

EDUCATION

Carnegie Mellon University

Pittsburgh, US

- *Ph.D. in Computer Science*

Feb. 2021 - Present

Peking University

Beijing, China

- *Bachelor of Science (Honored) in Computer Science*

Sep. 2016 - Jul. 2020

- **Turing Class:** First honor class
- **GPA:** 3.73/4.00

WORKING EXPERIENCE

Shanghai Qizhi Institute

Shanghai, China

- *Research Assistant, High Performance Blockchain Network Research*

Aug. 2020 - Feb. 2021

PUBLICATIONS

- Wang, M.*, **Zhou, M.***, Shi, S., & Qian, C. **Vacuum Filters : More Space-Efficient and Faster Replacement for Bloom and Cuckoo Filters**. VLDB, 2020.
*Equal contribution.
- Hou, C.*, **Zhou, M.***, Ji, Y., Daian, P., Tramer, F., Fanti, G., & Juels, A. **SquirRL: Automating Attack Analysis on Blockchain Incentive Mechanisms with Deep Reinforcement Learning**. NDSS 2021.
*Equal contribution.

RESEARCH EXPERIENCES

Sparse Vector Mean Estimation under Local Differential Privacy

Advisor: Prof. Giulia Fanti, Prof. Elaine Shi, Prof. Hubert Chan

Apr. 2021 - Present

- Proposed a new flexible LDP definition for vector analytics.
- Proved new lower bounds on the utilities for vector analytics in LDP.
- Designed an algorithm that achieves nearly optimal estimation error.

Mercury: Fast Transaction Broadcast in High Performance Blockchain System

Advisor: Prof. Dong Zhou

Aug. 2020 - Feb. 2021

- Built a robust network virtual coordinate in malicious network
- Constructed a broadcast scheme based on location-awareness clustering and early outburst strategy
- Achieved more than 50% latency improvement in Conflux Network(1000 nodes with 2000+ TPS)

VRecon: An Efficient Set Reconciliation Algorithm

Advisor: Prof. Yunhuai Liu, Prof. Chen Qian

Apr. 2020 - Jul. 2020

- Designed an efficient set reconciliation algorithm based on Vacuum Filter and Invertible Bloom Filter.
- Achieved 45% more bandwidth saving compared to existing works using matching vector optimization.
- Achieved both scalability and robust performance within linear time complexity.

SquirRL: Automating Attack Analysis on Blockchain Incentive Mechanisms with DRL

Advisor: Prof. Giulia Fanti, Prof. Ari Juels

Jun. 2019 - Jun. 2020

- Proposed a general framework for automatic attack discoveries on complex blockchain protocols.
- Implemented interactive environments for Bitcoin/Ethereum/GHOST protocols, supporting multi-agent setting.
- Achieved best attack results in real-data simulations with reinforcement learning.

Vacuum Filters : More Space-Efficient and Faster Replacement for Bloom and Cuckoo Filters

Advisor: Prof. Chen Qian

Mar. 2019 - Aug. 2019

- Proposed new table structures based on Cuckoo Filter to achieve SotA memory utilization.
- Optimized insertion/lookup and implemented parallel operations, achieving SotA throughput performance.
- Proposed a dynamic re-construction scheme for real application.

COMPETITIONS

International Collegiate Programming Contest, Regional Gold Medal, <i>ICPC Foundation</i>	Oct. 2018
National Olympiad of Informatics, Gold Medal, <i>China Computer Federation</i>	Aug. 2015

AWARDS AND HONORS

Outstanding Dissertation for Bachelor's Degree (Top 10 in the EECS school), <i>PKU</i>	Jun. 2020
Turing Benteng Scholarship, <i>PKU</i>	Nov. 2019
Kwang-Hua Scholarship (Top 3 in class, ~1% of students), <i>PKU</i>	Dec. 2018
Chuang-Long Ke Scholarship, <i>PKU</i>	Dec. 2017
Dean Scholarship for Freshman, <i>PKU</i>	Sep. 2016

CODING

- **Primary Languages:** C, C++, Python
- **Others:** Java, Rust