Robert Edward Fry

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4 years professionally experienced software engineer with a Master of Mathematics (**MMath, Distinction**) from the University of Portsmouth. • Able to design, implement, and test solutions to meet requirements and specifications. • Able to explain technical details to customers, clients, and stakeholders of all backgrounds. • Able to interpret and solve difficult mathematical problems.

Technical Competencies

• Rust • C++ (ISO/IEC 14882) • C (ISO/IEC 9899) • CMake • UML (ISO/IEC 19501) • Python • GNU/Linux • Bash • Git • Docker

Professional Experience

Software Engineer (C++, Rust) **January 2023 - Ongoing**
BAE Systems **Portsmouth, UK**

Royal Navy Combat Systems Modernisation

- Developed real-time data processors in Rust within an Agile Scrum team, contributing towards the Royal Navy's £285m RECODE combat management systems modernisation contract and NATOs push towards memory-safety.
- Proposed and implemented efficient algorithms and data structures to meet requirements, including geospatial indexing and deterministic scheduling for scalable distributed Kubernetes-based systems.
- Reviewed team code through pull requests, improving codebase quality and test coverage.
- Advocated for and introduced modern Rust features to the team, enhancing code readability and performance.

Training Simulation Secondment

- Implemented and tested new requirements in legacy C++03 training and simulation systems, successfully extending the solution lifespan via additional specifications.
- Applied Model-Based Software Engineering (UML and SysML under the NATO Architecture Framework v4) to document solution architecture and cross-company communication.
- Created a test procedure document generator using Python and Pandas, reducing delivery timelines from weeks to days.
- Facilitated the smooth integration of supplier assets by fully testing software and planning and documenting transition processes.
- Mentored a graduate engineer with no C++ background, guiding them through advanced concepts and ensuring contract deliverables where met.

Software Engineer (C, C++) **August 2019 - August 2020**
Raymarine **Fareham, UK**

- Built the embedded Yachtsense Digital Control System UI using C++17, delivering a modular and extensible interface for rapid feature deployment.
- Developed a NMEA 0183/2000 processor to enable seamless communication between legacy and modern maritime equipment.
- Took initiative to develop a high-performance string builder utility, reducing runtime overhead compared to STL standards. This earned team commendation and achieved widespread internal adoption.

Education

Master of Mathematics (MMath, Distinction) **September 2016 - July 2022**
University of Portsmouth **Portsmouth, UK**

Masters Thesis *(https://cloud.robertfry.xyz/s/Thesis2022)*
A Categorical Interpretation of Kleinberg's Impossibility Theorem for Clustering

- Clustering algorithms group data points by a measure of similarity. Using category theory, three commonly desired but mutually exclusive properties of clustering algorithms where generalised to find measures of similarity where these properties coexist.

Bachelors Project *(https://cloud.robertfry.xyz/s/Thesis2021)*
A Research Project for the NTRU Cryptosystem

- The NTRU cryptosystem, part of the NIST post-quantum standardisation effort, is designed to replace RSA with resistance to quantum attack vectors. Following research into the underlying mathematics, a C++17 library was designed and implemented.

Notable Projects

Director of the Emsworth Slipper Sailing Club Ltd **January 2023 - Ongoing**

- Serves on the general committee, oversees the club's day-to-day operations, and contributes to strategic decisions.
- Responsible for taking minutes for the sailing sub-committee, ensuring accurate documentation and effective follow-up actions.
- Teaches sailing to youth members as a qualified RYA Dinghy Instructor, and regularly races in Chichester Harbour.

Engine Monitor **Ongoing**

- Developing a real-time equipment monitoring system, using the i.MX RT1062 microprocessor, to generate NMEA data for leisure maritime engines lacking first-party instrumentation.
- Leading C++17 firmware and cross-platform desktop companion development, collaborating closely on hardware integration.
- Wrote a stackless cooperative coroutine scheduler with priority-based wake timers, enabling single-core concurrency.