# Shengyuan Yang

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## EDUCATION

**Nanjing University** Sept 2017-Jun 2021

- **Degree:** Bachelor of Engineering in Software Engineering
- **Ranking: 2/222 Overall GPA: 4.58/5 Major GPA: 4.62/5**

**Nanjing University** Sept 2021- Jun 2023

- **Degree:** Master of Engineering in Software Engineering
- **Ranking: 2/240 GPA: 4.65/5**

**University of Wisconsin-Madison** Sept 2023-May 2025

- **Degree:** Master of Computer and Information Science (and towards a PhD degree)
- **GPA: 4.0/4.0**

## RESEARCH EXPERIENCE

**Precise Static Modeling of Java Streams in Pointer Analysis** *advisor: Thomas Reps* Nov 2024 - Present

- Propose an approach to statically model element flows through Java Streams in pointer analysis.
- Integrate the stream modeling with a lambda analysis to precisely model functional-style operations.
- Evaluated on a newly introduced set of 10 micro-benchmarks and 4 real-world programs.
- Developed into my master's thesis at Wisconsin–Madison and is currently being prepared for journal submission.

**A Cut-Shortcut Approach to Fast and Precise Pointer Analysis** *advisor: Yue Li & Tian Tan* Oct 2021- Mar 2023

- Proposed a new pointer analysis approach for object-oriented languages, which is faster than traditional fast but imprecise analysis and achieves a high precision comparable to modern precise but heavy analysis approaches.
- The approach leverages a novel principle of improving the precision of pointer analysis by modifying the on-the-fly pointer flow graph (cutting off imprecise edges and adding precise shortcuts).
- Implemented the approach on pointer analysis framework Doop in Datalog and evaluated on 10 large java programs.
- Research paper published on **PLDI' 2023** (as the co-first author).

**A Hybrid Heap Abstraction for Pointer Analysis.** *advisor: Yue Li* Mar 2021-Jun 2021

- Presented *Hymers*, a hybrid heap abstraction strategy to accelerate pointer analysis by dividing abstract heaps into precision-critical and precision non-critical to apply corresponding abstraction methods.
- Developed *Hymers* as a stand-alone tool and implemented it on framework Doop.
- Evaluation results on 9 benchmarks show *Hymers* can speed up both traditional analysis and state-of-the-art analysis by about 30% with a precision loss below 4%.

## PROJECTS

**Online Cinema System** Mar 2019-Jun 2019

- A 2 KLOC web system to release and schedule movies for cinema and to book tickets and choose seats for audience.
- In responsible for most of the backend coding in a 4-person group (using SpringBoot+MyBatis+MySQL).

**OCEANIA, an Online Program Call-Graph Visualization System** Mar 2020-Jun 2020

- A web system to visualize the call-graph of a given program uploaded by users.
- As team leader of a 3-person group, designed the whole system and was responsible for all backend coding

(using SpringBoot+Neo4j/MySQL) including parsing code uploaded by users and constructing call-graphs.

- Implemented two call-graph construction algorithms in the system: one using code traversal to get fast but imprecise graphs, the other using static analysis to get slow but precise graphs.

**Campus Vacant Classroom Wayfinding App Based on WIFI Detection** Apr 2019-May 2019

- An Android App using WIFI detection to locate the user's position in buildings, searching for vacant classrooms based on course schedules and enabling in-building navigation for each classroom.
- As the backend developer in a 4-person group, be responsible for the wayfinding service and algorithms.
- App won 1st place in *hackathon by Academic Collaboration Dept., Microsoft Research Asia & Nanjing University.*

**Online Judge System** Mar 2021-Apr 2021

- As the Scrum manager of the team, guided the team to complete an agile software process in 2 sprints.
- Used agile software management tool Zenhub to manage Kanban and burndown chart for our software process, used Jenkins to build and test the system, hold daily Scrums for the team.

**Test Impact Analysis Tool** Nov 2020

- Leveraged static analysis framework WALA to design and implement a tool that selects test cases impacted by a given change to the user program.

## SERVICE & ACTIVITIES

**Teaching Assistant at UW Madison** – ***Theory and Design of Program Languages*** Sept 2023-present

*Advisor: Kaiser Pister*

- Course content includes Lambda Calculus, Functional Programming, Types, and other PL concepts.
- Holding Office Hours, creating exam papers, grading.

**Teaching Assistant at Nanjing University – *Software Analysis*** Sept 2021-Jan 2022

*Advisor: Yue Li, Tian Tan*

- Designed test cases for programming assignments (live variable analysis, constant propagation, dead code detection, CHA, context-sensitive pointer analysis, taint analysis).
- Answering students' questions, creting final exam paper, grading.

**Vice President in Science Fiction Association of Nanjing University** Sept 2018-Jun 2019

- Organizing campus essay competitions and symposiums, inviting local writers to give lectures.

## PUBLICATION

*Context Sensitivity without Contexts, A Cut-Shortcut Approach to Fast and Precise Pointer Analysis*

Wenjie Ma#, **Shengyuan Yang#**, Tian Tan, Xiaoxing Ma, Chang Xu, Yue Li

(the author with # contributed equally to this work)

*44nd ACM SIGPLAN Conference on Programming Language Design and Implementation* (**PLDI' 2023**)

## SKILLS

**Programming Language:** Java, Datalog, Python, C/C++, SQL, JavaScript, Haskell, Dafny.

**Platform & Framework:** Tai-e, Doop, Soot.

**Tools:** Git, Maven, Gradle, JetBrains Tools, Visual Studio, Zenhub.

**Interests:** Electric guitar, science fiction