

ORESTIS MELKONIAN

PERSONAL DATA

PLACE | DATE OF BIRTH: Athens, Greece | December 1992
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EDUCATION

SEP 2019 - SEP 2023 **PhD in COMPUTER SCIENCE @ University of Edinburgh**, Scotland
Institute: Laboratory for Foundations of Computer Science (LFCS)
Supervisor: Philip Wadler
Co-supervisors: Brian Campbell, Aggelos Kiayias
Thesis: Verified Compilation from BitML to Bitcoin: An Agda Odyssey

SEP 2017 - JUL 2019 **M.Sc. in COMPUTING SCIENCE @ Utrecht University**, The Netherlands
GPA: 8.99/10 (*cum laude*)
Specialization: Programming Technology
Supervisors: Wouter Swierstra (UU), Manuel M.T. Chakravarty (IOHK)
Thesis: Formalizing Extended UTxO and BitML Calculus in Agda

OCT 2010 - APR 2016 **B.Sc. in COMPUTER SCIENCE @ National and Kapodistrian University of Athens**, Greece
GPA: 8.6/10 (*distinction*)
Specializations: Knowledge and Data Management, Software
Supervisors: Panos Rondogiannis, Angelos Charalambidis
Thesis: RHEA - A Reactive, Heterogeneous, Extensible and Abstract Framework for Dataflow Programming

FEB 2014 - Jul 2014 Erasmus exchange student in **COMPUTER SCIENCE**
Universita della Svizzera Italiana, Lugano, Switzerland
Coordinators: Ioannis Emiris, Marc Langheinrich

WORK EXPERIENCE

JAN 2024 - MAR 2026 **Formal Methods Engineer @ Input Output (IOG/IOHK)**
Formalizing BFT consensus protocols in Agda & developing Agda compilers
Supervisor: James Chapman

SEP 2023 - JAN 2024 **Formal Methods Intern @ Input Output (IOG/IOHK)**
Working on the Agda formalization of the Cardano ledger
Supervisor: James Chapman

FEB 2021 - MAR 2023 **Haskell Reviewer (part-time) @ MigaMake**, Singapore
Reviewing code, technical reports, and scientific articles
Supervisor: Michal Gajda

JAN 2019 - JUL 2019 **Haskell Developer (part-time) @ QBayLogic**, The Netherlands
Implemented a GUI to inspect optimization steps in the Clash compiler
Supervisor: Christiaan Baaij

DEC 2017 - DEC 2018 **Haskell Developer (part-time) @ Utrecht University**, The Netherlands
FORMALZ: A tower-defence game for learning Hoare-style specifications
Developed the SMT-based checker between teacher and student formulas
Supervisor: Wishnu Prasetya

JUN 2017 - AUG 2017 **Research Intern @ Max Planck Institute for Software Systems (MPI-SWS)**, Germany
Software Analysis & Verification Group
Proof mechanization of a novel C/C++11 memory model in Coq
Supervisor: Viktor Vafeiadis

MAY 2016 - MAY 2017 **Technical Intern (Backend Web Developer) @ CERN**, Switzerland
INVENIO project: Video workflows for the Cern Document Server (CDS)
Supervisor: Ludmila Marian

OCT 2015 - APR 2016 **Research Intern @ National Center for Scientific Research "Demokritos"**, Athens, Greece
Software & Knowledge Engineering Laboratory (SKEL)
Design and implementation of a dataflow framework for robotics
Supervisor: Angelos Charalambidis

RESEARCH INTERESTS

- Programming Languages, Semantics
- Functional Programming, Compilers
- Formal Verification, Theorem Proving
- (Dependent) Type Theory, Category Theory
- Consensus, Blockchain, Smart Contracts
- Algorithmic Music

