# ORESTIS MELKONIAN

## PERSONAL DATA

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| PLACE \| DATE OF BIRTH: | Athens, Greece \| December 1992 |
| EMAIL: | melkon.or@gmail.com |
| WEBSITE: | omelkonian.github.io |

## EDUCATION

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| SEP 2019 - SEP 2023 | PhD in COMPUTER SCIENCE @ **University of Edinburgh**, Scotland<br>*Institute*: Laboratory for Foundations of Computer Science (LFCS)<br>*Supervisor*: Philip Wadler<br>*Co-supervisors*: Brian Campbell, Aggelos Kiayias<br>*Thesis*: Verified Compilation from BitML to Bitcoin: An Agda Odyssey |
| SEP 2017 - JUL 2019 | M.Sc. in COMPUTING SCIENCE @ **Utrecht University**, The Netherlands<br>*GPA*: 8.99/10 (*cum laude*)<br>*Specialization*: Programming Technology<br>*Supervisors*: Wouter Swierstra (UU), Manuel M.T. Chakravarty (IOHK)<br>*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<br>*GPA*: 8.6/10 (*distinction*)<br>*Specializations*: Knowledge and Data Management, Software<br>*Supervisors*: Panos Rondogiannis, Angelos Charalambidis<br>*Thesis*: RHEA - A Reactive, Heterogeneous, Extensible and Abstract<br>Framework for Dataflow Programming |
| FEB 2014 - JUL 2014 | Erasmus exchange student in COMPUTER SCIENCE<br>**Universita della Svizzera Italiana**, Lugano, Switzerland<br>*Coordinators*: Ioannis Emiris, Marc Langheinrich |

## WORK EXPERIENCE

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| JAN 2024 - NOW | Formal Methods Engineer @ **Input Output (IOG)**<br>*Formalizing BFT consensus protocols in Agda & developing an Agda-to-Rust compiler*<br>*Supervisor*: James Chapman |
| SEP 2023 - JAN 2024 | Formal Methods Intern @ **Input Output (IOG)**<br>*Working on the Agda formalization of the Cardano ledger*<br>*Supervisor*: James Chapman |
| FEB 2021 - MAR 2023 | Haskell Reviewer (part-time) @ **MigaMake**, Singapore<br>*Reviewing code, technical reports, and scientific articles*<br>*Supervisor*: Michal Gajda |
| JAN 2019 - JUL 2019 | Haskell Developer (part-time) @ **QBayLogic**, The Netherlands<br>*Implemented a GUI to inspect optimization steps in the C$\lambda$ash compiler*<br>*Supervisor*: Christiaan Baaij |
| DEC 2017 - DEC 2018 | Haskell Developer (part-time) @ **Utrecht University**, The Netherlands<br>FORMALZ: A tower-defence game for learning Hoare-style specifications<br>*Developed the SMT-based checker between teacher and student formulas*<br>*Supervisor*: Wishnu Prasetya |
| JUN 2017 - AUG 2017 | Research Intern @ **Max Planck Institute for Software Systems (MPI-SWS)**, Germany<br>Software Analysis & Verification Group<br>*Proof mechanization of a novel C/C++11 memory model in Coq*<br>*Supervisor*: Viktor Vafeiadis |
| MAY 2016 - MAY 2017 | Technical Intern (*Backend Web Developer*) @ **CERN**, Switzerland<br>INVENIO project: *Video workflows for the Cern Document Server (CDS)*<br>*Supervisor*: Ludmila Marian |
| OCT 2015 - APR 2016 | Research Intern @ **National Center for Scientific Research "Demokritos"**, Athens, Greece<br>Software & Knowledge Engineering Laboratory (SKEL)<br>*Design and implementation of a dataflow framework for robotics*<br>*Supervisor*: Angelos Charalambidis |

## Research Interests

- Programming Languages, Semantics
- Functional Programming, Compilers
- Formal Verification, Theorem Proving
- Type Theory, Category Theory
- Blockchain Technology, Smart Contracts
- Algorithmic Music

