

# Zac Garby

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## Academic

### 2023-present **University of Nottingham**

PhD Student, Functional Programming

Supervised by Professor Graham Hutton in the Functional Programming Lab.

I am working on compiler calculation methods, with a particular focus on languages with effects.

My main interests are program calculation, as well as automated program synthesis, interactive programming, and how these things can be combined for “friendly” programming experiences.

I have published an article, “*Calculating Compilers Effectively*”, in the 2024 *Haskell Symposium*.

### 2019-2023 **University of Nottingham**

MSci, Computer Science

First Class (87% average, awarded the best overall performance prize).

Achieved the highest ever grade in Computer Science at the University of Nottingham.

Dissertation: *Fantasia: Synthesising Recursive Functions Without Trace-complete Examples*

Dissertation: *Fugue: A Friendly Functional Programming Language with Holes*

### 2015-2019 **The Thomas Hardy School, Dorchester**

A-Levels

Mathematics, Further Mathematics, Computer Science, and Physics: *A\*AAA*

## Volunteering

### 2024-present *Hackathons UK*, Volunteer

- A member of a small core team at Hackathons UK, a charity which supports University students in organising and hosting hackathons across the country.
- I am primarily involved with event support and planning, but also sponsorships and outreach.

### 2024 *International Conference on Functional Programming*, Student Volunteer

- I served throughout the conference as a student volunteer, helping with registration and general running and logistics.

### 2022-2023 *HackSoc Nottingham*, President

- I was responsible for the society, including the community itself and its reputation, but also organisation, finances, and planning. I substantially increased society activity and general “sense of community” through restructuring.
- I also gave a number of talks and workshops, and acted as the Graphics Officer.

### 2021-2023 *HackSoc Nottingham*, Lead organiser, HackNotts

- I was responsible for the general planning and logistics of the event, as well as communicating with various companies to arrange funding and grants.
- HackNotts 23 was the largest HackNotts ever (and since), with 204 attendees in total.

### 2021-2022 *HackSoc Nottingham*, Development Secretary and Graphics Officer.

- I gave a number of workshops and talks on tech-related topics each month.
- I maintained the society’s website, graphics, and infrastructure.

### 2020-2021 *University of Nottingham*, A Computer Science mentor.

- I was assigned to a small group of first-year students to help them settle in to University.
- I ran a number of sessions with my group to help them with their first-year modules.

2018 *National Citizen Service*, Participant.

- As part of a team, I raised money and restored a youth centre in Dorchester.

2017-2019 *Thomas Hardy School*, Ran the Programming & Robotics club.

- I started and led the programming & robotics club at my school.
- We taught a group of Year 9 and GCSE students about various computer science topics.

2017-2019 *Thomas Hardy School*, Volunteered at a number of STEM days.

- I helped run day-sessions teaching middle school students about programming and robotics.

## Skills & Interests

- Extensive experience in a variety of programming languages, in particular Haskell, Python, C, Go, JavaScript and other web technologies, Agda and  $\text{\LaTeX}$ . Also some experience with Rust, various LISP, and numerous others including domains specific languages.
- As the ex-President of *HackSoc* at the University of Nottingham, I am an experienced public speaker, and can confidently take on leadership positions. Having led the organisation of *HackNotts*, I am comfortable communicating with organisations, dealing with finance, and sorting out logistics and large-scale plans.
- Strong interest in many areas related to programming language theory: type theory, compiler design/implementation, and synthesis and interactivity in programming languages.
- Varied experience with many areas of programming and computer science, including multimedia (image processing, audio processing/synthesis, game development), systems programming, scientific computing, full-stack web development, networking, and the design and implementation of programming language compilers.
- Strong interest in hackathons, both as an attendee and as an organiser. I've attended 13 hackathons and organised two of them. A complete portfolio is available on my website.
- I enjoy playing, listening to, and creating music; I play the guitar and the piano, but I am really interested in early music and am currently building a lute. I also enjoy reading, climbing, bouldering, and I am a member of—and a Training Officer at—the University of Nottingham's Medieval Combat Society.
- I have an Emergency First Aid at Work qualification.

## Awards, Achievements, Publications, etc.

- 2024 *Haskell Symposium*, I presented my paper, “Calculating Compilers Effectively” (Zac Garby, Graham Hutton, and Patrick Bahr)
- 2024 *Journal of Functional Programming*, I reviewed an article for the *JFP*'s special issue on program calculation.
- 2024 *Computerphile*, I created a video about L-systems, to create and render “plants” using Python, for the popular YouTube channel *Computerphile*, which was watched by around 50k people.
- 2024 *AstonHack 9*, Second place prize for my project, “Lunatic Lander”, a mixed-reality hardware game simulating a moon landing on a rotating model of the moon.
- 2024 *HackSussex 2024*, First place prize for my project, “Scribble Scraps”, a game where real-life objects are turned into digital creatures using computer vision.

- 2024 *Royal Hackaway v7*, First place prize for my project, “Jailbreak”, a game exploring a dystopian future where prisons are controlled by artificial intelligence.
- 2023 *University of Nottingham*, Elizabeth and J D Marsden Prize. Awarded to “the best students of the year” for: academic performance, and “outstanding character and personality”.
- 2023 *Computer Science, University of Nottingham*, Outstanding Community Contribution Prize, for my work organising HackNotts ’21 and ’23.
- 2023 *Computer Science, University of Nottingham*, Best Overall Performance Prize, for achieving the highest overall (over the full four years) grade percentage in my cohort.
- 2023 *Computer Science, University of Nottingham*, Best Year 4 Research Project Prize, for my work on the *Fantasia* program synthesis engine.
- 2023 *Computer Science, University of Nottingham*, High Achiever’s Award, for being within the top 5% in my year in terms of grades.
- 2023 *SussexHack 23*, Second place prize for my project, “Knuckles”, a biomechanical robot hand using shape-memory alloys.
- 2022 *OxfordHack 22*, Won the “What the Hack?!” prize for my project, “MusicBoard”, a novel pen-and-paper musical instrument.
- 2022 *Computer Science, University of Nottingham*, Best Individual Year 3 Dissertation prize for my work on the *Fugue* programming language.
- 2022 *Computer Science, University of Nottingham*, High Achiever’s Award, for being within the top 5% in my year in terms of grades.
- 2021 *AstonHack 2021*, First place for my project, “Network over Rube Goldberg Machine”, an experiment in physical data transmission.
- 2021 *AstonHack 2021*, The “Communication Prize”, a sponsor prize, also for my project, “Network over Rube Goldberg Machine”.
- 2021 *Computer Science, University of Nottingham*, High Achiever’s Award, for being within the top 5% in my year in terms of grades.
- 2020 *HackNotts 2020*, Sponsored prize for my project, “The Haskelltron 2000”, a Haskell interpreter embedded in a standard receipt printer.
- 2020 *Computer Science, University of Nottingham*, High Achiever’s Award, for being within the top 5% in my year in terms of grades.
- 2019 *Computer Science, University of Nottingham*, Silver Scholarship (a 25% tuition fee rebate each of my four years at university).
- 2019 *Thomas Hardy School*, Selected by my school to create an interactive exhibit for the local community’s “50th Anniversary of the Moon Landing” event.
- 2019 *Thomas Hardy School*, Received my school’s first ever Computer Science subject award.
- 2018 *United Kingdom Mathematics Trust*, Silver award in the Senior Mathematical Challenge.
- 2015 *Bournemouth University*, Second place out of hundreds in a programming competition.

## References

Available upon request.