Tom Divers

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Education

- **Postgraduate:** Currently in my first year of a PhD at the University of Bristol's Programming Languages Research Group, supervised by Meng Wang and Eddie Jones
- **Undergraduate (2024):** MEng Computer Science (1st Class), University of Warwick.
- **A-Levels (2020):** Mathematics (A*), Further Mathematics (A*), Physics (A*), Computer Science (A*).
- **GCSEs/iGCSEs (2018):** 10, all at grade A*/9.

Research Interests

- **Programming languages:** Nondeterministic control structures, using programming languages to model automata, game semantics, functional programming, and formal verification.
- **Automata theory:** Counter automata and automata over infinite alphabets.
- **Compilers and high-performance computing:** Domain-specific languages for HPC applications.
- **Machine learning:** Adversarial robustness, the implicit bias of neural networks, and computational learning theory.

Academic Experience

- **2022-2023[1]:** Completed a 3rd year project under the supervision of Dmitry Chistikov, achieving a mark of 78%. During this project, I designed a language and proof checker for two-way one-counter automata.
- **Summer 2023[2]:** Completed a research project under the joint supervision of Matthias Englert and Ranko Lazić about the reconstruction of training data from neural networks (as part of Warwick's Undergraduate Research Support Scheme). As part of this, I developed a novel method of improving a robust classifier's capacity to generate images.
- **2023-2024[3]:** Completed a 4th year group project under the supervision of Gihan Mudalige. We created an active-library DSL for parallelised, multi-node smooth particle hydrodynamics simulations.
- **Term 1 2023-2024:** Worked as a seminar tutor for Warwick's Mathematics for Computer Scientists I module. This module covers the basics of Boolean and first-order logic, set theory, formal proof, and introduces graphs and probability spaces.
- **Term 2 2023-2024:** Worked as a lab tutor for Warwick's Functional Programming module. This module introduces the Haskell language, and gives a comprehensive introduction to purely functional languages, including algebraic datatypes, typeclasses, functors and monads.

Other Experience

- **Summer 2020:** Internship at H&Y Filters, using web scraping to support a Kickstarter campaign. Ultimately, this campaign was highly successful, greatly exceeding its fundraising targets.
- **Summer 2022:** Internship at Oxford Vision and Sensor Technology, creating educational materials for their computer vision systems and helping to write a funding proposal.
- **Summer 2022 and Summer 2023:** Worked part-time at the Hong Kong International Learning Academy, teaching Mathematics and English to a small mixed-ability class, predominantly containing students with higher support needs.
- **2018-2022:** Tutored Mathematics and Computer Science (up to A Level standard) part-time, helping many of my students succeed in their exams.

Programming Languages

Python, Java, C/C++, Haskell, Lean, Rust, Javascript (node.js), SQL (Postgres), LaTeX

[1] The final report for this project, as well as the project's codebase, can be found at github.com/tomdaboom/twoc.

[2] The report produced as part of this research can be found at urss.warwick.ac.uk/items/show/411. Some relevant code can be found at github.com/tomdaboom/robust_transfer_generation.

[3] This project's codebase can be found at github.com/wash-dsl/wash.