Dr. Simon Cooksey

simon@graymalk.in
+44 (0) 7887 393086

Research

I study modern multi-processor computers to understand the behaviours admitted by their complex micro-architectural designs. My research has focussed particularly on so-called *weak memory behaviours*, which are exhibited on machines that allow out-of-order execution and caching.

Education

The University of Kent — Canterbury, United Kingdom
Doctor of Philosophy, Computer Science — Sept. 2016 – Sept. 2021
Computer Science with a Year in Industry BSc (Hons), *First class* — Sept. 2012 – Jul. 2016

Employment

NVIDIA — Remote
Research Scientist — Oct. 2023 – Present

The University of Kent — Canterbury, United Kingdom
Research Fellow in Programming Languages — Jul. 2022 – Sept 2023
Research Associate — Jul. 2020 – Jul. 2022
Assistant Lecturer — Sept. 2016 – Jun. 2020

NVIDIA — Santa Clara, California
Research Intern — Jul. 2018 – Dec. 2018

XMOS — Bristol, United Kingdom
Development Intern — Aug. 2014 – Aug. 2015

Skills

- **Rust.** Modifying the Rust compiler to target the new Morello platform.
- **OCaml.** Using OCaml to implement mathematical artefacts for mechanised evaluation.
- **Weak memory consistency.** Understanding and constructing mathematical models for multiprocessor systems, both in hardware and software.
- **Formal Hardware Specification.** Using internal hardware specifications and design manuals to capture a mathematical abstraction of machine behaviour, using *Alloy*.
- **Programming languages.** Regular user of C/C++, JavaScript, OCaml, and Python.

Publications

- *Rust for Morello: Always-on Memory Safety, Even in Unsafe Code*: *To appear:* 37th European Conference on Object-Oriented Programming, 2023. *Sarah Harris, Simon Cooksey, Michael Vollmer, Mark Batty*
- *P2850 Minimal Compiler Preserved Dependencies*: ISO C++ Standards Committee meeting, Varna, 2023. *Mark Batty and Simon Cooksey*
- *Mixed-Proxy Extensions for the NVIDIA PTX Memory Consistency Model*: 49th IEEE/ACM International Symposium on Computer Architecture, 2022. *Daniel Lustig, Simon Cooksey, Olivier Giroux*
  ★ IEEE Micro Top Picks Honourable Mention
- *The Leaky Semicolon: Compositional Semantic Dependencies for Relaxed-Memory Concurrency*: 49th ACM SIGPLAN Symposium on Principles of Programming Languages, 2022. *Alan Jeffery, James Riely, Mark Batty, Simon Cooksey, Ilya Kaysin, Anton Podkopaev*
- *Modular Relaxed Dependencies in Weak Memory Concurrency*: 29th European Symposium on Programming, 2020. *Marco Paviotti, Simon Cooksey, Anouk Paradis, Daniel Wright, Scott Owens, Mark Batty*
- *P1780 Modular Relaxed Dependencies: A new approach to the Out-Of-Thin-Air Problem*: ISO C/C++ Standards Committee meeting, Cologne, 2019. *Mark Batty, Simon Cooksey, Scott Owens, Anouk Paradis, Marco Paviotti, Daniel Wright*
- *PrideMM: Second Order Model Checking for Memory Consistency Models*: 10th Workshop on Tools for Automatic Program Analysis, 2019. *Simon Cooksey, Sarah Harris, Mark Batty, Radu Grigore, and Mikoláš Janota*

Prizes

- **Kent Postgraduate Prize**: (July 2020) Recognising the significant impact of my research.

Grants

All £ values at 80% FEC, unless otherwise noted.

- **Embedded Rust for Defence Applications**: *Principal Investigator* (£87,763 100% FEC) Defence and Security Accelerator. Competition: CHERI within Defence and Security
- **Complementing Capabilities: Introducing Pointer-Safe Programming to DSbD Tech**: *Researcher Co-Investigator* (£494,770) UK Innovation Funding. ISCF digital security by design - software ecosystem development

- CapC**: Capability C Semantics, Tools and Reasoning**: *Named Researcher and Grant Co-Author* (£596,634) UKRI: Digital Security by Design
- **Fixing the Thin-Air Problem: ISO Dissemination**: *Named Researcher and Grant Co-Author* (£60,455) UK Research Institute: Verified Trustworthy Software Systems

Conference Attendance

- **ECOOP, 2023**: Presenting the Rust for Morello work.
- **VeTSS Innagural Meeting, 2023**: Presenting the Rust for Morello work at the first new-VeTSS meeting.
- **DSbD All Hands, October 2022**: Catching up with other researchers working on the DSbD project.
- **High Integrity Systems, 2022**: Building industrial links for research collaboration.
- **CHERITech, 2022**: Presenting on-going work on porting Rust to Morello.
- **POPL, 2022**: Presenting *The Leaky Semicolon* with collaborators.
- **Aarhus Concurrency Workshop, 2017**: Explained the issues surrounding simulating the latest memory models and presented an early version of PrideMM.
- **PLMW/POPL, 2017**: Attended the Programming Languages Mentoring Workshop at POPL'17 in Paris with a grant from the ACM.

Professional Service

- **ISO C++ Standards Committee**: I attend SG1 to comment on and develop the concurrency specification of the C++ programming language.
- **DSbD Research Day**: Presenting progress on our research programme to DSbD stakeholders.

References

Available on request.