

Xiao Li, Ph.D. Candidate

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Research Objective

- 📌 I'm a fifth-year Ph.D. candidate. My research interest spans over the theory and practice of **distributed systems**, **programming languages** and **computer security**. I'm particularly interested in **Byzantine fault-tolerant replication**, **automated reasoning** and **formal verification** in distributed systems.

Education

- 2019 – Present 📌 **Ph.D. Candidate, University of California, Riverside, USA** in Computer Science. GPA:3.88/4
- 2017 – 2019 📌 **M.Sc., University of California, Riverside, USA** in Computer Science.
GPA: 3.88/4 (Transferred to Ph.D. program)
- 2013 – 2017 📌 **B.E., Huazhong University of Science and Technology, China** in Information Security. GPA: 3.65/4 (Outstanding Graduates)
- 2016 📌 **Summer Intern, The University of Singapore, Singapore**

Employment

- 2023 Fall–Present 📌 **Research Engineer Intern.** Chainlink Labs.
- 2019 – 2023 Summer 📌 **Graduate Student Researcher.** UC Riverside.




Technical Skills

- Object-Oriented Programming Languages 📌 Go, Java, Python, C++.
- SMT Solvers (SMT-LIB) 📌 Z3, CVC4.
- Databases 📌 SQL (PostgreSQL).
- Others 📌 Version Control (Git), L^AT_EX.

Research Projects

- 2023 – Present 📌 **Reconfigurable clustered Byzantine replication** (under review) Advisor: Prof. Mohsen Lesani
 - Designed replication protocols that enable over two times throughput increase with heterogeneous reconfigurable clusters. All the protocols are accompanied with correctness proof.
- 2022 – Present 📌 **Reconfigurable Heterogeneous Quorum Systems** (under review) Advisor: Prof. Mohsen Lesani
 - Designed reconfiguration protocols for heterogeneous quorum systems (HQS) to enable open membership for permissioned blockchains.
 - Proposed a reconfiguration optimization technique based on the graph characterization of HQS.
 - Implemented the reconfiguration protocols in Stellar-core framework with C++.
- 2022 – 2023 📌 **On the power of quorum subsumption for heterogeneous quorum systems** (published in DISC 2023) Advisor: Prof. Mohsen Lesani
 - Proved an impossibility result that shows quorum intersection and quorum availability are not sufficient for Byzantine reliable broadcast (BRB) and consensus in HQS setting.
 - Proposed a new property (quorum-subsumption) to help achieve BRB and consensus with detailed protocols and correctness proofs.

Research Projects (continued)

- 2020 – 2022  **Hamraz: Resilient Partitioning and Replication** (published in *SeP 2022*) Advisor: Prof. Mohsen Lesani
- Presented a security-typed object-based language and an information flow type inference system to automatically synthesis trustworthy-by-construction distributed system.
 - Designed and implemented a CPS transformation and program partitioning system in Java.
 - Designed and implemented a type inference system to generate verification conditions in Python and Z₃ framework.
- 2019 – 2020  **Hampa: Solver-aided Recency-Aware Replicated Objects** (published and artifact evaluated in *CAV 2020*) Advisor: Prof. Mohsen Lesani
- Designed a relational object language, its denotational semantics and syntax-directed analysis to infer optimum staleness bounds.
 - Designed and implemented a Java module to generate verification conditions in CVC4.
 - Designed and experimented synthesised run-time system on top of BFT-SmaRt library and SMT solver.
- 2014 – 2015  **Conditional Identity-based Broadcast Proxy Re-Encryption and Its Application to Cloud E-mail** Advisor: Prof. Peng Xu
- Lead a team to implement a prototype for a cloud email system based on CIBPRE and obtained 3rd Prize in the 8th National College Student Information Security Contest.

Publications

- 1 Li, X., Chan, E., & Lesani, M. (2023). On the power of quorum subsumption for heterogeneous quorum systems, In *Disc'23 (international symposium on distributed computing)*.
- 2 Li, X., Houshmand, F., & Lesani, M. (2022). Hamraz: Resilient partitioning and replication, In *SeP'22 (ieeE symposium on security and privacy)*.
- 3 Li, X., Houshmand, F., & Lesani, M. (2020). Hampa: Solver-aided recency-aware replication, In *International conference on computer aided verification*. Springer.

Awards and Achievements

- 2024  **SIGPLAN Mentorship**, Symposium on Principles of Programming Languages (POPL).
 **Dissertation Year Completion Fellowship**, UC Riverside .
- 2023  **Grace Hopper Conference Scholarship 2023**, UC Riverside .
 **Dissertation Year Program Fellowship 2023/2024**, UC Riverside .
- 2022  **Student Travel Grant**, 2022 ACM Conference on Computer and Communications Security (CCS).
 **GSA Travel Award**, UC, Riverside.
 **Student Travel Award**, 2022 IEEE Symposium on Security and Privacy (S&P).
- 2021  **Selected and Funded**, SPLASH Programming Languages Mentoring Workshop (PLMW) 2021.
- 2019  **Department Fellowship Award**, UC, Riverside.
- 2017  **Outstanding Graduates**, Huazhong University of Science and Technology.
- 2016  **Outstanding Academic Award**, Huazhong University of Science and Technology.
- 2015  **Third Prize**, in the 8th National College Student Information Security Contest.
- 2014  **Public Welfare Scholarship**, Huazhong University of Science and Technology.