Emanuele D'Osualdo

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Current position

Sep 2020–present **Postdoctoral Researcher**, Foundations of Programming group, *Max Planck Institute for Software Systems*, Saarbrücken, Germany

Topic Concurrent Separation Logics, Hyperproperties, Non-Volatile Memory Models, Refinement (with Derek Dreyer)

Experience

Sep 2018–Aug 2020 **Marie Curie Research Fellow**, Computing Department, *Imperial College London*, UK

Topic Compositional verification and specification for progress and security properties of concurrent software, integrating separation logics, automata theory and process algebra.

Funding Two years EU funded fellowship (H2020-MSCA-IF-2017 795218)

Apr 2017–Sep 2018 **Research Associate**, *Imperial College London*, UK

Topic Concurrent Separation Logic (with Philippa Gardner)

May 2015–Apr 2017 **Postdoctoral Researcher**, *Concurrency Theory Group*, TU Kaiserslautern, Germany

Topic Logics and Automata for Infinite State Model Checking (with Prof. Roland Meyer)

Education

2010–2015 **PhD in Computer Science**, *University of Oxford*, Merton College, UK

Thesis Verification of Message Passing Concurrent Systems (supervisor: Luke Ong)

Awards Winner of the 2016 BCS/CPHC Distinguished Dissertation award

2007–2010 **M.Sc. in Computer Science**, *University of Udine*, Italy, 110/110 *cum laude*

Dissertation on static analysis of Bigraphs by Abstract Interpretation

2004–2007 **B.Sc. in Computer Science**, *University of Udine*, Italy, 110/110 *cum laude*

Dissertation on Monads and Arrows in Haskell

Oct 2007–Mar 2008 **Exchange Student (Erasmus)**, *Istanbul Bilgi Universitesi*, Istanbul, Turkey

Awards & Fellowships

2018 **Marie Skłodowska-Curie Individual Fellowship**, *EU Horizon 2020*

Grant Title Verification and Specification through Progress Abstractions (VeSPA).

Budget € 195.454,80 for 2 years (grant number 795218).

2016 **Winner of the Distinguished Dissertation award**, *BCS/CPHC*, UK

Best British PhD dissertation in Computer Science selected by the Council of Professors and Heads of Computing, and the BCS Academy of Computing.

2010–2013 **Scatcherd European Scholarship**, *University of Oxford*, UK

University-wide fully-funded PhD scholarship.

2004–2010 **Scuola Superiore Student Fellowship**, *University of Udine*, Italy

University-wide fully-funded 5 years scholarship for excellent students. Members are annually reviewed and required to attend extra courses. See scuolasuperiore.uniud.it.

Publications

My research output is characterised by high-quality papers in top-tier conferences.

Total citations 135 (Google Scholar, July 2022).

OOPSLA'22 **Proving Hypersafety Compositionally**, with *Azadeh Farzan and Derek Dreyer*. **Conditionally accepted at OOPSLA'22.**

OOPSLA'22 **A Propositions-as-Sessions Interpretation of Bunched Implications in Channel-Based Concurrency**, with *Dan Frumin, Bas van den Heuvel, and Jorge A. Pérez*. **Conditionally accepted at OOPSLA'22.**

TOPLAS'21 POPL'22 **TaDA Live: Compositional Reasoning for Termination of Fine-grained Concurrent Programs**, with *Julian Sutherland, Azadeh Farzan and Philippa Gardner*. In ACM Transactions on Programming Languages and Systems (TOPLAS). ACM. 2021. Presented at POPL'22 (Journal-first submission).
Citations 14 CORE rank A* Length 84 pages + 49 appendix

CONCUR'20 **Decidable Inductive Invariants for Verification of Cryptographic Protocols with Unbounded Sessions**, with *Felix Stutz*. In Proc. of Concurrency Theory. LIPIcs. 2020.
Citations 4 CORE rank A Length 18 pages + 5 appendix

CSF'17 **Deciding Secrecy of Security Protocols for an Unbounded Number of Sessions: The Case of Depth-bounded Processes**, with *Luke Ong and Alwen Tiu*. In Proc. of Computer Security Foundations. IEEE Computer Society. 2017.
Citations 10 CORE rank A Length 17 pages

