

CIRRUS (FANGYU) GAI

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EMPLOYMENT

Babylon Labs <i>Staff Research Engineer, full-time</i>	<i>May 2022 - Present</i> <i>Remote</i>
Alibaba DAMO Academy <i>Research & Development Intern, full-time</i>	<i>Apr. 2021 - Apr. 2022</i> <i>Hangzhou, China</i>
Hangzhou Qulian Technology <i>Research & Development Intern, full-time</i>	<i>Sep. 2020 - Apr. 2021</i> <i>Hangzhou, China</i>
Dapper Labs <i>Research & Development Intern, part-time</i>	<i>June 2019 - Mar. 2020</i> <i>Vancouver, Canada</i>

EDUCATION

University of British Columbia <i>Ph.D. in Electrical Engineering</i> Doctoral Student member of Blockchain@UBC Advisor: Chen Feng, also closely working with Ivan Beschastnikh Dissertation: On the Performance of Byzantine Fault-tolerant Consensus in the Blockchain Era	<i>Sep. 2018 - Sep. 2022</i> <i>Kelowna & Vancouver, Canada</i>
Beijing Institute of Technology <i>B.Eng. in Software Engineering</i> Advisor: Zhiqiang Li, Hongchen Guo Dissertation: Enhance Adaboost Algorithm by Integrating LDA Topic Model <i>Ranking: 2nd out of 39 in the direction of Information Security</i>	<i>Sep. 2011 - June 2015</i> <i>Beijing, China</i>

RESEARCH INTERESTS

Blockchain, Databases, Distributed Systems, Internet of Things

EXPERIENCE

Babylon Labs <i>Staff Research Engineer</i> <ul style="list-style-type: none">Research and development of the Babylon node and auxiliary programs including finality provider, vigilante, and indexer.Technical lead of Babylon BitVM bridge. Website: https://babylonlabs.io. Project link: https://github.com/babylonlabs-io.	<i>May 2022 - Present</i> <i>remote</i>
Alibaba DAMO Academy <i>Research & Development Intern. Mentor: Sheng Wang.</i> <ul style="list-style-type: none">Research on scaling BFT consensus protocols by designing a robust shared mempool. Project link: https://github.com/gitferry/bamboo-stratus.Research on enhancing the centralized ledger database (LedgerDB) with ubiquitous verification abilities. Project link: https://www.alibabacloud.com/product/ledgerdb.	<i>Apr. 2021 - Apr. 2022</i> <i>Hangzhou, China</i>
Hangzhou Qulian Technology <i>Research & Development Intern. Mentor: Hao Duan.</i>	<i>Sep. 2020 - Apr. 2021</i> <i>Hangzhou, China</i>

- Research on the performance of state-of-the-art BFT protocols for permissioned blockchains.
Project link: <https://github.com/gitferry/bamboo>.
- Re-designed and implemented some of the core components (e.g., Raft and Mempool) of the consensus services in Hyperchain.

Dapper Labs

Research & Development Intern. Mentor: Alexander Hentschel.

June 2019 - Mar. 2020

Vancouver, Canada

- Explored the wide design space of blockchain consensus protocols, e.g., HotStuff, Algorand.
- Built demos of the HotStuff BFT protocol and evaluated its performance.
- Participated in building the consensus node of the Flow blockchain.
Project link: <https://github.com/onflow/flow-go>.

University of British Columbia

Teaching & Research Assistant

Winter 2018 & Winter 2020

Vancouver, Canada

- ENGR 453: Internet of Things.
- ENGR 464: Distributed Ledger Technologies with Engineering Applications.

