Email
Github
LinkedIn
Research Profile

Oliver Pearce

PhD researcher specializing in Rust, LLVM, and formal verification.

Education

Centre for Doctoral Training (PhD in Cyber Security) **Sept 2023 - July 2027**
Royal Holloway University of London

BSc Computer Science (Information Security) **Sept 2020 - Sept 2023**
Royal Holloway University of London
1st Class Honours

Publications

RustMC: Automated Verification of Real-World Concurrent Rust **2026**
Oliver Pearce, Julien Lange, Dan O'Keeffe
Formal Techniques for Distributed Objects, Components, and Systems (FORTE)
Preprint

Contributed Talks

RustMC: Automated Verification of Real-World Concurrent Rust **2026**
Rust Verification Workshop (ETAPS)

RustMC: Extending the GenMC Stateless Model Checker to Rust **2025**
South of England Regional Programming Language Seminar (S-REPLS)

Research

RustMC: Automated Verification of Real-World Concurrent Rust **Sept 2024 - Jan 2026**
Github

- Developed the first stateless model checking implementation capable of verifying Rust programs containing C/C++ dependencies.
- Designed and implemented novel LLVM transformation passes addressing Rust's unique multi-threading implementation and safety features in order to derive verifiable LLVM-IR modules from Rust code.
- Achieved an 83% verification success rate on a sample of 501 test cases across 14 real-world Rust crates.
- Demonstrated the effectiveness of optimal stateless model checking when applied to reproductions of real-world Rust concurrency bugs.

CDT Summer Project: Data Race Detection for Rust Programs **March 2024 - Sept 2024**

- Designed and implemented a prototype stateless model checker for Rust following an evaluation of the strengths and weaknesses of current state of the art static and dynamic concurrency verification techniques.

Undergraduate Dissertation: Binary Obfuscation and Program Analysis **Sept 2022 - April 2023**
Github

- Implemented low-level obfuscation techniques for ELF binaries, leveraging assembly-level transformations and control flow manipulation to investigate the ways malicious software authors evade program analysis.
- Built ELFCloak, an obfuscation framework that applies instruction-level rewriting, data-flow transformations, and symbol resolution manipulation to generate binaries hardened against reverse engineering techniques used by antivirus detection software.
- Demonstrated the effectiveness of ELFCloak in testing by producing malicious binaries which were not detected by over 20 commercial malware scanners including MalwareBytes and McAfee.
- ELFCloak is now used as a demonstration of an Information Security final year project demonstration at Royal Holloway open days.

Work Experience

Teaching Assistant **Sept 2022 - Ongoing**
Royal Holloway University of London *Egham*
Responsibilities:

- Marking undergraduate coursework and providing live debugging support in lab sessions.
- Explaining low-level concepts to students encountering them for the first time.

Tester/Lead Tester **July - Sept 2022; July - Sept 2023**
Gartner *Remote*
Responsibilities:

- Functionality and usability testing of web applications, chatbots and customer-facing purchasing platforms. Promoted to Lead Tester in 2023, coordinating team feedback and communicating findings through structured reports.

Technical Proficiencies

Tools and Languages:
Rust, C/C++, LLVM-IR, Java, Python, Haskell, SQL, Git, Linux, Docker