SELECTED PUBLICATIONS

- TYPES '26 **Peregrine: a middle-end for code generation from proof assistants**
E.H.Nielsen, S.Dima, L.Escot, O.Melkonian, H.S-Cholet, J.Chapman, Y.Forster, M.Sozeau, B.Spitters
32nd International Conference on Types for Proofs and Programs
- FMBC '25 (ETAPS) **A readable and computable formalization of the Streamlet consensus protocol**
Mauro Jaskelioff, Orestis Melkonian, James Chapman
6th International Workshop on Formal Methods for Blockchains
- FMBC '25 (ETAPS) **Program logics for ledgers**
Orestis Melkonian, Wouter Swierstra, James Chapman
6th International Workshop on Formal Methods for Blockchains
- FMBC '25 (ETAPS) **Validity, Liquidity, and Fidelity: Formal Verification for Smart Contracts in Cardano**
Tudor Ferariu, Philip Wadler, Orestis Melkonian
6th International Workshop on Formal Methods for Blockchains
- NEURIPS '24 **Learning Structure-Aware Representations of Dependent Types**
Konstantinos Kogkalidis, Orestis Melkonian, Jean-Philippe Bernardy
38th Annual Conference on Neural Information Processing Systems
- FMBC '24 (ETAPS) **Formal specification of the Cardano blockchain ledger, mechanized in Agda**
A.Knispel, O.Melkonian, J.Chapman, A.Hill, J.Jääger, W.DeMeo, U.Norell
5th International Workshop on Formal Methods for Blockchains
- FMBC '24 (ETAPS) **Structured Contracts in the EUTxO Ledger Model**
P.Vinogradova, O.Melkonian, P.Wadler, M.Chakravarty, J.Krijnen, M.Jones, J.Chapman, T.Ferariu
5th International Workshop on Formal Methods for Blockchains
- TYPES '23 **Nominal techniques as an Agda library (Extended Abstract)**
Murdoch J. Gabbay, Orestis Melkonian
29th International Conference on Types for Proofs and Programs
- HASKELL '22 (ICFP) **Reasonable Agda is correct Haskell: writing verified Haskell using AGDA2HS**
Jesper Cockx, Orestis Melkonian, Lucas Escot, James Chapman, Ulf Norell
15th International Haskell Symposium. ACM
- ISoLA '20 **Native Custom Tokens in the Extended UTXO Model**
M.Chakravarty, J.Chapman, K.MacKenzie, O.Melkonian, J.Müller, M.Jones, P.Vinogradova, P.Wadler
9th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation
- ECOOP '20 **Reconciling Event Structures with Modern Multiprocessors**
E.Moiseenko, A.Podkopaev, O.Lahav, O.Melkonian, V.Vafeiadis
34th European Conference on Object-Oriented Programming
- WTSC '20 (FC) **The Extended UTXO Model**
M.Chakravarty, J.Chapman, K.MacKenzie, O.Melkonian, M.Jones, P.Wadler
4th Workshop on Trusted Smart Contracts
- FARM '19 (ICFP) **Music as Language: Putting Probabilistic Temporal Graph Grammars to Good Use**
Orestis Melkonian
7th ACM SIGPLAN International Workshop on Functional Art, Music, Modeling, and Design. ACM
- FARM '19 (ICFP) **What Constitutes a Musical Pattern?**
Orestis Melkonian, Iris Yuping Ren, Wouter Swierstra, Anja Volk
7th ACM SIGPLAN International Workshop on Functional Art, Music, Modeling, and Design. ACM
- ICSE' 19 **Having Fun in Learning Formal Specifications**
Wishnu Prasetya, Craig Leek, Orestis Melkonian *et al.*
41th International Conference on Software Engineering: Software Engineering Education and Training. ACM
- REBLS' 18 (SPLASH) **RHEA: A Reactive, Heterogeneous, Extensible and Abstract Framework for Dataflow Programming**
Orestis Melkonian, Angelos Charalambidis
5th ACM SIGPLAN International Workshop on Reactive and Event-Based Languages and Systems. ACM
- ESSLLI '18 **D³ as a 2-MCFL**
Konstantinos Kogkalidis, Orestis Melkonian
Student Session of the 30th European Summer School in Logic, Language and Information. Springer

