


# Christa Jenkins

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<b>Nationality</b>	United States of America	<b>Web</b>	cwjnkns.github.io github.com/cwjnkns
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## Education

**2017-Now**    **The University of Iowa**, Iowa City

Ph.D. in Computer Science  
Advisor: Dr. Aaron Stump  
GPA – Overall: 4.15, Scale: 4.0

**2009-2013**    **Trinity University**, San Antonio, TX

B.Sc. Honors in Computer Science (*magna cum laude*)  
Minor – Mathematics  
GPA – Overall: 3.84, Major: 3.94, Scale: 4.0

## Research

**Sep 2023 -**    Stony Brook University  
**Sep 2025**    *Postdoctoral Associate (Omar Chowdhury)*

- ARMOR, verified X.509 parsing and CCVL (continuation of earlier work).
- RESTRICTOR, a tool for ensuring the *principal of least privilege* for access control policies in Cedar using SMT and SyGuS.
- AUTOMAN, a tool for automatically generating high-assurance implementations of distributed systems protocols from TLA-style specifications in Dafny.

**Jan 2022 -**    Oracle Labs  
**Jun 2022**    *Research Assistant,  $\frac{1}{4}$  time (Mark Moir, Harold Carr)*

Continuation of earlier work at Oracle Labs (Agda formalization of *LibraBFT*)

- Generalized proof engineering framework for arbitrary monadic effects.
- Was lead author of group's manuscript *Proof Engineering with Predicate Transformer Semantics*

**Sep 2021 -**    The University of Iowa  
**Dec 2021**    *Graduate Research Assistant (Omar Chowdhury – NSF Award 2006556)*

Worked on ARMOR, a formally verified sound, complete, and secure Agda parser for the X.509 ITU standard for public key certificates.

- Architected the design of the parser.
- Wrote supermajority of X.509 and X.690 parsing library.
- Mentored collaborators in the use of Agda.

- May 2021 - Sep 2021** Oracle Labs  
*Research Assistant (Mark Moir, Harold Carr)*  
 Worked on an Agda formalization of *LibraBFT*, a Byzantine fault tolerant consensus algorithm.
- Translated into Agda the in-house Haskell implementation of *LibraBFT*.
  - Architected the proof engineering framework based on weakest precondition predicate transformers for use in verifying correctness properties of nonfaulty nodes.
  - Formulated and verified the specification contracts of the internal operations of non-faulty nodes.
  - Verified a crucial network-wide safety property (nonfaulty nodes do not send inconsistent votes for the same proposal).
- Aug 2017 - Dec 2020** The University of Iowa  
*Graduate Research Assistant (Aaron Stump – NSF Award 1524519)*  
 Design and implementation of *Cedille*, an experimental dependently typed programming language implemented in Agda.
- Architected and co-implemented novel form of type inference called “spine-local type inference.”
  - Designed the surface-language Cedille syntax for inductive datatypes with case analysis and course-of-values induction using type-based termination checking.
  - Co-developed new standard library for Cedille, including datatypes, functions, and theorems.
- Jun 2011 - Jul 2011** The University of Wisconsin at Oshkosh  
*REU (David Furcy – NSF Award 0851569)*  
 Designed and implemented an educational algorithm visualization for Booth’s multiplication algorithm with accompanying digital mini-textbook, with preliminary study to measure efficacy.

## Teaching and Mentoring

- Sep 2023 - Sep 2025** Department of Computer Science, Stony Brook University  
*Postdoctoral Associate (Omar Chowdhury)*  
 Lead several informal reading and study groups for Prof. Chowdhury’s group.
- Study group on constructive logic, functional programming, and dependent types.
  - Study group on the F $\star$  programming language
  - Research reading group on axiomatic and predicate transformer semantics of programming languages, and verification condition generation.
- Aug 2022 - Dec 2022** Department of Computer Science, University of Iowa  
*Teaching Assistant (J. Garrett Morris, CS:3820 Programming Language Concepts)*
- Office hours (2 hours/week)
  - Co-wrote unit tests for auto-grading student submissions on weekly assignments.

**Aug 2020 -** Department of Mathematics, University of Iowa  
**Dec 2020** Mentor

Participated in the Directed Reading Program, leading a senior undergraduate student and junior PhD student through introductory materials on constructive logic, proof theory, and sequent calculus.

## Scholarship

### Journal Publications

- **Monotone recursive types and recursive data representations in Cedille**  
Jenkins, Christa and Stump, Aaron. 2021. In *J. Mathematical Structures in Computer Science*.
- **An effective educational module for Booth's multiplication algorithm**  
Jenkins, Christa and Voss, Adam and Furcy, David. 2012. In *J. Computing Sciences in Colleges*.

### Conference Publications

- **ARMOR: A formally verified implementation of X.509 certificate chain validation**  
Debnath, Joyanta and Jenkins, Christa and Sun, Yuteng and Chau, Sze Yiu, and Chowdhury, Omar. 2024. In *IEEE Symposium on Security and Privacy*
- **A Type-Based Approach to Divide-and-Conquer Recursion in Coq**  
Abreu, Pedro and Delaware, Benjamin and Hubers, Alex and Jenkins, Christa and Morris, J. Garrett and Stump, Aaron. 2023. In *Proc. of the ACM on Programming Languages, Issue POPL*
- **Strong Functional Pearl: Harper's Regular Expression Matcher in Cedille**  
Stump, Aaron and Jenkins, Christa and Spahn, Stephan, and McDonald, Colin. 2020. In *Proc. of the 25th ACM SIGPLAN International Conference on Functional Programming*.

