LUISA CICOLINI

creativity and formal methods enthusiast, PhD student at the University of Cambridge
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PROJECTS

Formalized Semantics For Hardware Verification

September 2024 - present

My research targets the **formalization of hardware abstractions in Lean**. I am interested in **bridging maths and hardware verification**, giving formalized (and formally verifiable!) semantics to hardware concepts and building the infrastructure necessary to enable reasoning about these concepts from a hardware perspective. The two abstractions I work with at the moment are **bitvectors**, for the formalization of combinational logic, and **coinduction**, the latency-insensitive abstractions.

Formalized RISC-V Instruction Set Architecture

March 2025 - present

I contribute to the development of a **fully-bitblastable library for the RISC-V Instruction Set**, proven equivalent to the Sail processor model.

`BitVec` in Lean4

July 2024 - present

I am among **Lean4's top 30 contributors**, working on the development of Lean's bitvector library and verified bitblaster.

Model Checking For CIRCT

September 2023 - present

I worked on formalizing the semantics of **CIRCT's Finite State Machine (FSM) dialect**, enabling CIRCT to integrate verification at a higher level of the stack.

Accelerating Regular Expressions Matching

March 2022 - September 2023

I worked on the **Multi-Finite-State-Automaton** model, aimed at accelerating regex pattern matching.

TALKS & PUBLICATIONS

- H. Böving, S. B. Mala, L. CICOLINI, et al. "*Interactive Bitvector Reasoning using Verified Bit-Blasting*,", **OOPSLA'25**
- B. Healy, L. CICOLINI "*Exploiting MLIR Abstractions for Hardware Verification*," technical talk at **LLVM-dev 2024**
- L. CICOLINI, F. Carloni, et al., "*One Automaton to Rule Them All: Beyond Multiple Regular Expressions Execution*," **CGO'24**
- B. Branchini, G. Gerometta, L. CICOLINI, et al., "*Surfing the wavefront of genome alignment*," **ISCAS'22**

EDUCATION

University of Cambridge, UK
- 2025-present, **Ph.D. Student** with the Cascade Centre
- 2024-2025, **Research Assistant**

University of Edinburgh, UK
- 2023, **Postgraduate Visiting Research Student**
- 2023, **Teaching Assistant** - Theoretical Computer Science

Politecnico di Milano, Italy
- 2024, Abilitazione Professionale - Ingegnere dell'Informazione
- 2021-2023, **M.Sc. Computer Science and Engineering**
- 2022, **Tutor** - Progetto di Algoritmi e Principi dell'Informatica
- 2021, **Tutor** - Informatica A
- 2020-2023, Member - Polifonia Student Association
- 2020-2023, Member/Chair - IEEE Women In Engineering SB
- 2020, Mentee - **Lead the Future**
- 2018-2023, Research Student - NECSTLab and NECSTCamp
- 2017-2020, **B.Sc. Energy Engineering**

Technische Universitaet Muenchen, Germany
- 2019-2020, **Exchange Student** (Erasmus)

CERTIFICATES

- **Goethe Zertifikat B2** - CEFR B2 - 2016
- **Cambridge Proficiency English** - CEFR C2 - 2017
- **TOEFL iBT** - 116/120 - 2023

MISC

- I volunteered with **kids** and **elderlies** during summer camps.
- I enjoy playing the **piano** and **singing**. I started studying **music** as a kid and have since performed with different bands - I still love joining a jam session whenever I can.
- I was a student volunteer at **DATE** (2019 and 2022 (virtual)), **PLDI** (2024), **OOPSLA** (2025).
- I was the **CGO** Publicity Chair in 2024, 2025, 2026.
- I am part of **Lead the Future** - first as a mentee, now as a mentor. I find **meaning** in sharing my experience (and mistakes) with younger students and members of the community.