## Selected Publications

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| **FMBC '25**<br>(ETAPS) | **A readable and computable formalization of the Streamlet consensus protocol**<br>M.Jaskelioff, O.Melkonian, J.Chapman<br>*6<sup>th</sup> International Workshop on Formal Methods for Blockchains* |

**FMBC '25 (ETAPS)**
**A readable and computable formalization of the Streamlet consensus protocol**
M.Jaskelioff, O.Melkonian, J.Chapman
*6$^{th}$ International Workshop on Formal Methods for Blockchains*

**FMBC '25 (ETAPS)**
**Program logics for ledgers**
O.Melkonian, W.Swierstra, J.Chapman
*6$^{th}$ International Workshop on Formal Methods for Blockchains*

**FMBC '25 (ETAPS)**
**Validity, Liquidity, and Fidelity: Formal Verification for Smart Contracts in Cardano**
T.Ferariu, P.Wadler, O.Melkonian
*6$^{th}$ International Workshop on Formal Methods for Blockchains*

**NeurIPS '24**
**Learning Structure-Aware Representations of Dependent Types**
K.Kogkalidis, O.Melkonian, J.Bernardy
*38$^{th}$ 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
*5$^{th}$ 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
*5$^{th}$ International Workshop on Formal Methods for Blockchains*

**WTSC '24 (FC)**
**Message-passing in the Extended UTxO Model**
Polina Vinogradova, Orestis Melkonian
*8$^{th}$ Workshop on Trusted Smart Contracts*

**TYPES '23**
**Nominal techniques as an Agda library (Extended Abstract)**
Murdoch J. Gabbay, Orestis Melkonian
*29$^{th}$ 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
*15$^{th}$ 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
*9$^{th}$ 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
*34$^{th}$ 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
*4$^{th}$ Workshop on Trusted Smart Contracts*

**FARM '19 (ICFP)**
**Music as Language: Putting Probabilistic Temporal Graph Grammars to Good Use**
Orestis Melkonian
*7$^{th}$ 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
*7$^{th}$ 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.*
*41$^{th}$ 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
*5$^{th}$ ACM SIGPLAN International Workshop on Reactive and Event-Based Languages and Systems. ACM*

**ESSLLI '18**
**D$^3$ as a 2-MCFL**
Konstantinos Kogkalidis, Orestis Melkonian
*Student Session of the 30$^{th}$ European Summer School in Logic, Language and Information. Springer*

## Teaching Experience

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| Sep 2020 - Mar 2021 | **Reasoning & Agents** @ University of Edinburgh<br>*Demonstrator & Marker* |
| Sep 2019 - Mar 2020 | **Types and Semantics for Programming Languages** @ University of Edinburgh<br>*Teaching Assistant* |
| Sep 2019 - Mar 2021 | **Introduction to Computation: Functional Programming** @ University of Edinburgh<br>*Teaching Assistant & Tutor & Marker* |

## Academic Service

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| 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 @ $31^{st}$ **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<br>*special edition in memory of Martin Hofmann* |

## Awards

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| Jun 2023 | **EuroProofNet** Short-term Scientific Mission @ **Chalmers University of Technology**, Gothenburg, SE<br>*Host: Jean-Philippe Bernardy* |
| May 2023 | **SICSA** Research Scholar Grant @ $36^{th}$ **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 (ESSLLI)**, 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

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| 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

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| Musical Instrument: | Electric jazz guitar (Intermediate)<br>**RGT Grade 6 (***distinction***)**, *UWLQ Level 3 Certificate in Music Performance*<br>University of West London<br>*Examiner:* Adam Moore BA(Hons), MMus, PGCE, FLCM |

## References

| Philip Wadler | Wouter Swierstra | Manuel M.T. Chakravarty | Viktor Vafeiadis |
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| University of Edinburgh | Utrecht University | IOHK | MPI-SWS |
| ✉ wadler@inf.ed.ac.uk | ✉ w.s.swierstra@uu.nl | ✉ manuel.chakravarty@iohk.io | ✉ viktor@mpi-sws.org |