Yuncong Hu

Ph.D. Candidate at UC Berkeley

Personal Information

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Research Interests

I am broadly interested in systems security and applied cryptography. My current research focuses on secure decentralized systems and zero-knowledge proofs.

Education

2017-PRESENT Doctor of Philosophy in Computer Science, UC Berkeley
Advisors: Prof. Raluca Ada Popa and Prof. Alessandro Chiesa
Thesis: Decentralized Ledgers: Design and Applications

2017-2020 Master of Science in Computer Science, UC Berkeley
Advisors: Prof. Raluca Ada Popa and Prof. Alessandro Chiesa
Thesis: Broadcast Encryption with Fine-grained Delegation and its Application to IoT

2013-2017 Bachelor in Computer Science, Shanghai Jiao Tong University (SJTU), China
ACM Honored Class, Zhiyuan College

Publications

- *Non-Interactive Differentially Anonymous Router*
(alphabetical order) Benedikt Bünz, *Yuncong Hu*, Shin'ichiro Matsuo and Elaine Shi
In Submission

- *Gemini: Elastic SNARKs for Diverse Environments*
(alphabetical order) Jonathan Bootle, Alessandro Chiesa, *Yuncong Hu* and Michele Orrù
Eurocrypt 2022 (41st Annual International Conference on the Theory and Applications of Cryptographic Techniques)

- *Merkle^2: A Low-Latency Transparency Log System*
Yuncong Hu, Kian Hooshmand, Harika Kalidhindi, Seung Jin Yang, Raluca Ada Popa
S&P 2021 (42nd IEEE Symposium on Security and Privacy)

- *Marlin: Preprocessing zkSNARKs with Universal and Updatable SRS*
(alphabetical order) Alessandro Chiesa, *Yuncong Hu*, Mary Maller, Pratyush Mishra, Noah Vesely, and Nicholas P. Ward
Eurocrypt 2020 (39th Annual International Conference on the Theory and Applications of Cryptographic Techniques)

- *Ghostor: Toward a Secure Data-Sharing System from Decentralized Trust*
(*co-primary authors) *Yuncong Hu**, Sam Kumar*, and Raluca Ada Popa
NSDI 2020 (17th USENIX Symposium on Networked Systems Design and Implementation)

- *JEDI: Many-to-Many End-to-End Encryption and Key Delegation for IoT*
Sam Kumar, *Yuncong Hu*, Michael P Andersen, Raluca Ada Popa, and David E. Culler
USENIX Security 2019 (28th USENIX Security Symposium)

Open Source Projects

- Merkle^2: A Low-Latency Transparency Log System (S&P 2021)

  - A Go library that implements a low-latency transparency log system and a new authenticated data structure. Our system can support 100x more users than prior state-of-the-art key transparency systems.

- Arkworks: An Ecosystem for Developing and Programming with zkSNARKs
  - A modular, coherent Rust ecosystem that provides a low-cost abstraction for developing and programming with zkSNARKs. Our ecosystem has been used in several blockchain companies (such as Aleo) for building applications with zkSNARKs.
  - The Marlin library implements a preprocessing zkSNARK for R1CS with universal and updatable SRS and is publised at Eurocrypt 2020.
  - The Gemini library implements an elastic zkSNARK for R1CS and is publised at Eurocrypt 2022.
- JEDI: Many-to-Many End-to-End Encryption and Key Delegation for IoT (USENIX Security 2019)
  - A Golang library that implements a secure many-to-many messaging protocol with decentralized key delegations for IoT devices. Our library has been used in a decentralized authorization framework that has been running for more than 2 years, with more than 800 IoT devices.

Talks

- **Non-Interactive Differentially Anonymous Router**
  - NTT Research Blockchain Group Meeting 2021
  - NTT Research CIS Lab Meeting 2021
- **Merkle^2: A Low-Latency Transparency Log System**
  - RISELab Retreat Summer 2021
  - S&P 2021 (42nd IEEE Symposium on Security and Privacy)
- **Marlin: Preprocessing zkSNARKs with Universal and Updatable SRS**
  - Eurocrypt 2020 (39th Annual International Conference on the Theory and Applications of Cryptographic Techniques)
- **Ghostor: Toward a Secure Data-Sharing System from Decentralized Trust**
  - RISELab Retreat Winter 2020, Summer 2019, Winter 2019, Summer 2018.
  - Microsoft Research Redmond Cryptography Colloquium 2020.
- **JEDI: Many-to-Many End-to-End Encryption and Key Delegation for IoT**
  - RISELab Retreat Summer 2019, Summer 2018, Winter 2018.
  - Stanford Secure Internet of Things Project 2018.

Internship Experience

Summer 2021	Research intern at NTT Research Lab, advised by Prof. Elaine Shi and Prof. Shin'ichiro Matsuo
Fall 2016	Research intern at Cornell University, advised by Prof. Elaine Shi

Teaching

Fall 2021	Teaching Assistant in Computer Security (CS161), UC Berkeley
Fall 2018	Teaching Assistant in Security in Computer Systems (CS261), UC Berkeley
Spring 2017	Teaching Assistant in Database System, ACM Honored Class, SJTU
Spring 2016	Teaching Assistant in Compiler Design and Implementation, ACM Honored Class, SJTU

Selected Scholarships, Grants, and Awards

- Berkeley Graduate Division Conference Travel Grant, University of California, Berkeley, 2020
- Boot Camp Project Grand Prize Winners (top 1), IC3-Ethereum Crypto Boot Camp and Workshop, 2016
  - Blog and Report
- Hui-Chun Chin and Tsung-Dao Lee Chinese Undergraduate Research Endowment Receiver, Shanghai Jiao Tong University, 2016
- International Collegiate Programming Contest (ACM-ICPC) Asia Regional
  - 10th Place in Taichung site, 2014
  - Gold Medal in Hangzhou site, 2013

Service

External/Sub-Reviewer	SOSP 2021, CRYPTO 2021, TDSC 2021, PKC 2021, S&P 2020, SOSP 2019, OSDI 2018, NSDI 2018
Student volunteer	FCS 2020 UC Berkeley Graduate Application Student Reviewer 2018 UC Berkeley Security Reading Group Organizer 2018