GEORGE PÎRLEA

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RESEARCH INTERESTS

Formal verification, distributed systems, automated reasoning, programming languages

EDUCATION

National University of Singapore Aug 2020 - ongoing
PhD Computer Science *Singapore, SG*

- Advised by Ilya Sergey at the NUS School of Computing
- Working at the intersection of programming languages and distributed systems

University College London Sep 2015 - Jun 2019
MEng Computer Science *London, UK*

- Degree classification: *First-Class Honours* (81 out of 100)
- Master's thesis: *Toychain: Formally Verified Blockchain Consensus*

RESEARCH EXPERIENCE

Stellar Development Foundation Oct 2023 - Dec 2023
Research Intern *Remote*

- Worked with Giuliano Losa on decidable reasoning for smart contracts
- Developed Ivy models of token & liquidity pools contracts and mypyvy to Ivy translation

Zilliqa Research Pte Oct 2019 - Jul 2020
Researcher *London, UK*

- Developed a smart contract sharding strategy based on static analysis
- Published at PLDI 2021; developed prototype integrating with Zilliqa blockchain

Max Planck Institute for Software Systems Jun-Sep 2019
Research Intern (Foundations of Programming) *Saarbrücken, DE*

- Formalised in-memory pinning in the λ_{Rust} semantic type system
- Verified the correctness of the `std::pin` module in the Rust standard library
- Used the Iris concurrent separation logic; supervised by Derek Dreyer and Ralf Jung

Microsoft Research Ltd Jun-Aug 2018
Research Intern (Confidential Computing) *Cambridge, UK*

- Developed F* formalisation of the Coco enterprise blockchain framework
- Proved sequential consistency for the formal model; supervised by Christoph Wintersteiger
- Found critical concurrency-related safety bug in the Coco C++ implementation

UCL Computer Science Jul-Sep 2017
Research Intern (Programming Principles, Logic, and Verification) *London, UK*

- Formalised and verified a parametric blockchain consensus protocol in Coq
- Joint paper with supervisor Ilya Sergey accepted at CPP 2018

PUBLICATIONS

1. Vladimir Gladshtein, **George Pîrlea**, Ilya Sergey. Small Scale Reflection for the Working Lean User. *Under submission.*

2. Qiyuan Zhao, **George Pîrlea**, Zhendong Ang, Umang Mathur, and Ilya Sergey. Rooting for Efficiency: Mechanised Reasoning about Array-Based Trees in Separation Logic. In *Proceedings of the 13th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2024)*. January 2024. ACM. **(Distinguished Paper Award)**

3. Ruijie Meng*, **George Pîrlea***, Abhik Roychoudhury, and Ilya Sergey. Greybox Fuzzing of Distributed Systems. In *Proceedings of the 2023 ACM SIGSAC Conference on Computer and Communications Security (CCS 2023)*. November 2023. ACM.

4. Yasunari Watanabe, Kiran Gopinathan, **George Pîrlea**, Nadia Polikarpova, and Ilya Sergey. Certifying the Synthesis of Heap-Manipulating Programs. In *Proc. ACM Program. Lang. 5 (ICFP 2021)*. August 2021. ACM.

5. **George Pîrlea**, Amrit Kumar, and Ilya Sergey. Practical Smart Contract Sharding with Ownership and Commutativity Analysis. In *42nd ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2021)*. June 2021. ACM.

6. **George Pîrlea** and Ilya Sergey. Mechanising Blockchain Consensus. In *7th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2018)*. Los Angeles, CA, USA, January 2018. ACM.

* – joint first author

ACADEMIC SERVICE

1. External reviewer for *Object-Oriented Programming, Systems, Languages and Applications 2023 (OOPSLA 2023)*
2. External reviewer for *10th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2021)*
3. Program Committee member for *NUS Computer Science Research Week August 2021*
4. Program Committee member for *4th ACM SIGPLAN Symposium on Principles of Programming Languages Artifact Evaluation (POPL 2021 AE)*
5. External reviewer for *18th Asian Symposium on Programming Languages and Systems (APLAS 2020)*
6. External reviewer for *9th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2020)*
7. Co-organiser of *ICFP Programming Contest 2019*: 143 teams from 25 countries participated

OTHER

- I maintain a popular list of errors found in distributed protocols.