

# E. Polgreen

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## Education

- 2020 – **Lecturer**, *Laboratory for Foundations of Computer Science*, University of Edinburgh.  
My research interests are in program synthesis algorithms, applications of program synthesis and integration of synthesis into verification techniques.
- 2020 – **Volunteer Researcher**, *Computer Science*, The University of California, Berkeley.
- 2019 – 2020 **Visiting Research Scholar**, *Computer Science*, The University of California, Berkeley.
- 2016 – 2020 **PhD**, *Computer Science*, The University of Oxford.
- 2010 – 2011 **Masters of Engineering**, *Electrical and Electronic Engineering*, The University of Cambridge.
- 2007 – 2010 **Bachelor of Arts**, *Electrical and Electronic Engineering*, The University of Cambridge.

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## Relevant Publications

- 2022 **UCLID5: Multi-Modal Formal Modeling, Verification, and Synthesis**, E. Polgreen, K. Cheang, P. Gaddamadugu, A. Godbole, K. Laeuffer, S. Lin, Y. Manerkar, F. Mora, S.A. Seshia, Computer Aided Verification (CAV).
- 2022 **Synthesis and Satisfiability Modulo Oracles**, E. Polgreen, A. Reynolds, S.A. Seshia, International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI).
- 2021 **The SyGuS Language Standard Version 2.1**, S. Padhi, E. Polgreen, M. Raghothaman, A. Reynolds, A. Udupa.
- 2021 **Medley Solver: Online SMT Algorithm Selection**, N. Pimpalkhare, F. Mora, E. Polgreen, S.A. Seshia, International Conference on Satisfiability (SAT).
- 2020 **Using model checking tools to triage the severity of security bugs in the Xen hypervisor**, B. Cook, B. Doebel, D. Kroening, N. Manthey, M. Pohlack, E. Polgreen, M. Tautschnig, P. Wiecekiewicz, Formal Methods in Computer-Aided Design (FMCAD).
- 2020 **Gradient Descent over Metagrammars for Syntax-Guided Synthesis**, N. Chan, E. Polgreen, S.A. Seshia, Workshop of Synthesis (SYNT).
- 2020 **Synthesis in UCLID5**, F. Mora, K. Chan, E. Polgreen, S.A. Seshia, Workshop of Synthesis (SYNT).
- 2018 **CounterExample Guided Inductive Synthesis Modulo Theories**, A. Abate, C. David, P. Kesseli, D. Kroening, E. Polgreen, Computer Aided Verification (CAV).
- 2017 **Automated Formal Synthesis of Digital Controllers for State-Space Physical Plants**, A. Abate, I. Bessa, D. Cattaruzza, L. Cordeiro, C. David, P. Kesseli, D. Kroening, and E. Polgreen, Computer Aided Verification (CAV).
- 2017 **DSSynth: An Automated Digital Controller Synthesis Tool for Physical Plants**, A. Abate, I. Bessa, D. Cattaruzza, L. Chaves, L. Cordeiro, C. David, P. Kesseli, D. Kroening, and E. Polgreen, Automated Software Engineering (ASE).

- 2017 **Automated Experiment Design for Efficient Verification of Parametric Markov Decision Processes**, *E. Polgreen, V. Wijesuriya, S. Hasaert, A. Abate*, Quantitative Evaluation of SysTems (QEST).
- 2016 **Data-efficient Bayesian Verification of Parametric Markov Chains**, *E. Polgreen, V. Wijesuriya, S. Haesaert, A. Abate*, Quantitative Evaluation of SysTems (QEST).

## Invited Talks

**Beyond CEGIS: Synthesis Modulo Oracles**, The International Workshop on Synthesis, 2022.

**CounterExample Guided Inductive Synthesis Modulo Theories**, The Simons Institute for the Theory of Computing, 2021.

## Supervision

- 2021-2022 **Portfolio solving for Syntax-Guided Synthesis**, *University of Edinburgh*, 2021, Undergraduate Project.
- 2020-2021 **Online-learning for SMT-solver algorithm selection**, *UC Berkeley*, Undergraduate project.
- 2020-2021 **Metagrammars for syntax-guided synthesis**, *UC Berkeley*, Undergraduate research project.
- 2017-2018 **CounterExample Guided Neural Synthesis**, *University of Oxford*, MSc project.

## Service

### Program committees.

ETAPS steering committee 2022-onwards

2022: SMT workshop, SAT, CAV, FMCAD, QEST

2021: International Workshop on Synthesis (SYNT) (chair), CAV (artefact evaluation), TACAS (artefact evaluation), FMCAD, QEST

2019: International Workshop on Synthesis (SYNT)

### Non-program committee reviews.

Acta Informatica, Transactions on Programming Languages and Systems, Robotics: Science and Systems 2017, CAV 2021, SOFSEM-FOCS2017, QEST 2017, QEST 2016, Information and Software Technology, 13th International Workshop on Discrete Event Systems

## Experience

- Jun 2018 – **Software Development Intern**, *Amazon Web Services, Dresden*.
- Sep 2018 Continuation of previous internship applying formal verification techniques to C code for an x86 hypervisor
- Aug 2017 – **Software Development Intern**, *Amazon Web Services, Dresden*.
- Oct 2017 Development of analysis tools based on formal methods for hot-patching an x86 hypervisor
- Sep 2015 – **Research Assistant in Verification**, *Department of Computer Science, University of Oxford*.
- Mar 2016 Working with Professor Alessandro Abate on application of machine learning techniques in verification. This work produced the paper published at QEST 2016
- Sep 2013 – **Research Support**, *Department of Computer Science, University of Oxford*.
- Aug 2015 Lead aspects of research project execution over a broad variety of research projects within the Systems Verification and Validation group.

- Jan 2013 – **Electronics and Software Engineer**, *Peach Innovations*, Cambridge.  
Aug 2013 Manufacture, testing and debugging of real-time rowing instrumentation systems. Analysis of system output data with view to new product development.  
Aug 2011 – **Electronics and Software Engineer**, *Eg Technology*, Cambridge.  
Jan 2013 Design engineer developing electronics hardware and software for a variety of consumer and medical devices. Main contributor of C code to embedded software projects using ARM microcontrollers. Further experience in LabVIEW, and contributing to larger team projects written in C#.

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## Teaching

- 2022 **System Design Project**, *University of Edinburgh*, Lecturer.  
2021 **Formal Verification**, *University of Edinburgh*, Course organiser.  
2022 **Reasoning and Agents**, *University of Edinburgh*, Tutorials.  
2021 **Discrete Maths and Probability**, *University of Edinburgh*, Tutorials.  
2020 **Formal Methods: Specification, Verification, and Synthesis**, *UC Berkeley*, Guest Lectures.  
2018 **Computer Aided Verification Course**, *University of Oxford*, Guest Lecture.