

Daniel Marshall

Programming Languages ★ Functional Programming ★ Category Theory

1 Carausius Court, Adelaide Place, Canterbury, Kent, United Kingdom, CT1 2HS

☎ (+44) 7932 019991 | ✉ daniel@starsandspira.ls | 🏠 https://starsandspira.ls | 🐦 @starsandspirals



References available on request.

Summary

- Currently a PhD student at the University of Kent, working on the Granule project aimed at capturing behavioural properties of programs at the type level. Interested in both the practical side of programming language research (with involvement in compiler design and implementation for Granule) and the theoretical side (having focused on linear and graded type theories).
- Proficient in functional programming techniques, primarily in Haskell (with experience developing a source plugin for GHC, among other work). Also familiar with a variety of other computational fields from undergraduate and hobby projects, such as machine learning (mainly in Python with PyTorch, including the use of transformer-based language models).
- Especially fascinated by applying concepts from pure mathematics (areas such as category theory, logical foundations and abstract algebra) to achieve practical benefits for programmers. Some experience with program verification and formalised mathematics (for example, developing mechanised proofs about properties of type systems in Agda).

Education

University of Kent

PhD Computer Science

Funded by a three-year EPSRC DTP Doctoral Studentship.

Canterbury

Sep 2020 - present

University of Sheffield

MComp Computer Science with Mathematics

First class with honours. Was awarded an Alumni Fund Hedley Howe Scholarship.

Sheffield

Sep 2016 - Jun 2020

Longley Park Sixth Form

A-Levels (Maths A*, Further Maths A, Physics A, Chemistry A, EPQ A*)

Extended project on the topic of "the mathematics of artificial intelligence".

Sheffield

Sep 2014 - Jun 2016

Research

Linearity and Uniqueness: An Entente Cordiale

Daniel Marshall, Michael Vollmer, Dominic Orchard

Accepted for the 31st European Symposium on Programming (ESOP 2022).

Extended abstract accepted for the Student Research Competition at POPL 2022.

[Submission]

[Poster]

How to Take the Inverse of a Type

Daniel Marshall, Dominic Orchard

Submitted to the 36th European Conference on Object-Oriented Programming (ECOOP 2022).

[Draft]

Linear Exponentials as Graded Modal Types

Jack Hughes*, Daniel Marshall*, James Wood*, Dominic Orchard

In the proceedings of the 5th International Workshop on Trends in Linear Logic and Applications (TLLA 2021).

[Extended abstract]

[Slides]

Comparing Evolutionary Algorithms for the Graph Colouring Problem

Daniel Marshall*, Robert Dennison*, Trisha Goel*, Sam Clowes*

Darwin (master's) project. Supervised by Dirk Sudholt.

[Report]

Verification and Correctness of Functional Programs in Isabelle/HOL

Daniel Marshall

Undergraduate dissertation. Supervised by Georg Struth.

[Dissertation]

Experience

Haskell.org × CodeWorld

Student Developer (Google Summer of Code)

Remote

May 2019 - Aug 2019

Mentored by Chris Smith and Daniel Cartwright. Created a source plugin for the Glasgow Haskell Compiler which applies static analysis techniques, allowing instructors to define requirements for the code within a project and automatically validate them. Funded by Google, and passed all three evaluations resulting in a successful Summer of Code project.

School of Health and Related Research

Student Researcher (Sheffield Undergraduate Research Experience)

Sheffield

Jun 2018 - Aug 2018

Supervised by Pete Dodd and Mozghan Kabiri Chimeh. Applied a GPU agent-based modelling tool to data collected from Zambia and South Africa, to create a model of TB transmission that runs around 30x faster than a comparable model running on a CPU. Presented in April 2019 at the British Conference of Undergraduate Research.

Service

Aug 21 **Student Volunteer**, 26th International Conference on Functional Programming (ICFP)

Remote

Jan 21 **Student Volunteer**, 48th Symposium on Principles of Programming Languages (POPL)

Remote

Aug 20 **Student Volunteer**, 25th International Conference on Functional Programming (ICFP)

Remote

Jun 20 **Student Volunteer**, 41st Conference on Programming Language Design and Implementation (PLDI)

Remote

Aug 19 **Student Volunteer**, 24th International Conference on Functional Programming (ICFP)

Berlin

18-20 **Publicity Media Officer**, LGBT+ Representative Committee, Students' Union

Sheffield

17-20 **Senior Student Ambassador**, Department of Computer Science

Sheffield

16-18 **Academic Representative**, School of Mathematics and Statistics

Sheffield

Teaching

Spr 22 **CO545 Functional Programming**, University of Kent

Canterbury

Spr 21 **CO545 Functional Programming**, University of Kent

Canterbury

Aut 18 **Introduction to Web Development**, Code First: Girls

Sheffield

Presentations

Linear Exponentials as Graded Modal Types

Remote

5th International Workshop on Trends in Linear Logic and Applications (TLLA 2021)

Jun 2021

Morita Theory in Abelian Categories

Sheffield

School of Mathematics and Statistics Departmental Seminar

Sep 2019

A High-Performance Agent Based Model of Tuberculosis Transmission

Pontypridd

British Conference of Undergraduate Research (BCUR 2019)

Apr 2019

Elm: Putting the Fun in Functional

Sheffield

Global Diversity CFP Day 2019

Mar 2019

Honours

Jan 22 **Travel Award**, 49th Symposium on Principles of Programming Languages (POPL)

Philadelphia

Apr 21 **Attendee**, Midlands Graduate School 2021

Remote

Aug 20 **Attendee**, Scottish Programming Languages and Verification Summer School 2020

Remote

Aug 20 **Attendee**, Programming Languages Mentoring Workshop (ICFP 2020)

Remote

Aug 19 **Travel Award**, 24th International Conference on Functional Programming (ICFP)

Berlin

Feb 18 **Best Pitch for Funding**, Engineering: You're Hired! (Second Year Project Week)

Sheffield

Oct 17 **Best Use of a .tech Domain**, HackSheffield 3.0

Sheffield