LICS'16 **First-order Logic with Reachability for Infinite-State Systems**, with *Roland Meyer and Georg Zetzsche*. In Proc. of Symposium on Logic in Computer Science. ACM. 2016.
Citations 6 CORE rank A* Length 18 pages + 3 appendix

ESOP'16 **On Hierarchical Communication Topologies in the π-calculus**, with *Luke Ong*. In Proc. of European Symposium on Programming. Vol. 9632 of LNCS. Springer. 2016.
Citations 5 CORE rank A Length 27 pages + 14 appendix

SAS'13 **Automatic Verification of Erlang-Style Concurrency**, with *Jonathan Kochems and Luke Ong*. In Proc. of Static Analysis. Vol. 7935 of LNCS. Springer. 2013.
Citations 71 CORE rank A Length 18 pages + 5 appendix

AGERE'12 **Soter: an Automatic Safety Verifier for Erlang**, with *Jonathan Kochems and Luke Ong*. In Proceedings of the 2nd edition on Programming systems, languages and applications based on actors, agents, and decentralized control abstractions. ACM. 2012.
Citations 21

Monograph **Verification of Message Passing Concurrent Systems**. BCS/CPHC Distinguished Dissertation Award Series, ISBN 978-1-78017-363-4, BCS. 2016. Citations 4

Teaching

2016/2017 **Lecturer** of Concurrency Theory, *TU Kaiserslautern*, Germany

2016 **Lecturer** of Advanced Automata Theory, *TU Kaiserslautern*, Germany

May–Jul 2015 **Teaching Assistant**, Concurrency Theory, *TU Kaiserslautern*, Germany

Jun 2013–Mar 2014 **Tutor** at Merton College, *University of Oxford*, UK

Subjects Concurrent Programming, Imperative Programming 2

2011–2014 **Teaching Assistant**, Dept. of Computer Science, *University of Oxford*, UK

Subjects Imperative Programming (Scala), Concurrent Programming (Scala), Functional Programming (Haskell), Concurrency (CSP).

Student supervision

2017–2022 Assistant Supervisor of **Julian Sutherland**, PhD in Computer Science, *Imperial College*

Topic Compositional Termination Proofs of Fine-grained Concurrent Programs

2019 **Felix Stutz**, MSc Computer Science, *Saarland University*, Germany

Topic Automatic verification of cryptographic protocols through inductive invariants

2019 **Ruhi Choudhury**, MEng Computing, *Imperial College London*

2018 **Blaine Rogers**, MEng Joint Mathematics and Computing, *Imperial College London*

Thesis A π-calculus Abstraction for Erlang

– Winner of Davis Prize award (best JMC thesis)

Invited Talks

May 2022 Invited Talk at **Iris Worksop 2022**, Radboud University, Nijmegen, The Netherlands.

Topic *TaDA Live: Compositional Termination Verification for Concurrent programs*

May 2019 Talk at **Effective Verification: Static Analysis Meets Program Logics**, Lorentz Center, The Netherlands. Invitation-only research workshop.

Topic *Inductive Invariants for Automatic Verification of Cryptographic Protocols*

Jan 2019 Talk at **Open Problems in Concurrency Theory**, Lisbon, Portugal
Invitation-only research seminar organised by IFIP-WG 1.8 co-located with POPL'19.

Topic *Progress for Concurrent Programs*

Research Talks

TaDA Live: Compositional Reasoning for Termination of Fine-grained Concurrent Programs

May 2022 Invited talk at the Iris Workshop, Radboud University Nijmegen, The Netherlands

Jan 2022 TOPLAS Track at POPL'22, Philadelphia, USA

Oct 2019 Iris Workshop, Aarhus University, Denmark

Jul 2019 Surrey Concurrency Workshop and S-REPLS 12, University of Surrey, Guilford, UK

