

## Hanxi “Gary” Chen

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### EDUCATION

**Cornell University, Cornell Ann S. Bowers College of Computing and Information Science**  
Incoming CS Ph.D.

**University of Pennsylvania, School of Engineering and Applied Science & The Wharton School**

Master’s Degree & Uncoordinated Dual Bachelor’s Degree in Engineering and Business

**M.S.E. in Computer and Information Science**

2023-2025

**B.S.E. in Computer Science**, Concentration in Software Foundations, Minor in Mathematics

2020-2025

**B.S. in Economics**, Concentration in Business Analytics

2020-2025

Cumulative GPA: 3.97 / 4.00; Master’s GPA: 3.97 / 4.00

Advisor: [Prof. Steve Zdancewic](#)

### RELEVANT COURSEWORK

**Computer Science (Graduate):** Compilers (CIS 7000); Friendly Logic (CIS 6820); Randomized Algorithms (CIS 6770); Separation Logic (CIS 6700); Type Theory, Lambda Calculus, and Effects (CIS 6700); Computer Organization and Design (CIS 5710); Networked Systems (CIS 5530); Advanced Programming (CIS 5520); Database and Information Systems (CIS 5500); Operating System (CIS 5480); Software Analysis (CIS 5470); Big Data Analytics (CIS 5450); Machine Learning (CIS 5200); Theory of Computation (CIS 5110); Software Foundations in Rocq (CIS 5000); Linear, Nonlinear, and Integer Optimization (ESE 5040); Applied Econometrics (STAT 5200).

**Computer Science (Undergraduate):** Algorithmic Game Theory (NETS 4120); Network Theory (NETS 3120); Distributed Cloud Programming (NETS 2120); Algorithms (CIS 3200); Introduction to Computer Systems (CIS 2400); Discrete Math (CIS 1600); Foundations of Data Science (ESE 3050); Bayesian Statistics (STAT 4420); Statistical Inference (STAT 4310); Probability (STAT 4300); Linear Algebra (MATH 3130 / MATH 2400); Multivariable Calculus (MATH 1410).

**Business:** Economics; Corporate Finance; Accounting; Forensic Analytics; Marketing; Management; International Banking; Negotiations.

### PUBLICATIONS

#### Published Papers

Calvin Beck\*, **Hanxi Chen\***, Steve Zdancewic. Vellvm: Formalizing the Informal (An Experience Report). *The 17th NASA Formal Methods Symposium (NFM)*, 2025.

Calvin Beck\*, **Hanxi Chen\***, Steve Zdancewic. Vellvm: Formalizing the Informal. *The Eleventh International Workshop on Rocq for Programming Languages (RocqPL)*, 2025.

Calvin Beck\*, Irene Yoon, **Hanxi Chen**, Yannick Zakowski, Steve Zdancewic. A Two-Phase Infinite/Finite Low-Level Memory Model: Reconciling Integer-Pointer Casts, Finite Space, and undef at the LLVM IR Level of Abstraction. *Proceedings of the ACM on Programming Languages*, 8 (ICFP), 2024.

#### Unpublished Manuscripts

**Hanxi Chen\***, Random Differential Testing at the LLVM IR Level. Approved CIS Undergraduate thesis, 2024. Reviewed by Prof. Steve Zdancewic (advisor) and Prof. Benjamin C. Pierce. Received Grade A.

**Hanxi Chen\***, Knapsack Problems with Precedence Constraints. Wharton undergraduate thesis supervised by Sanjeev Khanna, University of Pennsylvania. Received Grade A.

#### Works in Progress

Calvin Beck\*, **Hanxi Chen\***, Steve Zdancewic. GenLLVM: Randomized Differential Testing for LLVM IR.

### RELEVANT RESEARCH EXPERIENCE

**Research Assistant, PLClub**, supervised by [Prof. Steve Zdancewic](#)

Jun 2021 – Present

**University of Pennsylvania**, Computer and Information Science

- Contributed to the Verified LLVM (Vellvm) Project, formalizing LLVM IR semantics in Rocq. Formalized nontrivial lemmas such as serialization. Participated in the development of a low-level memory model in Rocq to facilitate pointer-integer casting.
- Developed a Rocq-based LLVM differential testing framework, as part of the Vellvm project, using QuickChick, capable of generating UB-free LLVM programs with nontrivial features like pointer manipulations. Submitted approved bug reports to the LLVM project.
- Developed a program tracer using OCaml and Rocq for generating the dynamic trace via Vellvm interpreter. The tracer can generate annotated program trace, as well as well-formed LLVM IR program, for efficiently detecting bugs according to Vellvm’s semantics.

\* indicates (co-)first authors.

