

ZITENG YANG

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EDUCATION

Georgia Institute of Technology (Georgia Tech), Atlanta, GA, USA

Aug. 2021 – Present

Ph.D. student in Computer Science, PLSE Lab at School of Computer Science

- Advised by *Vivek Sarkar*
- Research Interests: formal verification, program analysis, parallel program

Minor in Mathematics

Shanghai Jiao Tong University (SJTU), Shanghai, China

Sept. 2017 – Jul. 2021

B.E. in Computer Science and Technology, Department of Computer Science and Engineering

PUBLICATIONS

- **Z. Yang**, X. Yin and S. Li. “Maximally permissive supervisor control of timed discrete-event systems under partial observation,” in 21st IFAC World Congress, 2020 [**Formal Control Theory**]

In submission

- [***Co-first author, dictionary order**] Verification-aided Compiler Optimization [**Compiler Verification**]

RESEARCH PROJECTS

Efficient May-happen-in-parallel Analysis for parallel program via CFL-reachability Currently

First Author Advisor: *Vivek Sarkar*, School of Computer Science, Georgia Tech.

- Proposed an interprocedural analysis formulation for May-happen-in-Parallel (MHP) analysis via a sub-problem of CFL-reachability for which is more precise than previous ones
- Proposed and implemented an $O(V + E)$ -worst-case faster algorithm based on this formulation (previously $O(V^3)$)
- Implemented the new MHP algorithm on async/finish parallel model; it can also apply to fork/join model

Verification-aided Compiler Optimization in the CompCert Compiler Apr. 2020 – Jun. 2021

First Author Advisor: *Qinxiang Cao*, John Hopcroft Center for Computer Science, SJTU.

An expedition to implement a verified program’s verified special new compiler optimization framework prototype:

- Designed a new semantics framework based on small step semantics in CompCert Certified Compiler, aiming for verifying new compiler optimization methods for certified program using hints of Hoare/Separation Logic assertions annotated in C program
- Designed and proved the correctness of the verification routine of backward simulation relation as well as the preservation of annotation’s consistency between source and compiled program for the newly proposed optimization method

Modal Logic’s Completeness Theory in Coq via Finite Model Methods Nov. 2019 – Apr. 2020

Research Assistant Advisor: *Qinxiang Cao*, John Hopcroft Center for Computer Science, SJTU.

- Formally proved Propositional Dynamic Logic’s completeness theorem in Coq via finite canonical model

Formal Control Theory of Timed Discrete-Event Systems

Aug. 2018 – Oct. 2019

First Author Advisor: *Xiang Yin*, Department of Automation, SJTU.

Field: Formal methods in Automata & Control Theory

- Proposed a method for synthesizing a safe and maximally-permissive supervisor for Timed Discrete Event System, a finite-automata-style model which models time into automata, and formally proved the correctness;

TEACHING EXPERIENCE

Teaching Assistant, CS4510 Automata and Complexity, Georgia Tech, lectured by *Joseph Jaeger* Fall 2022
Teaching Assistant, MA208 Discrete Mathematics, SJTU, lectured by *Qinxiang Cao* Fall 2020
Teaching Assistant, MA239 Discrete Mathematics (Honor), SJTU, lectured by *Xiang Yin* Fall 2020

COURSES AND PROJECTS

Graduate Courses: 2021 - Present, Georgia Tech

- **[Ongoing, major] High Performance Computer Architecture, Information Security Labs**
- **[Ongoing, minor] Measure Theory, Algebra I**
- **Compiler Design:** middle/back-end optimization of modern compiler (LLVM) with project on dynamic array bound checking and project on loop dependence testing
- **Software Analysis and Testing:** Topics and paper review around classical and cutting edge program analysis researches

Selected Undergraduate Courses (Scored A): 2017 - 2021, SJTU

- Programming Languages (98/100), Computing Theory, Projects of Operating System (100/100), Linux Kernel, Cloud Computing, Database System Technology

Project: Interpreter for “SimPL” Programming Language Spring 2020

- Implemented an interpreter (type checking and evaluation) of a simplified dialect of ML using Java following given semantic specification

Project: Naive Airdrop Fall 2019

- Designed a file synchronizing application from Android phone to PC within local area network with encryption in transfer, auto connection, changes detecting etc.

Project: Re-implementation of deque and map in STL Fall 2018

- Re-implemented the *deque* and *map* template class in C++ Standard Template Library w.r.t. the interface

SKILLS

Programming Experiences:

- **Coq:** long-term research projects on Mathematical Logic and CompCert Certified compiler
- **C/C++:** course and research projects (LLVM IR, Linux kernel, STL implementation, algorithm design)
- **Java:** Android & PC applications
- **Python:** course projects (machine learning)

Familiar Tools/Libraries:

- **LLVM IR**
- **CompCert Certified Compiler** (the end-to-end formally verified C compiler)
- **VST** (Verified Software Tool-chain in Coq, a separation logic based verification tool for C programs)

Languages: Standard Mandarin (Native), Sichuanese Mandarin (Fluent), English (Fluent)

HONORS AND AWARDS

- Rongchang Scholarship for Science and Technology Innovation, Finalist, 10,000 CNY (10 finalists and 10 winners, university-wide per year) 2020
- Undergraduate Excellent Scholarship, 500 CNY Third-class 2018
- 1st Prize in National High School Mathematics League in Provinces 2016