Jan 2019 Open Problems in Concurrency Theory, POPL'19, Lisbon, Portugal

Decidable Inductive Invariants for Verification of Cryptographic Protocols

Jul 2022 RSS Meetups, LASIGE/FCUL, University of Lisbon, Portugal

Jun 2022 SRM seminar, University of Luxembourg

Sep 2020 CONCUR 2020, Virtual event

Sep 2020 iFM^2 Meeting, University of Udine, Italy

Sep 2020 Nobuko Yoshida's group, Imperial College London, UK

May 2019 Effective Verification Workshop, Leiden, The Netherlands

Deciding Secrecy of Security Protocols for an Unbounded Number of Sessions

Sep 2017 Highlights of Logics, Games and Automata, Queen Mary University of London

Aug 2017 CSF'17, UCSB, Santa Barbara, USA

First-order Logic with Reachability for Infinite-State Systems

Jul 2016 LICS'16, Columbia University, New York City, USA

On Hierarchical Communication Topologies in the π-calculus

May 2018 PLAS Group Seminar, University of Kent, UK

Oct 2017 Theory Group Seminar, Queen Mary University of London, UK

Dec 2016 IMDEA Software, hosted by Boris Köpf, Madrid

Aug 2016 Nanyang Technological University, hosted by Alwen Tiu, Singapore

Apr 2016 ESOP'16, ETAPS, Eindhoven, Nederlands

Mar 2016 D-CON'16, Universität des Saarlandes, Saarbrücken, Germany

Feb 2016 Oxford Advanced Seminar on Informatic Structures, University of Oxford

Feb 2016 Nobuko Yoshida's group, Imperial College, London

Precise Abstractions of Concurrent Systems

Aug 2014 Hosted by Pawel Sobocinski, University of Southampton

Automatic Verification of Erlang-Style Concurrency

Jun 2013 SAS'13, Seattle, USA

Jan 2013 Student Short Talk Session at POPL'13, Rome

Towards Static Analysis for Bigraphical Reactive Systems

Oct 2011 Bigraphs Present & Future Workshop, IT University of Copenhagen

Academic Activities

Program Committee Erlang Workshop 2018/2021, EXPRESS/SOS 2019, OOPSLA 2022 (External).

Organisation Local organiser for MFPC/CALCO 2019 in London.

Reviewer

Conferences OOPSLA 2020/2022, ECOOP 2022, CONCUR 2020, LMCS 2020, PLACES 2020, EXPRESS 2019, iFM 2019, ESOP 2019, CAV 2019, SAS 2018, PLDI 2018, CONCUR 2015/2017/2018/2020, ERLANG 2018/2021, FoSSaCS 2017, TACAS 2016, NETYS 2016/2021, MFCS 2012, LICS 2015, FSTTCS 2015, VMCAI 2014, DMC 2014, TAMC 2012, POPL 2012, TLCA 2011.

Journals TCS, Information and Computation, Information and Software Technology, Mathematical Structures in Computer Science.

Artifact Evaluation OOPSLA 2022, ECOOP 2022.

Award Committee POPL Student Research Competition 2021 Selection Committee.

Research Software

Lemma9 A tool for automatically checking/inferring invariants of security protocols (with F. Stutz).

Website `http://github.com/bordaigorl/lemma9`

Soter A proof-of-concept static analyser for Erlang programs (with J. Kochems).

Demo `http://soter.emanueledosualdo.com/`

JamesBound A proof-of-concept implementation of my ESOP'16 type system for the π-calculus

Website `http://github.com/bordaigorl/jamesbound`

- Includes an Haskell framework for analysing the π-calculus.

Stargazer An innovative, instructional, interactive execution environment for the π-calculus

Website `http://stargazer.emanueledosualdo.com`

- Used as a teaching/presentation aid in my talks and lectures, with excellent student engagement and feedback.
- University of Southern Denmark is using it in lectures.

Other skills

Languages Italian (native speaker) · English (fluent)

Programming Haskell, Python, JavaScript, Scala, Java, Erlang.

Music Studied violin for more than ten years playing Classical and Jazz Music.
Studied Musical Composition from 2000 to 2005 at the conservatory of Udine.