Zicong (Joey) Hong

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Education

The Hong Kong Polytechnic University | *Hong Kong*
PH.D. STUDENT IN COMPUTER SCIENCE | *09/2020 - 07/2024 (expected)*
- Advisor: Prof. Song Guo

ETH Zürich | *Switzerland*
VISITING SCHOLAR | *04/2023-10/2023*
- Advisor: Prof. Roger Wattenhofer

Sun Yat-sen University | *China*
BACHELOR OF ENGINEERING IN SOFTWARE ENGINEERING | *09/2015-07/2020*
- Advisor: Prof. Wuhui Chen

Research Interests

I am currently working on an open and decentralized AI infrastructure, supported by massive distributed cloud, edge, and end computing nodes, capable of serving AI in a cost-effective and efficient manner, based on **Systems for AI** and **Blockchain** technologies. More concretely, I have the two following design objectives.

1. **Affordable**: Considering the high computational intensity and memory consumption of serving AI in the era of large models, I am developing "affordable AI" from algorithm to system to hardware optimization as follows. From the algorithm aspect, I am developing an elastic model-serving framework for queries with varying computational effort, accuracy, and latency requirements. From the system aspect, I am developing a new serverless AI system to achieve a pay-as-you-go business model for AI services. From the hardware aspect, I am developing a heterogeneous AI computing system that integrates different AI computing nodes (especially different brands such as NVIDIA, Apple, Huawei).

2. **Trustworthy**: I am developing "trustworthy AI" by running the AI serving process (e.g., data sharing and inference) on blockchains. Users concerned about the AI infrastructure being biased or cheating could benefit from this. Considering the growing popularity of AI infrastructure nodes and the logic complexity of AI serving, the newly proposed blockchain architecture, unlike traditional blockchains, can accommodate millions of participants, protect user privacy, and support rich governance functionalities based on some novel techniques for blockchain sharding, off-chain, roll-up, and cryptography algorithms.

Awards, Fellowships, & Grants

2020-2024	**Hong Kong Ph.D. Fellowship (Top Fellowship in HK)**, Hong Kong Research Grants Council
2019	**Kwang-Hua Fellowship**, Kwang-Hua Educational Foundation
2023	**The Most Appreciated Teaching Assistant Award**, The Hong Kong Polytechnic University
2022	**2nd Runner-Up Award in Huawei Global Developer Competition for APAC**, Huawei
2020	**Best Paper Runner-up Award**, the 49th International Conference on Parallel Processing
2020	**Outstanding Thesis Award (Top 3.98%)**, Sun Yat-sen University
2019	**First Academic Innovation Scholarship (Top 3%)**, Sun Yat-sen University

Publications

CONFERENCE

[EUROSYS] **Zicong Hong***, Jian Lin*, Song Guo, Sifu Luo, Wuhui Chen, Roger Wattenhofer, and Yue Yu (*The first two authors have equal contribution). "*Optimus: Warming Serverless ML Inference via Inter-Function Model Transformation*". European Conference on Computer Systems, 2024.

[INFOCOM] Jinyu Chen, Wenchao Xu, **Zicong Hong***, Song Guo, Haozhao Wang, Jie Zhang and Deze Zeng (*mentoring author). "*OTAS: An Elastic Transformer Serving System via Token Adaptation*". IEEE International Conference on Computer Communications, 2024.

[WWW] Enyuan Zhou, Song Guo, Zhixiu Ma, **Zicong Hong***, Tao Guo and Peiran Dong (*mentoring author). "*Poisoning Attack on Federated Knowledge Graph Embedding*". The Web Conference, 2024.

[VLDB] Enyuan Zhou, Song Guo, **Zicong Hong**, Christian S Jensen, Yang Xiao, Dalin Zhang, Jinwen Liang, and Qingqi Pei. "*VeriDKG: A Verifiable SPARQL Query Engine for Decentralized Knowledge Graphs*". International Conference on Very Large Data Bases, 2024.

[NDSS] Jianting Zhang, Wuhui Chen, Sifu Luo, Tiantian Gong, **Zicong Hong**, and Aniket Kate. "*Front-running Attack in Distributed Sharded Ledgers and Fair Cross-shard Consensus*". The Network and Distributed System Security Symposium, 2024.

[ICDE] Wuhui Chen, Ding Xia, Zhongteng Cai, Hong-Ning Dai, Jianting Zhang, **Zicong Hong**, Junyuan Liang, and Zibin Zheng. "*Porygon: Scaling Blockchain via 3D Parallelism*". The IEEE International Conference on Data Engineering, 2024.

