Tom Cassar

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Education

B.Sc. Computer Science Sept. 2022 – Jun. 2025
University of Manchester *United Kingdom*

- First Year **80%**, Second Year **77%** (First Class).
- Algorithms and Data Structures, Distributed Systems, System Architecture, Operating Systems, Machine Learning, Cyber Security, Chip Multiprocessors.

Hampton School Sept. 2017 – Jul. 2022

- Further Maths, Chemistry, Computer Science, Maths at **A*A*A*A***.
- 10 GCSEs all at **Grade 9**.

Experience

Netcraft - Android Malware Sandbox Team Jul. 2024 – Sept. 2024
Software Engineering Intern. www.netcraft.com *Manchester, United Kingdom*

- **Reverse engineered** the protocol that the *EagleSpy* Android malware family uses to communicate with **Command and Control servers**. Mimicked requests made by infected devices to extract attacker's techniques and procedures, enabling takedowns.
- **Improved sandbox coverage** by deploying 5 static analysis rules spanning the *Copybara*, *EagleSpy*, and *Godfather* malware families. The *Godfather* rule reduced classification false negative rate 7% and increased true positive rate 11%.
- **Tracked classification performance** of Netcraft's Android Malware sandbox. System analysed 250 APKs up to once a day; results and metrics visualised with Grafana. Led to smarter, data-driven decisions about which families to support.
- **Collaborated across teams** to build an app logo classification model. Extracted and cleaned 2,100 app logo icons from 500 APKs.

Projects

Fine-Grained System Call Filtering - *Final Year Project* Sept. 2024 – Present

- Developed an **`strace`-like analysis tool** in **eBPF** and **Go** to study **syscall invocation patterns** across dynamically linked libraries, revealing that different libraries invoked distinct sets of syscalls.
- Designed a **fine-grained syscall filtering mechanism** based on process address space, enabling per-library filtering. Motivated by results from analysis tool: **37.0% privilege reduction for Redis** and **23.7% for Nginx** (worst case).
- **Implemented a proof-of-concept** using **eBPF** to dynamically apply syscall whitelists to running processes. Highly configurable via a CLI (written in Go).
- Published source code and results under MIT Licence at www.github.com/tcassar-diss.

Optimising Matrix Multiplication Apr. 2024

- **Investigated architecture** of i7-8550U by optimising naive 'schoolbook' matrix multiplication in C.
- Plotted **throughput** (in floating point operations per second) against matrix dimension for different optimisations, selecting test values using **knowledge of underlying architecture** (e.g. cache line size, core count).
- Achieved a **speedup of 1000x** using 'Single Instruction, Multiple Data', tiling, multi-core, and loop collapsing.

Autotrader Machine Learning Hackathon Win Mar. 2024

- **Predicted a car's time to sell** on AutoTrader using 225,000 rows of data with a root mean squared error of 21 days.
- Explored data to inform data **cleaning, wrangling, and feature engineering**. Produced clear visualisations which highlighted subtle trends in data, revealing a source of data leakage which others did not find.
- Experimented with **Random Forests**, **Decision Trees** and **Artificial Neural Networks**. Plotted graphs comparing model performance with `matplotlib` and `seaborn` to inform model selection.
- **Presented** data processing pipeline and results to **ML engineers at AutoTrader**.

Sony Hackathon Win - IRIS Jun. 2023

- Created device to aid visually impaired users by **describing the surrounding environment in realtime**.
- Implemented a **containerised backend service** which used the Google Cloud API, and OpenAI's GPT3.5 API.
- Designed a **bespoke low level communication protocol** between the Spresence board and the backend over sockets.
- Presented design to a panel of industry judges, defended design decisions, and placed first out of 140 students.

Awards and Leadership

- **Career Mentoring** Sept. 2024 - Nov. 2024
  Advised Second Year students with job search strategies, CV reviews, and mock interviews.
- **Bloomberg BPuzzled** Nov. 2023, Apr. 2024
  Won BPuzzled Manchester. Qualified for and competed in the BPuzzled Global Finals in London.
- **Cambridge Chemistry Challenge Gold Award** Jul. 2021, Feb. 2022
  Qualified for, and placed 6th out of 60, in the Cambridge Chemistry Race.
- **Rowing Coxswain** Sept. 2017 - Jul. 2021
  Leadership, **cooperation**, **interpersonal** and **organisational skills**.

Tools

- Go, Python, C, BPF, C++, Linux, Docker, git, Java, PHP, PostgreSQL, Haskell, Bash, LaTeX.