

# LAILA ELBEHEIRY

[LailaElbeheiry](https://github.com/LailaElbeheiry) [web2.qatar.cmu.edu/loe/](https://web2.qatar.cmu.edu/loe/) [✉ osslaila@gmail.com](mailto:osslaila@gmail.com)

*Interests: formal verification, language-based security, computer-system design and implementation, programming languages*

## Education

---

### Carnegie Mellon University

2017 - 2021

*B.S. Computer Science*

Programming Languages and Systems Concentrations

GPA: 4.0/4

*Relevant Courses:*

Principles of Programming Languages, Automated Program Verification, Distributed Systems, Constructive Logic, Software Foundations of Security, Embedded Systems

## Publications

---

**Laila El-Beheiry, Giselle Reis, and Ammar Karkour.** SmlToCoq: Automated Generation of Coq Specifications and Proof Obligations from SML Programs with Contracts [LFMTP 2021](#)

## Research & Industry

---

### Certified Systems Researcher

*CertiK*

*Mentor: Vilhelm Sjoberg*

*May 2021 - Present*

- Formalized a subset of MIR (Rust's mid-level Intermediate Representation) in Coq (Mirlight)
- Modified Rust's compiler to translate Rust source code to Mirlight
- Verified a Rust hypervisor using this tooling
- Used a combination of automated and manual analysis for Rust smart contract auditing

### Machine-Dependent Code Optimizations Tailored for Edge

*Advisors: Khaled Harras Giselle Reis*

*August 2020 - Present*

- Proposed a novel FemtoCloud architecture for computational offloading in IoT that optimizes the computation for each architecture
- Evaluated a toy implementation of the proposed architecture on different platforms

### SML to Coq

*Mentor: Giselle Reis*

*August 2019 - August 2020*

- Implemented a tool that automatically translates SML programs into equivalent Coq specifications
- Formalized a big subset of SML's basis library in Coq
- Wrote a documentation that includes formal definitions of the abstract syntax trees that are used for the translation

### Prosa

*Max Plank Institute for Software Systems*

*Mentor: Bjorn B. Brandenburg*

*May 2020 - September 2020*

- Proved theorems about real-time systems such as proving the optimality of EDF schedules
- Used `ssreflect` for writing proofs in Coq and `Coqdoc` for documenting them

### Web Development Intern

*Qatar Computing Research Institute*

*Mentors: Preslav Nakov Hamdy Mubarak*

*May 2018 - July 2018*

- Built a website that displays live news with geo-tagging integration; used Sklearn to implement a news bias checker

## Skills

---

<b>Languages:</b>	C, Rust, Python, Standard ML, Java, Gallina
<b>Theorem Provers:</b>	Coq, Why3, Lean
<b>Technologies:</b>	Git, LLVM Toolchain, LaTeX, Shell Scripting, Intel Pin
<b>Big Data Ecosystems:</b>	Hadoop, MPI
<b>Microcontrollers/Microprocessors:</b>	Arduino Uno, Tiva <sup>TM</sup> C Series, Raspberry Pi

## Awards & Honors

---

### **Qatar Foundation Merit-Based Scholarship**

*Awarded to top students in CMU-Q*

### **Phi Kappa Phi Honor Society**

### **CMU-Q's Annual Hackathon**

### **Dean's List**

*8/8 semesters*

### **Outstanding Course Assistant Award**

*Annually awarded to one CA*

### **Cambridge IGCSE High Achievement**

*Highest rank in Qatar for Biology, Physics, and Accounting*

## Teching Experience

---

### **Teaching Assistant**

*CMU-Q*

*August 2021 - Present*

- Computer Networks, 15-441.
- Introduction to Computer Systems, 15-213.

### **Student Course Assistant**

*CMU-Q*

Fundamentals of Programming and Computer Science, Imperative Programming, Functional Programming, Introduction to Computer Systems, Algorithms Design and Analysis, Probability Theory

### **Student Course Instructor**

*CMU-Q*

- Co-designed and taught a student-taught course on many of the tools, knowledge, and skills that needed in computer science
- Topics included: practical tools such as source control, IDEs, LaTeX, and UNIX, skills, such as research skills, and general cs information such as emerging CS fields, history of CS, and interesting paradoxes.

## Other Projects

---

### **BitTorrent with Congestion Control**

- Implemented a BitTorrent-like file transfer application that uploads/downloads chunks of files simultaneously from different peers.
- Implemented reliability and congestion control on top of UDP to ensure fair and efficient network utilization.

### **Question G/A**

- Used Stanford's Tregex and Tsurgeon and other NLP software to implement a tool that, generates or answers questions given a Wikipedia article