[VLDB] **Zicong Hong**, Song Guo, Enyuan Zhou, Wuhui Chen, Huawei Huang, and Albert Zomaya. "*GriDB: Scaling Blockchain Database via Sharding and Off-Chain Cross-Shard Mechanism*". International Conference on Very Large Data Bases, 2023.

[INFOCOM] **Zicong Hong**, Song Guo, Enyuan Zhou, Jianting Zhang, Wuhui Chen, Jinwen Liang, Jie Zhang, and Albert Zomaya. "*Prophet: Conflict-Free Sharding Blockchain via Byzantine-Tolerant Deterministic Ordering*". IEEE International Conference on Computer Communications, 2023.

[DSN] **Zicong Hong**, Song Guo, Rui Zhang, Peng Li, Yufeng Zhan, and Wuhui Chen. "*CYCLE: Sustainable Off-Chain Payment Channel Network with Asynchronous Rebalancing*". IEEE/IFIP International Conference on Dependable Systems and Networks, 2022.

[SoCC] Wuhui Chen, Xiaoyu Qiu, **Zicong Hong**, Zibin Zheng, Hong-Ning Dai, and Jianting Zhang. "*Proactive Look-Ahead Control of Transaction Flows for High-Throughput Payment Channel Network*". ACM Symposium on Cloud Computing, 2022.

[ICDCS] Leijie Wu, Song Guo, Yi Liu, **Zicong Hong**, Yufen Zhan, and Wenchao Xu. "*Sustainable Federated Learning with Long-term Online VCG Auction Mechanism*". International Conference on Distributed Computing Systems, 2022.

[INFOCOM] **Zicong Hong**, Song Guo, Peng Li, and Wuhui Chen. "*Pyramid: A Layered Sharding Blockchain System*". IEEE International Conference on Computer Communications, 2021.

[ICDCS] Yi Liu, Leijie Wu, Yufeng Zhan, Song Guo, and **Zicong Hong**. "*Incentive-Driven Long-term Optimization for Edge Learning by Hierarchical Reinforcement Mechanism*". International Conference on Distributed Computing Systems, 2021.

[WCNCW] Zhen Zhang, Qingqing Li, Wuhui Chen, and **Zicong Hong**. "*Distributed resource allocation for NOMA-based mobile edge computing with content caching*". IEEE Wireless Communications and Networking Conference Workshops, 2021.

[ICPP] Jianting Zhang*, **Zicong Hong***, Yufen Zhan, Song Guo, and Wuhui Chen (*The first two authors have equal contribution). "*SkyChain: A Deep Reinforcement Learning-Empowered Dynamic Sharding Blockchain System*". International Conference on Parallel Processing (**Best paper runner-up prize**), 2020.

[WOWMOM] Hui Lin, Zetao Yang, **Zicong Hong**, Shenghui Li, and Wuhui Chen. "*Smart contract-based hierarchical auction mechanism for edge computing in blockchain-empowered IoT*". IEEE 21st International Symposium on A World of Wireless, Mobile and Multimedia Networks, 2020.

JOURNAL

[OJCS] Jiahang Zhou, Yanyu Chen, **Zicong Hong**, Wuhui Chen, Yue Yu, Tao Zhang, Hui Wang, Chuanfu Zhang, and Zibin Zheng. "*Training and Serving System of Foundation Models: A Comprehensive Survey*". IEEE Open Journal of the Computer Society, 2024.

[TC] Jianting Zhang, Wuhui Chen, **Zicong Hong**, Gang Xiao, Linlin Du, and Zibin Zheng. "*Efficient Execution of Arbitrarily Complex Cross-shard Contracts for Blockchain Sharding*". IEEE Transactions on Computers, 2024.

[TMC] Yi Liu, Song Guo, Yufeng Zhan, Leijie Wu, **Zicong Hong**, and Qihua Zhou. "*Chiron: A Robustness-Aware Incentive Scheme for Edge Learning Via Hierarchical Reinforcement Learning*". IEEE Transactions on Mobile Computing, 2024.

[NETWORK] **Zicong Hong**, Xiaoyu Qiu, Jian Lin, Wuhui Chen, Yue Yu, Hui Wang, Song Guo, and Wen Gao. "*Intelligence-Endogenous Management Platform for Computing and Network Convergence*". IEEE Network, 2023.