### Workshop Publications

- **Towards Formal Verification of HotStuff-Based Byzantine Fault Tolerant Consensus in Agda**  
Carr, Harold and Jenkins, Christa and Moir, Mark and Miraldo, Victor Cacciari and Silva, Lisandra. 2022. In *Proc. of NASA Formal Methods – 14th International Symposium, NFM 2022*
- **Simulating Large Eliminations in Cedille**  
Jenkins, Christa and Marmaduke, Andrew and Stump, Aaron. 2021. In *Proc. of the 27th International Conference on Types for Proofs and Programs*
- **Zero-cost Constructor Subtyping**  
Marmaduke, Andrew and Jenkins, Christa and Stump, Aaron. 2020. In *Proc. of the 32nd Symposium on Implementation and Application of Functional Languages*
- **Efficient lambda encodings for Mendler-style coinductive types in Cedille**  
Jenkins, Christa and Stump, Aaron and Diehl, Larry. 2020. In *Proc. of the 8th workshop on Mathematically Structured Functional Programming*.
- **Quotients by idempotent functions in Cedille**  
Marmaduke, Andrew and Jenkins, Christa and Stump, Aaron. 2019. In *Proc. of the 20th International Symposium on Trends in Functional Programming*.
- **Spine-local type inference**  
Jenkins, Christa and Stump, Aaron. 2018. In *Proc. of the 30th Symposium on Implementation and Application of Functional Languages*.

## Theses

- **Elaborating Inductive Definitions in the Calculus of Dependent Lambda Eliminations**  
Doctoral Dissertation, Department of Computer Science at The University of Iowa. 2023 (anticipated).
- **Toward a parallel implementation of J: Data parallelism in functional, array-oriented languages.**  
Undergraduate Honors Thesis, Department of Computer Science at Trinity University. 2013.

## Manuscripts

- **Proof Engineering with Predicate Transformer Semantics**  
Jenkins, Christa and Moir, Mark and Carr, Harold. <https://arxiv.org/abs/2208.08070>. 2022
- **Elaborating Course-of-Values Induction in Cedille**  
Jenkins, Christa and Firsov, Denis and Diehl, Larry and McDonald, Colin and Stump, Aaron. [github.io](https://github.com/cwjnk/cedille). 2020.

## Other Work

- Jul 2015 - Jul 2017**     **Parlevel Systems, Inc**, 114 E Cevallos St, San Antonio, TX 78204  
*Lead embedded systems software developer*  
*Parlevel Box*, a vending machine telemeter with an ARM CPU and custom board running customized F9 microkernel.
- design an implementation of high-level and thread-safe libraries for platform peripherals;
  - implement low-level vending machine communication protocols (DEX/MDB);
  - design and implementation of server tools for remote device management;
  - project management, including interviewing customers to assess requirements, planning, effort estimation, and documentation;
  - provide tier 3 technical support for customers.
- Jun 2013 - Jul 2015**     **Genesi USA, Inc**, 2600 Virginia Avenue NW, Washington, D.C. 20037  
*Embedded systems software developer*  
*Slimbook*, a netbook with an ARM CPU and custom board running customized Ubuntu. Projects include:
- porting and maintaining Ubuntu packages (both user applications and system libraries);
  - porting and maintaining Linux kernel drivers for hardware peripherals (battery, MMC, camera, audio);
  - writing documentation and technical guides for customers and third party companies on building and using software.

## Grants, Fellowships, and Honors

### Graduate

- **Post-Comprehensive Research Fellowship** (Spring 2021)  
Awarded by the University of Iowa Graduate College to students with distinguished academic achievement during their early academic training.

## Undergraduate

- **Charles Babbage and Ada Lovelace Award** (2013)  
Awarded by the the Trinity University Department of Computer Science
- **Mach Fellowship Award** (2013)  
Awarded by Trinity University

## Software Engineering Skills

### ■ Programming Languages

**Proficient:** *Agda, Haskell, C*

**Familiar:** *F\*, OCaml, Coq, Dafny, JavaScript, PHP, Python, Scala, Java, Bash, J*

### ■ Miscellaneous

**Proficient:** *Git,  $\LaTeX$ , Linux (Debian), Emacs*

**Familiar:** *Haskell Stack Tool, Cabal, GCC, Make*

## Software Projects

### Agda      **christiansen-bidirectional-tutorial**

An intrinsically verified implementation of “Bidirectional typing rules: a tutorial” for the simply typed lambda calculus.

### Agda      **system-inf**

Experiments with intrinsically verified local type argument inference for System F.

### Agda      **harper-pfpl-agda**

Formal proofs for the programming language in chapters 4-6 of Harper’s “Practical Foundations for Programming Languages.”

## Other Education

### Oct 2016      **Coursera / École Polytechnique Fédérale de Lausanne**, online course

Certificate earned for “Functional Program Design in Scala”

### Jan 2016      **edX / Delft University of Technology**, online course

Certificate earned for “FP101x: Introduction to Functional Programming in Haskell”

### Jun 2014      **University of Oregon**, Eugene OR

Attended the “Oregon Programming Languages Summer School”

## Hobbies and Interests

- **Creator of the *Cedille Cast* on YouTube**
- ***Dungeons and Dragons, 5th edition* (as Dungeon Master and Player)**

## Referees

**Name**                      Dr. Aaron Stump  
**University**                The University of Iowa  
**Position**                  Professor  
**Contact**                   aaron-stump@uiowa.edu

**Name**                      Dr. J. Garrett Morris  
**University**                The University of Iowa  
**Position**                  Assistant Professor  
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