TEACHING EXPERIENCE

- SEP 2020 - MAR 2021 **Reasoning & Agents** @ University of Edinburgh
Demonstrator & Marker
- SEP 2019 - MAR 2020 **Types and Semantics for Programming Languages** @ University of Edinburgh
Teaching Assistant
- SEP 2019 - MAR 2021 **Introduction to Computation: Functional Programming** @ University of Edinburgh
Teaching Assistant & Tutor & Marker

ACADEMIC SERVICE

- APR 2026 Program Committee @ **FMBC**, International Workshop on Formal Methods for Blockchains, 2026
- APR 2025 Invited Reviewer @ **JFP**, Journal of Functional Programming, 2025
- OCT 2025 External Reviewer @ **ITP**, International Conference on Interactive Theorem Proving, 2025
- MAY 2025 Program Committee @ **FMBC**, International Workshop on Formal Methods for Blockchains, 2025
- NOV 2024 Artifact Evaluation Committee @ **POPL**: Symposium on Principles of Programming Languages, 2025
- FEB 2024 Artifact Evaluation Committee @ **OOPSLA**, 2024
- NOV 2023 Artifact Evaluation Committee @ **POPL**: Symposium on Principles of Programming Languages, 2024
- JUN 2023 Artifact Evaluation Committee @ **ICFP**: International Conference on Functional Programming, 2023
- FEB 2023 Artifact Evaluation Committee @ **ESOP**: European Symposium on Programming, 2023
- NOV 2022 Organizer @ **31st Agda Implementors' Meeting (AIM XXXI)**, Edinburgh, Scotland
- OCT 2022 Artifact Evaluation Committee @ **POPL**: Symposium on Principles of Programming Languages, 2023
- JUN 2022 Artifact Evaluation Committee @ **ICFP**: International Conference on Functional Programming, 2022
- MAR 2022 Invited Reviewer @ **TYPES** post-proceedings, 2022
- FEB 2022 Artifact Evaluation Committee @ **ESOP**: European Symposium on Programming, 2022
- JUL 2021 Invited Reviewer @ **APLAS**: Asian Symposium on Programming Languages and Systems, 2021
- AUG 2021 Invited Reviewer @ **MSCS**: Mathematical Structures in Computer Science
special edition in memory of Martin Hofmann

AWARDS

- JUN 2023 **EuroProofNet** Short-term Scientific Mission @ Chalmers University of Technology, Gothenburg, SE
Host: Jean-Philippe Bernardy
- MAY 2023 **SICSA** Research Scholar Grant @ **36th Agda Implementors' Meeting (AIM XXXVI)**, Delft, NL
- JUN 2022 Travel Grant @ **Programming Language Mentoring Workshop (PLMW)**, PLDI, San Diego, US
- JUN 2019 Travel Grant @ **ZuriHac: A 3-day Haskell Hackathon**, Zurich, CH
- APR 2019 Travel Grant @ **School and Workshop on Univalent Mathematics**, Birmingham, UK
- AUG 2018 Registration Grant @ **European Summer School on Logic, Language & Information (ESSLI)**, Sofia, BG
- JUL 2018 Travel Grant @ **DeepSpec Summer School**, Princeton, US
- JUL 2017 Travel Grant @ **CAV Conference**, Heidelberg, DE
- JAN 2016 Travel Grant @ **Programming Language Mentoring Workshop (PLMW)**, POPL, Florida, US
- MAR 2016 Travel Grant @ **Meddays '16**, Sophia-Antipolis, FR

LANGUAGES

- GREEK: Native speaker
- ENGLISH: **Fluent**, *Certificate of Proficiency, University of Michigan*
- GERMAN: **Intermediate**, *Zertifikat B1, Goethe Institute*
- FRENCH: **Beginner**, *A2.1, Supercomm Suisse SA*

EXTRA-CURRICULAR ACTIVITIES

- Musical Instrument:** Electric jazz guitar (Intermediate)
RGT Grade 6 (*distinction*), *University of West London - Certificate in Music Performance*
Examiner: Adam Moore BA(Hons), MMus, PGCE, FLCM

REFERENCES

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|---|---|--|--|
| Philip Wadler
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