[TKDE] Enyuan Zhou, **Zicong Hong**, Yang Xiao, Dongxiao Zhao, Qingqi Pei, Song Guo, and Rajendra Akerkar. "*MSTDB: A Hybrid Storage-empowered Scalable Semantic Blockchain Database*". IEEE Transactions on Knowledge and Data Engineering, 2023.

[TPDS] Zhongteng Cai, Junyuan Liang, Wuhui Chen, **Zicong Hong**, Jianting Zhang, Hong-Ning Dai, and Zibin Zheng. "*Benzene: Scaling Blockchain with Cooperation-Based Sharding*". IEEE Transactions on Parallel and Distributed Systems, 2023.

[TMC] Leijie Wu, Song Guo, **Zicong Hong**, Yi Liu, Wenchao Xu, and Yufeng Zhan. "*Long-Term Adaptive VCG Auction Mechanism for Sustainable Federated Learning With Periodical Client Shifting*". IEEE Transactions on Mobile Computing, 2023.

[JSAC] **Zicong Hong**, Song Guo, and Peng Li. "*Scaling Blockchain via Layered Sharding*". IEEE Journal on Selected Areas in Communications, 2022.

[NETWORK] Leijie Wu, Song Guo, Junxiao Wang, **Zicong Hong**, Jie Zhang, and Yaohong Ding, "*Federated Unlearning: Guarantee the Right of Clients to Forget*". IEEE Network, 2022.

[TSC] Ting Cai, **Zicong Hong**, Shuo Liu, Wuhui Chen, Zibin Zheng, and Yang Yu. "*SocialChain: Decoupling Social Data and Applications to Return Your Data Ownership*". IEEE Transactions on Services Computing, 2021.

[TETC] Yufeng Zhan, Jie Zhang, **Zicong Hong**, Leijie Wu, Peng Li, and Song Guo. "*A Survey of Incentive Mechanism Design for Federated Learning*". IEEE Transactions on Emerging Topics in Computing, 2021.

[IOTJ] Weikun Zhang, **Zicong Hong**, and Wuhui Chen. "*Hierarchical Pricing Mechanism with Financial Stability for Decentralized Crowdsourcing: A Smart Contract Approach*". IEEE Internet of Things Journal, 2020.

[TVT] Xiaoyu Qiu, Luobin Liu, Wuhui Chen, **Zicong Hong**, Zibin Zheng. "*Online Deep Reinforcement Learning for Computation Offloading in Blockchain-Empowered Mobile Edge Computing*". IEEE Transactions on Vehicular Technology (**ESI highly cited paper**), 2019.

[IOTJ] Wuhui Chen, Zhen Zhang, **Zicong Hong**, Chuan Chen, Jiajing Wu, Sabita Maharjan, Zibin Zheng, and Yan Zhang. "*Cooperative and Distributed Computation Offloading for Blockchain-Empowered Industrial Internet of Things*". IEEE Internet of Things Journal, 2019.

[TPDS] **Zicong Hong**, Wuhui Chen, Huawei Huang, Song Guo, and Zibin Zheng. "*Multi-hop Cooperative Computation Offloading for Industrial IoT-Edge-Cloud Computing Environments*". IEEE Transactions on Parallel and Distributed Systems, 2019.

[TVT] **Zicong Hong**, Huawei Huang, Song Guo, Wuhui Chen, and Zibin Zheng. "*QoS-Aware Cooperative Computation Offloading for Robot Swarms in Cloud Robotics*". IEEE Transactions on Vehicular Technology, 2019.

Teaching Experience

Spring'24	**Computer Systems Security**, Teaching Assistant
Spring'23	**Emerging Topics in Fintech**, Teaching Assistant
Fall'22	**Programming Fundamentals and Applications**, Teaching Assistant
Spring'22	**Big Data Analytics**, Teaching Assistant
Fall'21	**Programming Fundamentals**, Teaching Assistant
Spring'21	**Big Data Analytics**, Teaching Assistant
Fall'20	**Object-oriented Programming**, Teaching Assistant

Outreach & Professional Development

SERVICE

2023-Now	**Asia-Pacific Artificial Intelligence Association (AAIA), Singapore**, Founding Secretary

PEER REVIEW

IEEE Transactions on Mobile Computing, IEEE Transactions on Green Communications and Networking, IEEE Transactions on Vehicular Technology, IEEE Transactions on Industrial Informatics, IEEE Transactions on Industrial Informatics, ...

Skill

C++/C, Java, Golang, Python, Matlab, ...