TECHNICAL STRENGTHS

Computer Languages

Golang, Rust, Python

Protocols & Blockchain Platform

Bitcoin, Cosmos, BitVM, CometBFT, HotStuff, etcd

Tools

Vim, git, Markdown, L^AT_EX

LANGUAGES

Mandarin (Native), English (Professional), Japanese (Basic)

SELECTED PUBLICATION

Conference Papers

- C10 Ertem Nusret Tas, David Tse, **Fangyu Gai**, Sreeram Kannan, Mohammad Ali Maddah-Ali, Fisher Yu, “Bitcoin-Enhanced Proof-of-Stake Security: Possibilities and Impossibilities” in *Proc. IEEE S&P, 2023*. **CCF-A**.
- C9 **Fangyu Gai**, Jianyu Niu, Ivan Beschastnikh, Chen Feng, Sheng Wang, “Scaling Blockchain Consensus via a Robust Shared Mempool” in *Proc. IEEE ICDE, 2023*. **CCF-A**.
- C8 Xinying Yang, Sheng Wang, Feifei Li, Yuan Zhang, Wenyan Yan, **Fangyu Gai**, Benquan Yu, Likai Feng, Qun Gao, and Yize Li, “Ubiquitous Verification in Centralized Ledger Database” in *Proc. IEEE ICDE, 2022*. **CCF-A**.
- C7 Hanzheng Lyu, Jianyu Niu, **Fangyu Gai**, and Chen Feng, “Publish or Perish: Defending Withholding Attack in Dfinity Consensus” in *Proc. IEEE MSN, 2021 (best paper award)*. **CCF-C**.
- C6 **Fangyu Gai**, Jianyu Niu, Seyed Ali Tabatabaee, Chen Feng, and Mohammad Mussadiq Jalalzai, “Cumulus: A Secure BFT-based Sidechain for Off-chain Scaling” in *Proc. IEEE IWQoS, 2021*. **CCF-B**.
- C5 **Fangyu Gai**, Ali Farahbakhsh, Jianyu Niu, Chen Feng, Ivan Beschastnikh, and Hao Duan, “Dissecting the Performance of Chained-BFT” in *Proc. IEEE ICDCS, 2021*. **CCF-B**.
- C4 Jianyu Niu, **Fangyu Gai**, Mohammad Mussadiq Jalalzai, and Chen Feng, “On the Performance of Pipeline HotStuff” in *Proc. IEEE INFOCOM, 2021*. **CCF-A**.
- C3 Jianyu Niu, Ziyu Wang, **Fangyu Gai**, and Chen Feng, “Incentive Analysis of Bitcoin-NG, Revisited” in *Proc. IFIP WG_{7.3} Performance, 2020*. **CCF-B**.
- C2 **Fangyu Gai**, Baosheng Wang, Wenping Deng, and Wei Peng, “Proof of Reputation: A Reputation-Based Consensus Protocol for Peer-to-Peer Network” in *Proc. DASFAA, 2018*. **CCF-B**.

- C1 Dongxing Li, Wei Peng, Wenping Deng, **Fangyu Gai**, “A Blockchain-Based Authentication and Security Mechanism for IoT” in *Proc. ICCCN, 2018*. **CCF-C**.

Journal Papers

- J4 Mohammad Jalalzai, Jianyu Niu, Chen Feng, and **Fangyu Gai**, “Fast-Hotstuff: A Fast and Resilient Hotstuff Protocol” in *IEEE TDSC, 2024*. **CCF-A**.
- J3 **Fangyu Gai**, Jianyu Niu, Seyed Ali Tabatabaee, Chen Feng, and Mohammad Mussadiq Jalalzai, “A Secure Sidechain for Decentralized Trading in Internet of Things” in *IEEE IoT Journal, 2024*. **JCR-Q1**.
- J2 Jianyu Niu, **Fangyu Gai**, and Chen Feng, “Crystal: Enhance Blockchain Mining Transparency with Quorum Certificat” in *IEEE TDSC, 2023*. **CCF-A**.
- J1 Jianyu Niu, Ziyu Wang, **Fangyu Gai**, and Chen Feng, “Incentive Analysis of Bitcoin-NG, Revisited” in *PEVA, 2020*. **CCF-B**.