

Pinhan Zhao

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Research Interests

Programming Languages, Formal Methods, Automated Reasoning, Artificial Intelligence, Databases

Education

2028
(Expected) **University of Michigan, Ann Arbor, MI**
Ph.D. in Computer Science and Engineering

May 2023 **New York University, New York, NY**
B.S. in Computer Science

Research Experience

Jun 2022 –
Present **Formal Methods for Database Applications**

- Designed an SMT-based approach to formally verify bounded equivalence for complex SQL queries with integrity constraints.
- Designed a mutation-based SQL query testing framework using semantics under-approximation to efficiently generate systematic distinguishing test databases.

Mar 2022 –
Mar 2023 **NSF Science Outreach and Research**

- Developed interactive physics lab simulations in Unity tailored to New York City public K-12 schools for enhancing students lab experience and learning outcomes in STEM curriculum. Deployed online lab simulations to AWS.
- Analyzed activity feedback data from 75 students and evaluated the effect of interdisciplinary web-based simulations on improving students' performance and learning experience.
- Presented work at the 2022 Tandon Research Excellence Exhibit.

Mar 2021 –
Aug 2022 **Satellite Network Congestion Control Research**

- Evaluated the performance of TCP HyStart during different states over a ViaSat-2 satellite Internet link and investigated the cause of HyStart's throughput degradation during start-up state; investigated the optimal timing for exiting TCP slow start over large BDP links.
- Proposed and implemented a fix to TCP slow start in Linux kernel using packet pair bandwidth estimation to avoid premature slow start exiting and enter congestion avoidance at a safe point.
- Performed experiments measured performance and fairness of simultaneous flows where the Linux default TCP congestion control algorithm competes with other approaches over the satellite network.

Honors & Awards

2023 University Honors Scholar, New York University
2022 NASA Student Launch Design Division Overall Winner
2022-2023 NSF Science Outreach and Research Teaching Fellowship

Publications

REFEREED CONFERENCE PAPERS

October 2022 Maryam Ataei Kachooei, **Pinhan Zhao**, Feng Li, Jae Won Chung, and Mark Claypool
[Fixing TCP Slow Start for Slow Fat Links](#)
Proceedings of the 0x16 NetDev Conference

January 2022 **Pinhan Zhao**, Benjamin Peters, Jae Won Chung, and Mark Claypool
[Competing TCP Congestion Control Algorithms over a Satellite Network](#)
Proceedings of the IEEE Consumer Communications and Networking Conference (CCNC), 2022

July 2021 Benjamin Peters, **Pinhan Zhao**, Jae Won Chung, and Mark Claypool
[TCP HyStart Performance over a Satellite Network](#)
Proceedings of the 0x15 NetDev Conference

Teaching

Fall 2021 **NYU Game Center, New York University**
Teaching Assistant, Introduction to Programming for Games

- Mentored nine students within the section on program design in Processing (utilizing Java) and GameMaker Studio during weekly lab sessions and offered detailed explanations of programming concepts.
- Graded homework assignments and provided constructive feedback for improving students' code quality.

Presentations

August 2015 Industrial Ethernet Penetration Testing: Exploring the Weak Points of Industrial Control Systems Security. 2015 Knownsec KCon Cybersecurity Conference. August 2015.

Skills

Programming Languages: Proficient in Python, JavaScript, SQL. Familiar with Haskell, Go, Prolog, C, C++, Java, TypeScript, Racket, C#, Forth, Elixir, Rust, PHP.

Databases: MySQL, MongoDB, PostgreSQL.

Tools: Z3, Docker, Git, Unity.