JACOB GARBY

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EDUCATION

University of Nottingham *Sep 2019 - July 2023*
MSci in Computer Science 1st Class Degree

Thomas Hardye School *Sep 2017 - Jul 2019*
A Levels Computer Science: **A**, Maths: **A**, Physics: **B**, Further Maths: **C**

SKILLS

Languages:	Native English speaker. Intermediate Swedish.
Programming:	C, C++, Python, Haskell, Assembly (x86 and ARM), Java, Javascript.
Tools/Software:	Linux internals, Git, Docker, Wireshark, FreeCad, KiCad, ONE simulator

EXPERIENCE

Organising HackNotts Hackathon *Sep 2022-Feb 2023*
I was the lead organiser for a large programming competition at the University of Nottingham. This event took place over two days in February 2023, after almost a year of preparation. ***204 people attended****, from over 20 universities.*

Treasurer & Development Secretary for Nottingham University's programming & tech society *2020-present*
I'm on the committee of HackSoc, which is a society at the University of Nottingham that runs events twice a week, either workshops teaching students how to use various technologies, or talks about interesting topics. In the 2021 academic year I was the society's treasurer, in charge of managing the budget and all the invoices. In 2022, I'm the development secretary, meaning that I'm responsible for organising these talks and workshops, as well as maintaining the society's vast online infrastructure. ***I frequently give talks and workshops*** *about topics including microcontrollers, graphics programming, and C programming.*

Member of Nottingham University's robotics team, RoboNotts *Spring 2022-present*
I am one of the first members of the University's robotics competition team. ***We compete in robotics competitions around the country****, and will be competing in Europe. We build and program robots using ROS, with a focus on assistive robotics.*

Mentor (and then Senior Mentor) for the School of Computer Science at my university *2020 & 2021*
In my second year I decided to sign up to be a mentor, which involves helping the new first years settle in to the university, as well helping them academically with the content. In my third year, I signed up to be a senior mentor, whose job is to help mentors do their job. In this position, ***I came up with a new method of pairing mentors with mentees based on their interests****, which is the method the university still uses now.*

Programming & Robotics Club Leader *2017-2019*
I ran a club at my high school, ***teaching younger students how to program*** *in Python, as well as the hardware aspects of building robots*

PROJECTS

Both in my free time and for university, I've worked on countless projects. I've experimented with various fields including low level computer architecture, full-stack web development, and all sorts of things in between. Below, I'll list those projects that seem most relevant to this position, as well as those that show a range of different techniques and technologies.

A Novel Protocol for Mobile Delay Tolerant Networks *Winter 2022*
Relevant paper attached to application.
- I designed a new DTN protocol for networks consisting of mobile nodes that exhibit a specific movement characteristic.
- Targetted primarily towards "smart dust" movement, but equally suitable for many types of network that behave in a

similar way.
- Based on the observation that nodes in these networks are likely to generally form clusters (due to wind currents for smart dust, but many nodes exhibit this behaviour, like flocking animals (boids).
- I developed a simulation of this protocol on a boids based movement model, and demonstrated results better than or similar to some leading DTN protocols.

Operating System Experiments *Oct 2019 - present*
https://github.com/j4cobgarby/octOs
- I started working on this to fully understand the x86 architecture.
- Memory management (malloc) working, FAT16 filesystem functionality, various peripherals (monitor, keyboard, timer module, etc.)
https://github.com/j4cobgarby/flux-kernel
- My second major attempt at operating system development.
- This time I based the design on a microkernel model, and thought more about IPC.

Novel Control Architecture for Low Power/Low Cost Drone Fleets *Nov 2021 - June 2022*
https://github.com/j4cobgarby/dronefleet
- 3rd year individual dissertation at Nottingham University
- A new concept I came up with where each drone in a fleet does not calculate what speed to set its own motors to, and instead sends raw sensor data to a central server, which does all the calculations server-side, meaning the drones can use a lot less power and be cheaper.
- For this project I programmed a drone simulator to interact with this type of control server, and showed that it's a feasible method for controlling drones.

A logic circuit design for a 16-bit CPU *Feb - Apr 2022*
https://github.com/j4cobgarby/proc
- For this project I designed, from scratch, the architecture for a 16-bit CPU. I then implemented this as a logic circuit with a program called *Logisim*. I have begun designing a physical circuit for this CPU using discrete logic chips.
- Supports conditional execution for each instruction.

A social network website *Jun 2017 - Jul 2017*
https://github.com/j4cobgarby/Cordial
- A fully functional social network site written in PHP.

EXTRACURRICULAR HOBBIES

Electronics/Hardware design
I like designing and building various circuits, and especially integrating them with software

- I've designed and built a computer keyboard using an ATmega32u4 microcontroller, including writing the keyboard firmware, and getting custom PCBs printed.
- For the drone fleet project mentioned earlier, I designed the circuitry for a drone.
- On my Github page is a computer I designed using the Z80 CPU.

Music
I like playing several instruments, such as classical and electric guitar, and also the double bass.

Medieval Combat Reenactment
At my university I do medieval reenactment with historically accurate weapons and armour, especially from the Viking period.

AWARDS

- Scholarship from the Nottingham University School of Computer Science

- First place prize at the ”AstonHack 7” hackathon (*December 2021*). On top of this, we also won the prize for projects on the theme of ”communication”.

- Second place prize at the ”HackSussex” hackathon (*February 2023*).

- A-Level award for achievement in computer science from my high school (Thomas hardye School)

REFERENCES

- Steve Bagley (*steven.bagley@nottingham.ac.uk*)

- Ahmed Ali-Eldin Hassan (*ahmed.hassan@chalmers.se*)