

HAOJUN MA

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EDUCATION

- University of Michigan, Ann Arbor (UMich)** *Sep. 2017 ~ Aug. 2022*
PhD in Computer Science and Engineering
Research area: distributed systems, formal verification
Advisor: Prof. Manos Kapritsos
Dissertation: Automating the Verification of Distributed Systems
- Cornell University** *Jul. 2016 ~ Dec. 2016*
Visiting Scholar in the Department of Computer Science
Mentor: Prof. Robbert van Renesse
- Shanghai Jiao Tong University(SJTU)** *Sep. 2013 ~ Jun. 2017*
B.E. in Computer Science, Zhiyuan College (**ACM Honored Class**)

PUBLICATIONS

- Haojun Ma**, Hammad Ahmad, Aman Goel, Eli Goldweber, Jean-Baptiste Jeannin, Manos Kapritsos, and Baris Kasikci. *Sift: Using Refinement-guided Automation to Verify Complex Distributed Systems*. In USENIX Annual Technical Conference 2022 (ATC 2022)
- Jacob R. Lorch, Yixuan Chen, Manos Kapritsos, **Haojun Ma**, Bryan Parno, Shaz Qadeer, Upamanyu Sharma, James R. Wilcox, Xueyuan Zhao, *Armada: Automated Verification of Concurrent Code with Sound Semantic Extensibility*. In ACM Transactions on Programming Languages and Systems (TOPLAS) 44(2)
- Haojun Ma**, Aman Goel, Jean-Baptiste Jeannin, Manos Kapritsos, Baris Kasikci, and Karem A. Sakallah. *I4: Incremental Inference of Inductive Invariants for Verification of Distributed Protocols*. In Symposium on Operating Systems Principles 2019 (SOSP 2019)
- Haojun Ma**, Aman Goel, Jean-Baptiste Jeannin, Manos Kapritsos, Baris Kasikci, and Karem A. Sakallah. *Towards Automatic Inference of Inductive Invariants*. In Workshop on Hot Topics in Operating Systems (HotOS 19)

WORK EXPERIENCE

- **Reserach Scientist**, Meta, CA *Sep. 2022 ~ now*
- **Software Engineer Intern**, Facebook, WA *Jun. 2021 ~ Aug. 2021*
- **Research Assistant**, UMich *Sep. 2017 ~ Aug. 2022*
- **Research Intern**, System Group, Microsoft Research, Redmond *Jun. 2020 ~ Aug. 2020*
- **Graduate Student Instructor**, Distributed systems, UMich *Sep. 2019 ~ Dec. 2019*
- **Data Engineer Intern**, Yahoo, Sunnyvale, California *Jun. 2019 ~ Aug. 2019*
- **Teaching Assistant**, Compiler, SJTU *Spring 2016*
- **Teaching Assistant**, Data Structure, SJTU *Fall 2014*

RESEARCH PROJECTS

- Cruiser: Automated Verification for Heap-based Distributed Implementations** *Dec. 2021 ~ Now*
Research Assistant, Advisor: Prof. Manos Kapritsos *University of Michigan*
- Identifying the differences from a protocol layer to an efficient implementation
 - Automatically generating heap-based implementation and its refinement proof

Sift: Refinement-guided Automation to Verify Complex Distributed Systems *Dec. 2019~Dec. 2021*
Research Assistant, Advisor: Prof. Manos Kapritsos *University of Michigan*

- Using refinement to scale automation to complex systems
- Using encapsulation to leverage the automation from monolithic provers to prove refinement.
- Significantly simplify proof effort for Raft and Multi-Paxos
- Publication is accepted by ATC 2022

Armada: Verification of High-Performance Concurrent Programs *Jun. 2020 ~ Aug. 2020*
Research Intern, Mentor: Jay Lorch *Microsoft Research*

- Aimed to prove the correctness of large-scale concurrent program
- Targeted on Hekaton SQL engine
- Improved usability problems in Armada
- Analyzed unsupported C++ features and evaluated their performance influence

I4: Incremental Inference of Inductive Invariant (Automatic Verification) *Jul. 2018 ~ Nov. 2019*
Research Assistant, Advisor: Prof. Manos Kapritsos *University of Michigan*

- Aiming to automatically verify distributed systems
- Using a finite instance of an unbounded protocol to infer a general proof
- Combining the power of model checking and automatic reasoning to fully automate this process
- Publications are accepted by HotOS 2019 and SOSP 2019

Flexible Fast Paxos *Sep. 2017 ~ Mar. 2018*
Research Assistant, Advisor: Prof. Manos Kapritsos *University of Michigan*

- Aimed to provide strong consistency with low latency for geo-distributed systems
- Used the idea of flexible quorums to reduce datacenter access
- Implemented this protocol and tested it

Software Defined Distributed Systems *May. 2016 ~ Mar. 2017*
Visiting Scientist, Mentor: Prof. Robbert van Renesse *Cornell University*

- Aimed to build evolvable large-scale distributed systems that run in the cloud
- Added different modules to measure latency, throughput and fault tolerance
- Implemented an interface and applied Yahoo Cloud Serving Benchmark (YCSB) on it
- Re-implemented the system in C++ for better performance and reached 20x speedup

An Authenticated Data Feed for Smart Contracts *Sep. 2016 ~ Jan. 2017*
Visiting Scientist, Mentor: Prof. Ari Juels *Cornell University*

- Aimed to combine a blockchain front end with a trusted hardware back end
- Focused on testing and reconstructing
- Added unit tests for further updates
- Worked on ABI(Application Binary Interface) encoding and mastered the methods to interact with blockchain

Distributed Deep Learning System *Jul. 2015 ~ May. 2017*
Research Assistant, Mentor: Prof. Minyi Guo *SJTU*

- Aimed to build a distributed deep learning system with multi-GPU
- sponsored by Huawei Technologies Co., Ltd
- Building our system based on Minerva
- Designed a few ways of task scheduling and implemented some of them with ZeroMQ
- Constructed the InfiniBand network to decrease the network overhead

AWARDS AND HONORS

- **Student Grant**, ATC 2022 *2022*
- **Rackham Conference Travel Grant**, UMich *2022*
- **Student Grant**, OSDI 2020 *2020*
- **Rackham Conference Travel Grant**, UMich *2020*
- **6th place**, ACM ICPC East Central North America Regional *2018*
- **rank 445**, Google Code Jam *2018*
- **Academic Excellence Scholarship**, SJTU *2016*
- **Top 1000**, Beauty of Programming, Microsoft Research Asia *2016*
- **Academic Excellence Scholarship**, SJTU *2015*
- **3rd Prize**, Shanghai Mathematical Contest In Modeling *2014*
- **Academic Excellence Scholarship**, SJTU *2014*
- **2nd place**, Super Coder Competition in SJTU *2014*
- **1st prize**, National Olympiad in Informatics in Provinces *2012*
- **Silver Medal**, National Olympiad in Informatics *2012*
- **1st prize**, National Olympiad in Informatics in Provinces *2011*
- **2nd prize**, National Olympiad in Informatics in Provinces *2010*

ACTIVITIES AND SERVICES

- **External Reviewer**, SOSP, *2021*
- **External Reviewer**, OSDI, *2021*
- **External Reviewer**, OSDI, *2020*
- **External Reviewer**, ICDCS, *2020*
- **External Reviewer**, ATC, *2019*
- **External Reviewer**, NSDI, *2019*
- **External Reviewer**, OSDI, *2018*
- **External Reviewer**, ATC, *2018*
- **Vice Monitor**, ACM Honored Class, SJTU *Sep. 2013 ~ Sep. 2014*