

Donald Robertson

Full-stack software engineer with 9 years of professional experience across multiple technology stacks. I like building efficient and robust web applications, mentoring other developers and implementing effective processes. Onetime researcher with a focus on transport protocols, streaming media applications and how they can collaborate to achieve fairer performance for users.

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Experience

OCT. 2022 - PRESENT

Senior Software Engineer

BEAMERY, REMOTE

- Led migration of internal tooling from multiple CLIs to a single **ReactJS** web UI. Overhauled a dormant project with dependency upgrades. Added **OpenTelemetry**-based observability surfaced using **Grafana**. Co-authored an internal RFC proposing architectural simplifications and efficiency gains for related upstream services.
- Subsequently selected to lead UI development on a new business-critical product. Responsible for project setup, technology choices, documentation, system architecture, operational ownership and feature delivery.
- Drove process improvements that increased team velocity through a reduction in non-essential meetings and adoption of asynchronous pre-refinement activities. Defined a collaborative process with product and design to identify and resolve technical unknowns before they could block delivery.
- Mentored multiple engineers of varying seniority in front-end development to reduce development bottlenecks and minimise knowledge siloing.

MAY. 2016 - SEP. 2022

Software Engineer

FINDMYPAST, DUNDEE

*(PART-TIME:
OCT. 2018 - SEP. 2022)*

- Helped drive the migration of user account data and functionality from an **ASP.NET/MS-SQL** monolith to an **Elixir/PostgreSQL** microservice with zero downtime and 6 weeks ahead of schedule
- Designed, implemented and optimised a novel family tree layout algorithm in **NodeJS** supporting performant layout of 10,000 node trees in ancestral and descendant directions simultaneously thereby outperforming competing products. The algorithm underpins the **ReactJS** family-tree application within the wider family history product.
- Investigated network performance at the container, node and VM layers of an on-premises **Kubernetes** cluster using **eBPF** and **perf** resulting in issues with DNS caching being identified while affirming normal patterns of **softirq** processing following a NIC upgrade

JUN. 2020 - SEP. 2020

Research Intern

BBC, REMOTE

(INTERNSHIP)

- Researched improvements to low-latency live-streaming performance by enabling communication of server-side transport state via a novel HTTP header to a client-side **dash.js** video player
- Deployed an **OpenResty** server as a transparent proxy that generates and prepends the header to responses from an upstream CDN server
- Implemented a throughput estimator in **dash.js** to parse the contents of the HTTP header and estimate throughput based on the congestion window, MSS and RTT
- Documented the project results in an internally published report. The approach was refined and expanded to support **QUIC** in the course of my PhD.

FEB. 2016 - APR. 2016

Software Engineer

ETELLECT, GLASGOW

JUL. 2015 - JAN. 2016

Graduate Software Engineer

VERINT, INCHINNAN

Education

SEP. 2018 - SEP. 2024

PhD Computer Science

UNIVERSITY OF ST ANDREWS

Supervisors: Marwan Fayed (Primary), Saleem Bhatti (Secondary)

Thesis: Collaborative Feedback Controls for Transport and Application Layers in Dynamic Adaptive Streaming over HTTP (DASH)

- Conducted a statistical analysis of data transfer during slow-start to avoid issues due to nesting the congestion avoidance and ABR algorithm control loops
- Implemented a system allowing a modified **dash.js** player to enable pacing at the server-side using a combination of: 1) an HTTP server implemented in **Rust**, 2) a custom congestion control module with Reno AIMD, and 3) a modified Linux kernel
- Explored using server-side transport-state to improve low-latency live-streaming performance in a **dash.js** player modified to handle TCP or **QUIC** metrics
- Deployed a patched version of **Nginx** with **QUIC** support provided by **Quiche** to enable surfacing of transport-state without the use of **OpenResty** or **Lua**

AWARDS

- *Brendan Murphy Memorial Prize, 2019*: Awarded for the best presentation by a young researcher at the Next Generation Networks Multi-Service Networks workshop

SEP. 2011 - JUN. 2016

BSc Software Engineering

UNIVERSITY OF STIRLING

First Class (Honours)

Dissertation: Development of a Linux Driver for the Microsoft Xbox 360 Wired Controller

- Implemented a Linux kernel USB device driver for the Microsoft Xbox 360 Wired game controller including support for LED and vibration features
- Conducted a statistical analysis of performance against extant solutions using number of clock cycles to avoid issues with time-based measurement of kernel-space driver software

AWARDS

- *Computing Science Honours Project Prize, 2015*
- *Computing Science Third Year Prize, 2014*
- *Computing Science Second Year Prize, 2013*

Technical Skills

LANGUAGES JavaScript, TypeScript, Rust, Elixir, Python, SQL (PostgreSQL), HTML, CSS, C

- LIBRARIES
- **JavaScript:** NodeJS, React, Next.js, Tanstack Query, Prisma, Jest, Playwright
 - **Rust:** Actix, Tokio, Hyper, Log, Lazy Static, Tracing, Serde
 - **Python:** Jupyter, Matplotlib, NumPy, SciPy

TOOLING Nginx, Kubernetes, OpenTelemetry, Prometheus, AlertManager, Grafana, Ansible, Vault, GitHub Actions

Interests

FOOTBALL I have been a devotee of football since childhood. I am a diehard fan and former season ticket holder of Leicester City. Sadly I am now reduced to following them from afar. I delight in learning more of the global history of the game. Most recently I have been reading about the evolution of Argentinian football across the twentieth century.

PROGRAMMING Writing code has been my main hobby since beginning my undergraduate degree. I enjoy problem solving and the structure programming brings to that pursuit. I was treasurer and then president of Stirling University Computer Club. In second year I led development of an on-campus route finder for Android. I now work primarily in TypeScript. I enjoy the safety provided by type annotations when trying to ensure program correctness.