

DING Chao

[Personal Website](#)

Education:

Time	Institute	Major	Degree
2006.9-2010.6	Jilin University	Computational Mathematics	Bachelor of Science
2016.9-2020.12	Nanjing University	Computer Science and Technology	Master Program, Quit
2022.8 - 2028.5(expected)	University of Illinois at Chicago	Computer Science	PhD Student

Research:

Nanjing University:

S(hang)M(i) Algorithms formalized in Coq: https://github.com/sleepycoke/ShangMi_Coq

"Coq is a formal proof management system. It provides a formal language for writing mathematical definitions, executable algorithms, and theorems, and an environment for semi-interactive development of machine-checked proofs. " -- <https://coq.inria.fr>

SM2, 3, 4 is a Chinese Elliptic Curve Cryptography Algorithm suite.

Formalising them in Coq is the foundation of both proving its mathematical properties and verifying program correctness.

My formalisation passed the test cases on the documents. However, this work was interrupted after I quit Nanjing University.

University of Illinois Chicago

1. Prove the correctness of concurrent programs using Iris(iris-project.org) as the verification toolset.
2. Building a transformer from RefinedC's AST to VST's, using Coq and Iris.

Publication

None.

Academic Service

None.

Work:

Time	Organization	Position	Description
2010.7-2013.9	Self-employed	High School Math and Physics Tutor	Freelancer job as a private tutor
2013.10-2015.6	AvePoint	Mobile and Server Software Developer	C# and Objective-C developer on the SharePoint platform, involving web service, iOS client, WPF, and SharePoint Farm deployment.
2017.9-2019.6	Nanjing University	Teaching Assistant	Combinatorial, Mathematical Logic, Computation Models, Formal Semantics of Programming Language
2021.1-2022.2	TouchPlanet	Embedded Software Developer	Projector touchscreen calibration and motion control on LPC1769, using C and C++.
2022.4 - 2022.7	FESCO Adecco	Software Developer	Verify the equivalence of two piece of programs, using C++ and model checking
2022.8 - Now	University of Illinois Chicago	Teaching and Research Assistant	Teaching Program Design using C++, Object-Orientated Languages and Environments, mainly using Java, Provably Correct Programming, using Coq. Working on projects about program verification.

Skills:

Programing: Coq, C, C++, OCaml, C#, obj-C, Python, Java

Details

Work in AvePoint

AvePoint's main product was DocAve, a SharePoint wrapper. Though powerful, SharePoint is sometimes challenging for IT staff to learn. AvePoint provides customised solutions to deploy and utilise SharePoint in a friendlier way.

My work in AvePoint involves:

1. Build a knowledge base web page using ASP.net to invoke the SharePoint search engine.
2. Build a Windows desktop application to call the SharePoint farm API to deploy farms, using WPF.
3. Build an iOS app to access SharePoint, viewing and editing items, using Objective-C.
4. Build a web service running on IIS to communicate with the iOS app and the SharePoint farm.

Work in Nanjing University

There were four courses in which I was the teaching assistant:

- Combinatorial
- Mathematical Logic
- Computation Models
- Formal Semantics of Programming Language.

All these courses are theoretical and math-heavy. I was responsible for working on assignments and typesetting solutions, and for giving several lectures to teach supplementary materials, exercises, and Q&A.

Work in Touch Planet

Touch Planet is focusing on touchscreen solutions. My work involves:

1. Design and implement an algorithm to find the bijection between the coordinates in the computer and the image projected to the screen. This job is indeed to construct a projective transformation (homography) from at least four pairs of points (one on the computer image and one on the screen).

2. Adding two more axes to a traditional 3-axis Cartesian 3D printer. The program is running on an embedded ARM MCU. The 3D printer is used to produce touch membranes, which are part of the touchscreen. By adding these 2 more axes, the printer can print waves more efficiently, since the oscillation is performed by a much smaller, faster motor, with a rotating motor controlling the direction of the oscillation.
3. Calibrate the bed of the 3D printer by probing a set of coordinates. I developed a real-time program to make a probe run along coordinates on the same line without pauses and to communicate in parallel via UART to measure the probe's real-time length. Then, we can use these raw data to build a mesh and adjust the printer's height according to the slopes.

Work in FESCO Adecco

Writing wrapper software to call SMT solvers to check the equivalence of two programs. It was mostly C++ engineering rather than solver development.

Work at the University of Illinois Chicago

In the Fall of 2022, I was a teaching assistant for CS141, Program Design II. My responsibilities include teaching lab sessions, giving lectures, hosting office hours, designing lab activities and grading programs.

In Spring 2023 and Fall 2023, I was a teaching assistant for CS474, Object-Oriented Languages and Environments, responsible for grading and office hours.

In Spring 2024, I was a teaching assistant for CS472, Provably Correct Programming, where I introduced Coq and Iris as verification tools for programming languages. I am responsible for building auto-graders and hosting online office hours and Q&A.

From Fall 2024 to Fall 2026, I am a research assistant working on verifying the correctness of concurrent programs and building an AST transformer for RefindC and VST.

Curriculum

Graduate

- Concurrent Computing Systems
- Introduction to Quantum Computing
- Computability
- Mathematical Logic
- Compiler Design
- Computational Complexity

- Principles of Concurrent Programming
- Introduction to Machine Learning
- Object-Oriented Programming Languages
- Programming Language Design
- Formal Languages and Automata
- Data Mining
- Combinatorics
- Matrix Theory and Its Applications
- Computer Problem Solving II
- Introduction to Computation Theory
- Advanced Algorithms
- Graph Theory
- Computer Graphics
- Design and Analysis of Computer Algorithms

Undergraduate

- Advanced Algebra I
- Spatial Analytical Geometry
- Mathematical Analysis I
- Programming in C
- Advanced Algebra II
- Mathematical Analysis II
- Introduction to Modern Mathematics I
- Complex Variable Functions
- General Physics I
- Experiments of General Physics I
- Mathematical Analysis III
- Matrix Theory
- Ordinary Differential Equations
- Probability and Statistics
- General Physics II
- Mathematical Analysis IV
- Numerical Analysis I
- Mathematical Experiments
- Computation Experiments I
- Real Variable Functions
- Mathematical Physics Equations
- Numerical Analysis II

- Principles of Information Theory
- Linear Programming
- Computation Experiments II
- Data Structure and Algorithms
- Numerical Solutions of Partial Differential Equations
- Functional Analysis
- Mathematical Models
- Principles of Statistics
- Experiments with Graphics and Images
- Applied Mathematical Software
- Experiments in Life Science
- Parallel Algorithms
- Computer Algebra
- Discrete Mathematics
- Software Design Methods
- Graduation Thesis
- Inverse Problems of Mathematical Physics