Yongrae Jo

Summary

I earned my Ph.D. in Computer Science and Engineering from Pohang University of Science and Technology (POSTECH), Pohang, Republic of Korea, under the supervision of Prof. Chanik Park. My research primarily focuses on high-performance blockchain systems for large-scale transaction processing. Recently, I have been exploring sharding-based hierarchical blockchain architectures and leveraging directed acyclic graph (DAG)-based Byzantine Fault Tolerant (BFT) consensus algorithms.

Education

Pohang University of Science and Technology (POSTECH)
Doctor of Philosophy (Ph.D.) in Computer Science and Engineering
Advisor: Prof. Chanik Park, System Laboratory (SSLab)
Feb. 2017 – Feb. 2025.

Pusan National University
Bachelor of Computer Science and Engineering
Mar. 2012 - Feb. 2017.

Research Papers & Presentations

- **Yongare Jo** and Chanik Park, "A Hierarchical Blockchain supporting Dynamic Locality in Edge Computing by Extending Execute-Order-Validate Architecture", In *Blockchain-Based Pervasive Systems: Theory, Applications, and Challenges* [Special issue]. ACM Distributed Ledger Technologies: Research and Practice, Aug. 2024
- **Yongare Jo** and Chanik Park, "Enhancing Ethereum PoA Clique Network with DAG-based BFT Consensus", 6th IEEE International Conference on Blockchain and Cryptocurrency (ICBC'24), May 27 – May 31, 2024, Dublin, Ireland
- **Yongrae Jo**, Jeonghyun Ma and Chanik Park, Toward Trustworthy Blockchain-as-a-Service with Auditing, 40th IEEE International Conference on Distributed Computing Systems (ICDCS 2020), November 29 – December 1, 2020, Singapore (Acceptance Rate: 18%, 105 out of 584)
- Jeonghyeon Ma, **Yongrae Jo** and Chanik Park, PeerBFT: Making Hyperledger Fabric's Ordering Service Withstand Byzantine Faults, IEEE Access, 2020, doi: 10.1109/ACCESS.2020.3040443
- **Yongrae Jo** and Chanik Park, Codit: Collaborative Auditing for BaaS, 3rd Workshop on Scalable and Resilient Infrastructures for Distributed Ledgers December 9th-13th, 2019 Collocated with Middleware 2019, UC Davis, CA, USA
- **Yongrae Jo** and Chanik Park, A Blockchain Sharding Protocol supporting Dynamic Locality in Mobile Edge Computing, the 13th International Conference on ICT Convergence (ICTC 2022).
- **Yongrae Jo** and Chanik Park, BlockLot: Blockchain based Verifiable Lottery, arXiv preprint arXiv:1912.00642
- **Yongrae Jo** and Chanik Park, MEC-Chain: Scalable Block Chain for Dynamic Locality, Korea Computer Congress (KCC) 2022
- **Yongrae Jo** and Chanik Park, A Novel Transaction Processing in Hierarchical Blockchain for Edge Computing (KCC) 2023
- Haesung Park, **Yongrae Jo**, and Chanik Park, B-Lottery: Blockchain based lottery system with flexible random seed, Korea Computer Congress (KCC) 2019
- **Yongrae Jo** and Chanik Park, A Novel Cross-Shard Protocol for Hierarchical State Sharding Blockchain, The 29th ACM Symposium on Operating System Principles, Poster Presentation, October 23 - October 26, 2023, Koblenz
- **Yongrae Jo** and Chanik Park, Delegated Byzantine Fault Tolerance Using Trusted Execution Environment, Poster Presentation, 27th USENIX Security Symposium (USENIX Security '18)
- Jeonghyeon Ma, **Yongrae Jo**, and Chanik Park, Redesigning Hyperledger Fabric Blockchain with Append-only Ledger, Poster Presentation, 13th USENIX Symposium on Operating Systems Design and Implementation (USENIX OSDI'18)

Dissertations

A Sharding-based Hierarchical Blockchain for Large-Scale Transaction Processing
- o Ph.D Thesis, Pohang University of Science and Technology

Developing Arduino Based Synthesizer with Interactive User Interface and Communication
- o B.S. Thesis, Pusan National University

Teaching Experiences

- Teaching Assistant, Operating Systems, CSED312, Sep. 2018 – Dec. 2018
- Teaching Assistant, Microprocessor Architecture and Programming, CSED211, Sep. 2017 – Dec. 2017

Patents

- Chanik Park, **Yongrae Jo**, System of speculative transaction execution for Blockchain scalability and method thereof, Korea Patent, 10-2021-0019754 (*Registered*)
- Chanik Park, **Yongrae Jo**, Apparatus and method of state reshard protocol for dynamic locality in sharded blockchain platforms, Korea Patent, 10-2022-0142805 (*Pending*)
- Chanik Park, **Yongrae Jo**, System of Blockchain Framework for Mobile Edge Computing and Method thereof, Korea Patent, 10-2021-0191559 (*Registered*)
- Chanik Park, **Yongrae Jo**, Blockchain Network System for Blockchain Service Provider and Method for Blockchain Service Provider, Korea Patent, 10-2022-0023611 (*Registered*)
- Chanik Park, **Yongrae Jo**, Apparatus and Methods for Verifiable Lottery, Korea Patent, 10-2017-0170038 (*Registered*)
- Chanik Park, **Yongrae Jo**, Blockchain apparatus and method for mobile edge computing, US Patent, US20230208659A1 (*Pending*)

Project Experiences

Core Technologies for 5G-Aware Blockchain Networks
Design of hierarchical blockchain for mobile edge computing environment in 5G network. Funded by Institute for Information & Communications Technology Planning & Evaluation (IITP) in South Korea.   Apr. 2020 - Dec. 2021

Development of High-performance and High-reliable Blockchain for Distributed Autonomous IoT Platform
Research on Byzantine fault tolerance (BFT) in distributed system to build an efficient consensus algorithm for permissioned blockchain. Apr. 2017 - Dec. 2018

Core Technologies for Hybrid P2P Network-based Blockchain Services
Design of edge computing-enabled blockchain platform and supporting Ethereum-compatible blockchain. Funded by Institute for Information & Communications Technology Planning & Evaluation (IITP) in South Korea Apr. 2021 - Dec. 2025

Development of Big Blockchain Data Highly Scalable Distributed Storage Technology for Increased Applications in Various Industries
Design of auditing services for blockchain providers. Funded by Institute for Information & Communications Technology Planning & Evaluation (IITP) in South Korea Apr. 2021 - Dec. 2025

Volunteer

- Reviewer, IEEE Transactions on Dependable and Secure Computing (TDSC)
- Reviewer, IEEE Access

Technical Skills & Languages

- Blockchain, Hyperledger Fabric, Docker, Operating Systems, Golang, Python, GNU/Linux
- English (Intermediary), Korean (Native)

Honors

- LINE X KIISE Blockchain Software Contest (won the third prize). In this contest, I demonstrated *BlockLot: Blockchain-based verifiable lottery application using Hyperledger/Fabric*. The contest is supported by LINE Corp.