RUNCHAO HAN

25 Exhibition Walk, Clayton VIC 3800, Australia
runchao.han@monash.edu ◇ https://runchao.rocks

EDUCATION

Monash University and CSIRO-Data61 *February 2019 - Present*
Doctor of Philosophy Supervisors: Jiangshan Yu, Joseph Liu and Shiping Chen
Faculty of Information Technology and Distributed Systems Security group

The University of Manchester *August 2017 - September 2018*
MSc Advanced Computer Science Supervisor: Christos Kotselidis
School of Computer Science Overall Percentage: 82/100

Beijing University of Posts and Telecommunications *September 2013 - July 2017*
BSc E-Commerce Engineering with Law Overall Percentage: 83/100

RESEARCH

Analysis and improvement of shard allocation protocols

- We formally define shard allocation protocols for sharded blockchains.
- We evaluate state-of-the-art shard allocation protocols based on our formalisation.
- We design a shard allocation protocol with optimal security and performance guarantee.

On the optionality and fairness of Atomic Swap

- We show the HTLC-based Atomic Swap equals to an American Call Option without premium.
- We evaluate the unfairness of HTLC-based Atomic Swaps using Cox-Ross-Rubinstein model.
- We fix such unfairness of HTLC-based Atomic Swap by paying the premium during the swap.

Challenging the honest majority assumption of permissionless blockchains

- We show the honest majority assumption does not always hold, and existing incentive mechanisms in PoW-based consensus may encourage rational miners to launch 51% attacks.
- We formally model 51% attacks with external mining power as a Markov Decision Process.
- We evaluate such 51% attacks and found that, 51% attacks are feasible and profitable for most mainstream PoW-based blockchains.

WORK EXPERIENCE

Bytom Blockchain, Hangzhou, China September 2018 - January 2019
Intern Blockchain Engineer *Hangzhou, China*

· Developed and refactored the original mining pool of the Bytom blockchain
· Developed the first version of the heterogeneous desktop grid computing platform based on the mining pool and the AI cloud platform
· Research on state-of-the-art technologies to improve the Bytom blockchain (sharding, consensus and P2P) and the cryptocurrency mining pool

CNIC, Chinese Academy of Sciences, Beijing, China June 2017 - July 2017
Intern Researcher *Beijing, China*

· Designed the Solidity smart contracts for electronic licenses library based on Ethereum
· Deployed smart contracts on Docker containers of Geth/TestRPC clients
· Implemented the front-end client of the DApp based on Web3 and Truffle

SELECTED PUBLICATIONS

Full publication list can be found at `https://dblp.org/pers/hd/h/Han:Runchao`.

- Runchao Han, Jiangshan Yu, Ren Zhang. Analysing and Improving Shard Allocation Protocols for Sharded Blockchains. In submission.
- Runchao Han, Zhimei Sui, Jiangshan Yu, Joseph Liu, Shiping Chen. Challenging the honest majority assumption of permissionless blockchains. In submission.
- Runchao Han, Haoyu Lin, Jiangshan Yu. On the optionality and fairness of Atomic Swaps. AFT'19.
- Runchao Han, Nikolaos Foutris and Christos Kotselidis. Demystifying Crypto Mining: Performance Analysis and Optimizations of PoW Algorithms. ISPASS'19.

TECHNICAL STRENGTHS

Programming Languages	C++, Go, Rust, Java, Python
Blockchains	Bitcoin, Ethereum, Monero
Parallel Programming	CUDA, OpenMP, MPI
Cryptography	Libsodium, Ring (Rust), golang/crypto

ADDITIONAL INFORMATION

Github	SebastianElvis
Homepage	runchao.rocks
Wechat	elvisage