-email, an RFC5322 compliant email parser; Public repo at <https://git.systemreboot.net/guile-email>

guile-xapian Author of guile-xapian, guile bindings for the xapian full text search engine; Public repo at <https://git.systemreboot.net/guile-xapian/>

exiftool.el Author of exiftool.el, an elisp wrapper around exiftool, the metadata manipulation tool; Public repo at <https://git.systemreboot.net/exiftool.el/>

sdiff Author of sdiff, a tree diff program for lisp S-expressions

Others Small contributions to Emacs Org Mode, GNU Guile and to many different projects; active bug reporter

Courses & research training

Numerical methods Numerical Methods, Numerical Solutions of Differential Equations, Numerical Linear Algebra, Modelling and Simulation

Computer science Data Structures and Programming, Data Analysis and Visualization, High Performance Computing, Parallel Programming

Physics Introduction to Photonics, Quantum Mechanics I, Applied Solid State Physics, Quantum Mechanical Principles in Materials, Computational Modelling of Materials

Biology Advanced Bioinformatics

Conferences

- NL-RSE19 Functional Package Management using GNU Guix at the Netherlands Research Software Engineers Conference 2019
- FOSDEM 2021 Semantically meaningful S-expression diff: Tree-diff for lisp source code
- NCI CWIG Reproducible FAIR+ workflows and the Concise Common Workflow Language
- FOSDEM 2022 Concise Common Workflow Language: Concision and elegance in a workflow language using lisp
- DeclMed Propagator networks for degenerate computation
- ICFP 2023

Publications

- [1] Christopher Batten et al. "The Case for Using Guix to Enable Reproducible RISC-V Software & Hardware". In: *Sixth Workshop on Computer Architecture Research with RISC-V*. 2022.
- [2] Christopher Batten et al. "The Case for Using Guix to Solve the gem5 Packaging Problem". In: *International Symposium on Computer Architecture*. 2022.
- [3] Arun I. and Murugesan Venkatapathi. "An $\mathcal{O}(n)$ algorithm for generating uniform random vectors in n -dimensional cones". In: (2021). arXiv: 2101.00936 [math.NA].
- [4] Arun I. and Murugesan Venkatapathi. "Analysis of numerical solutions to Sommerfeld integral relation of the half-space radiator problem". In: *Applied Numerical Mathematics* 106 (2016), pp. 79–97.
- [5] Arun Isaac, Abhijeet Jawlekar, and Murugesan Venkatapathi. "An algorithm for estimating non-convex volumes and other integrals in n dimensions". In: *Computational and Applied Mathematics* 42.6 (2023), p. 242.