- Developed a permutation library and prove the equivalence of seven variations of list permutations based on type class. Building a complete solver using MetaCoq for solving associativity-commutativity-unification on lists.
- Formalized the polymorphic, multiplicative, exponential linear logic in Rocq with properties like cut elimination as a potential use case for the permutation library and a related formalization of EPIC.
- Formalizing the preservation and confluence properties of linear EPIC, an opportunistically parallel, linear-resource programming language intended to accelerate programs with large language model queries.

**Research Assistant, Wharton Research Scholars**, supervised by [Prof. Sanjeev Khanna](#)  
**University of Pennsylvania**, The Wharton School

Jan 2023 – Present

- Proved the existence of pseudo-polynomial solution for precedence constraints knapsack problems with two different graph classes: 1) union of three paths, and 2) one-directional bipartite poset with consecutive children.
- Wrote a 48 pages undergraduate technical report, which will be submitted to Wharton Research Scholars Program in December 2024.

**Research Assistant, Penn Computational Intelligence Lab**, supervised by Prof. Jing Li  
**University of Pennsylvania**, Electrical and Systems Engineering

Feb 2021 – Sep 2021

- Co-designed and coded a novel simulator prototype, written in C++, that partially models the functionality of Intel's Optane Memory.
- Researched C# solution in modifying PDFSplit, a PowerPoint Add-ins in Linux, to the Microsoft platform.

## TEACHING EXPERIENCE

**Teaching Assistant, Compilers (CIS 5521)**, University of Pennsylvania

Spring 2025. Supervised by Prof. Steve Zdancewic.

A graduate course on compilers in OCaml. Topics include lexical analysis, grammars, parsing, intermediate representations, syntax-directed translation, code generation, type checking, dataflow and control-flow analyses, and optimizations.

**Teaching Assistant, Advanced Programming (CIS 5520)**, University of Pennsylvania

Fall 2024. Supervised by Prof. Stephanie Weirich.

A graduate course on Haskell and programming paradigms. Topics include functional programming, type class, functor, applicative, monad, monad transformers. Taught 4 lectures. Currently mentoring 4 project groups.

**Head Teaching Assistant, Analysis of Algorithms (CIS 5020 / CIT 5960 / CIS 3200)**, University of Pennsylvania

Summer 2022, Fall 2023, Spring 2023, Summer 2023, Fall 2023, Summer 2024. Supervised by Prof. Sanjeev Khanna.

A (graduate) class on the paradigms for design and analysis of algorithms. Topics include dynamic programming, graph algorithms, flow and combinatorial optimization algorithms, linear programming, randomization, intractability, and approximation algorithms.

**Head Teaching Assistant, Theory of Networks (NETS 3120)**, University of Pennsylvania

Spring 2024. Supervised by Prof. Victor Preciado.

An undergraduate course on network and data science. Topics include graph theory, social network analysis, graph machine learning, knowledge graphs, and graph generation.

**Teaching Assistant, Software Foundations (CIS 5000)**, University of Pennsylvania

Fall 2023. Supervised by Prof. Benjamin Pierce.

A graduate course on basic concepts and techniques of programming languages. Topics include operational techniques for formal definition of language features, type systems and type safety properties, polymorphism, constructive logic, and the Rocq Proof Assistant. Taught 1 lecture.

**STEM Tutor, Weingarten Center**, University of Pennsylvania

Spring 2021, Summer 2021, Fall 2021, Spring 2022, Summer 2022

Taught Programming Languages and Techniques I (CIS 1200), Mathematical Foundations of Computer Science (CIS 1600), Programming Languages and Techniques II (CIS 1210), Introduction to Algorithms (CIS 3200), Calculus II (MATH 1410), Calculus III (MATH 2400).

## HONORS & AWARDS

CIS Faculty Appreciation Award	2024	Tau Beta Pi	2022, 2023, 2024
MCIT TA Award	2024	Eta Kappa Nu	2022, 2023, 2024
CIS Senior Thesis	2024	Beta Gamma Sigma	2023, 2024
Wharton Research Scholars	2024	Dean's List	2022, 2023

## COMMUNITY INVOLVEMENT

SPLASH 2024, Student Volunteer

October 2024

OPLSS 2024, Student Volunteer  
 POPL 2025, Student Volunteer

June 2024  
 January 2025

#### OTHER EXPERIENCE

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**Research Assistant**, *The Knowledge Puzzle Project*, supervised by Prof. Andrew Carton  
**University of Pennsylvania**, The Wharton School Feb 2021 – Sep 2021

- Wrote a report on conducting experiments comparing different extraction tools on tables from scholarly papers.

**Research Intern**, *House Committee on Technology and Intergovernmental Affairs*  
**Massachusetts State House**, Boston, MA Jun 2019 – Aug 2019

- Wrote a report for the Committee hearing regarding telehealth security, analyzing telehealth cybersecurity strategies at the federal and state levels, and suggesting potential improvement for legislation.
- Researched and wrote proposals regarding solutions to the cybersecurity workforce shortage in Massachusetts.