

# Shengyuan Yang

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## EDUCATION

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### Nanjing University

Sept 2017-Jun 2021

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

### Nanjing University

Sept 2021-July 2023

- ◆ **Major:** Electronic Information - Software Engineering **Degree:** Master of Engineering
- ◆ **Ranking:** 2/240 **GPA:** 4.65/5

## RESEARCH EXPERIENCE

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### A Cut-Shortcut Approach to Fast and Precise Pointer Analysis

Oct 2021-Nov 2022

- ◆ 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 accepted by **PLDI' 2023**.

### A Hybrid Heap Abstraction for Pointer Analysis

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

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### 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.

### A Side-Scrolling Tactical RPG by Unity

Oct 2018-Dec 2018

- ◆ Designed the whole game (mechanism, level, characters), developed the game maps and animation state machines.
- ◆ As the leader of an 8-person team, managed the team's workflow, assigned tasks to other game developers and game artists, hold regular meetings, and composed design & development documents.
- ◆ Game demo won 1st place in *Game Development Contest by Thunder Fire Studio, NetEase & Nanjing University*.

## 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

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### Research Assistant - Dept. of Computer Science and Technology, Nanjing University

Sept 2021-Present

*Advisor: Yue Li, Tian Tan*

- ◆ Research in fundamental pointer analysis

### Teaching Assistant - Course *Software Analysis*

Sept 2021-Jan 2022

*Advisor: Yue Li, Tian Tan*

- ◆ Designed test cases and composed official answers for programming assignments (live variable analysis, constant propagation, dead code detection, CHA, context-sensitive pointer analysis, taint analysis).
- ◆ Assisted with teaching, answered students' questions, created final exam paper, scored assignments and exams.

### Vice President in Science Fiction Association of Nanjing University

Sept 2018-Jun 2019

- ◆ Organized several campus essay competitions and symposiums, invited local writers to give lectures.

### Volunteer of Cyrus Tang Foundation

Sept 2017-Jun 2021

- ◆ Organized and took part in community volunteer services each summer and winter holiday.

## PUBLICATION

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*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)

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

## HONORS & AWARDS

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*Cyrus Tang Foundation Scholarship* for 4 years

2017-2018, 2018-2019, 2019-2020, 2020-2021

*China National Scholarship* for 1 year

2018-2019

*The First-class Scholarship of Nanjing University* for 2 years

2017-2018, 2019-2020

## SKILLS

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**Programming Language:** Java, Python, C, C++, SQL, Datalog

**Platform & Framework:** SpringBoot, Unity, Tai-e, Doop, WALA, Soot

**Tools:** MongoDB, Neo4j, MySQL, Git, Jenkins, Maven, Gradle, JetBrains Tools, Visual Studio, Zenhub

**Interests:** electric guitar, science fiction