Qingjie Lu

Building Resilient Systems & Secure Protocols
Making Tech More Accessible Through Videos

andylu@seas.upenn.edu
qingjielu.com

Research Interests

Systems, Data Centers, Applied Cryptography, Privacy
My research interests span the intersection of data center systems, applied cryptography, and privacy. I focus on two principal directions: (1) designing systems and large-scale tools to enhance the resilience, efficiency, and security of data centers, and (2) developing novel protocols to strengthen both large-scale data centers and public infrastructure.

Education

University of Pennsylvania, Philadelphia, PA *August 2024 - present*
PhD in Computer and Information Science
Advisor: Andreas Haeberlen

Duke University, Durham, NC *2022 - 2024*
Master of Science in Computer Science
Coursework: Operating Systems, Distributed Systems, Advanced Architecture, Advanced Networks, Computer Security, Natural Language Processing, Generative Models, Secure Software Systems

University of Rochester, Rochester, NY *2017 - 2021*
Bachelor of Science in Computer Science & Bachelor of Arts in Financial Economics
Coursework: Design of Efficient Algorithms, Programming Language Design & Implementation, Computation & Formal Systems, Computer Architecture, Machine Learning, Web Development, Behavioral Economics

Research Projects

Modeling Metastability *September 2024 - Present*
Advisor: Prof. Andreas Haeberlen - *University of Pennsylvania*

- Designed and implemented algorithms and simulation tools to detect potential metastable failures, a novel type of failure that indicates vulnerable data centers that could not recover from high traffic loads even after the heavy loads were removed.

A Framework for Verifying Certificate Transparency Log Consistency *September 2023 - Present*
Advisors: Prof. Bruce Maggs, Prof. Michael Reiter & Prof. Anrin Chakraborti - *Duke & University of Illinois Chicago*

- Prototyped a complex protocol that enables clients to report web certificate entries to a semi-honest auditor anonymously. Implemented and evaluated a two-phase prototype that permits clients to reshuffle the reporting database and reveal secrets without compromising anonymity.
- Implemented a fault-tolerant version of the base prototype using the Shamir Secret Sharing scheme, which ensures fault tolerance, accommodating scenarios where certain clients may not participate in the secret revealing phase.
- Identified and resolved overlooked issues, notably the mapping of lengthy web certificates onto the elliptic curve, and the migration of open-source code to more secure implementations.
- Currently developing signature schemes and zero-knowledge proofs to counteract potential risks posed by a malicious auditor, preparing a paper for publication.

Accountable IO on seL4: A Powerful Abstraction on a Verified Kernel *May 2023 - Present*
Advisor: Prof. Matthew Lentz - *Duke University*

- Prototyped the Accountable IO (AIO) on the seL4 microkernel, which addresses the problem of reconciling the I/O software stacks from many mutually distrusting principles on a single device.
- Implemented a detailed formal specification of AIO in Verus/Rust, utilizing the verified attributes of the sel4 microkernel. Engaged in comprehensive explorations of the seL4 kernel, identifying several issues within the microkernel kernel.
- Currently proving the implementation's refinement to the specification, preparing paper for publication.

Work Experience

Ruijin Hospital / Baiyi Data (Shanghai) Inc *August 2021 - August 2022*
Algorithm Engineer

- Adopted and enhanced RITnet for eye disease diagnosis by researching and identifying RITnet as an effective approach.
- Modified RITnet's architecture to align with company requirements using PyTorch and processed new data sets for retraining the model.

Programming Skills

- *Systems Development:* Extensive xv6 programming and developing on seL4 using C
- *Formal Verification:* Written proofs for distributed systems using Dafny and Verus
- *Cryptographic Protocols:* Implemented complex protocols using low-level APIs in Go
- *ML & Deep Learning:* Developed multiple models for Natural Language Processing and Computer Vision with PyTorch
- *Web Development:* Full stack development using React & Nodejs and deployments using Amazon Web Service

Papers

- *Q*ingjie Lu. "TBA." HotOS XX Under Review 2025
- *Q*ingjie Lu. "TBA" CCS Under Review 2025
- *Q*ingjie Lu. "Neural Network-Based Approaches for Aspect-Based Sentiment Analysis." Highlights In Science, Engineering and Technology 12 (2022): 222-229, 2022 4th International Conference on Information Science and Electronic Technology

Certifications

- *A*mazon Web Service (AWS) Certified Solutions Architect Associate *November 2019*
- *A*mazon Web Service (AWS) Certified Developer *November 2019*
- *S*ystems Software Verification Summer School Course from University of Michigan *May - August 2023*

Teaching & Activities

- Teaching Assistant for Software Systems at Univeristy of Pennsylvania *Starting Fall 2025*
- Teaching Assistant for Programming for Data Analytics at Duke Univeristy *Jun. - Aug. 2023*
- Content Creator for Computer Science-related videos on Bilibili, garnering over 750k views *Mar. 2023 - Present*
- Alumni Interviewer of the University of Rochester for undergraduate admissions *Sep. 2021 - Present*
- Taught English and mentored students in Wuhu China, my hometown *May 2018 - Aug. 2019*

Miscellaneous

- *Languages:* Bilingual in Chinese and English; Elementary in German
- *Hobbies:* Classic Guitar, Soccer, Audiobooks, Legal Studies, Taekwondo, History, Poker, Team Fight Tactics, Black Myth: Wukong