Name: Cyrus Knopf ✻ *E-mail:* cyrus.knopf@gmail.com ✻ *Telephone number:* +44 7816296232

Education

BSc (Hons) Computer Science **2022-2025** **University Of Manchester**

Grade: First Class **Societies:** Trading (Co-head), Computer Science, Mathematics, Radio

Dissertation: *Exploring the Semantics of Recursion in Register Machine Programs with Category Theory*

Courses: *Machine Learning, Compilers, GPU & Parallel Programming, Advanced Algorithms & Data Structures*

Experience

Freelance Software Engineer **2023-**

Optimistics London

- Developed greenfield software for an SEO company with customers including a top 10 UK travel insurance broker
- Applied knowledge of **natural language processing**, with **Python** and Scikit, increasing content outputs **2.5x**
- Advisor on **microservices**, **containerised deployment**, and large language models

Projects

MCTS Chess Agent https://github.com/cyrusknopf/yggdrasil

- Built a bitboard agent with my own implementation of the Monte Carlo tree search algorithm in modern **C++23**
- Followed **test-driven development** with Google Test, in a growing test suite of **over 100** unit tests
- Data-driven optimisations motivated by **microbenchmarking** with Google Benchmark resulting in **10x** speedups
- Identified hot-path and key functions to target optimisations using **profiling** tools such as Callgrind (Valgrind tool)

Open Source Obsidian Plugin https://github.com/cyrusknopf/obsidian-smart-tasklists

- Contributed an **open-source** plugin to the Obsidian note-taking platform, written in **Typescript**
- Crafted a recursive algorithm to efficiently scan entire Markdown notes, noting the state of specific task items
- Accumulated an active user base, improving everyday productivity and enhancing the Markdown environment

Optiver Trading Bot https://github.com/cyrusknopf/optibook-challenge/

- Developed an algorithmic trading bot in Python for a mock financial exchange, accumulating $\$\mathbf{10,000}$/hr at peak
- Leveraged arbitrage across **2 markets**, managing a **delta neutral** portfolio over 3 products and 2 baskets
- Optimised **low-latency** Python to execute decisions at pace with the market as a **top 10 fastest** competitor

Mini Operating System for ARM microcontroller https://github.com/cyrusknopf/arm-assembly-os

- Engineered core OS functions, extending them to develop a program with multimodal I/O interaction with the user
- Added support for software debouncing with bespoke **interrupt handlers** and **supervisor calls**
- Synthesised **Verilog** onto an **FPGA** to uniquely extend functionality and facilitate more complex programs

Sales Forecasting with ARIMA https://github.com/cyrusknopf/peakai-hackathon

- Won **1st place** out of 30 teams of 4 at Peak AI's data science hackathon, attended by students of four universities
- Evaluated data via stationary testing and autocorrelation analysis, training the model, generating multi-step forecasts
- Presented research findings to a panel of **3 judges**, receiving **commendation from head of AI** at Peak AI

Functional Data Structures https://github.com/cyrusknopf/dust

- Implemented common (e.g. doubly linked list) and esoteric (e.g. zipper) immutable **data structures** in **OCaml**
- Ensured correctness via **unit testing** with Jane Street's ppx_expect **preprocessing library**
- Benchmarked and **evaluated** performance of implementations with Jane Street's **Bench** microbenchmarking library

Skills

C/C++, Python, Java, ARM Assembly, Rust, OCaml, Linux CLI, Bash, Git, Valgrind, GDB, Nix, Vim

Relevant Interests

Low latency C++, programming language design, lambda calculus, compilers, functional programming