Songyuan **Li**

Ph.D. Student in Computer Science · University of Exeter, United Kindom

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Biography

Mr. Songyuan Li is currently working toward the Ph.D. degree in Computer Science with the College of Engineering, Mathematics and Physical Sciences at the University of Exeter, United Kingdom, supervised by Dr. Jia Hu and Prof. Geyong Min.

Before that, he received the B.Eng. and M.Eng. degrees in Computer Science and Technology from the Beijing University of Posts and Telecommunications, China, in 2018 and 2021, respectively. During his Master's career, he worked with Prof. Jiwei Huang and Prof. Bo Cheng, at the State Key Laboratory of Networking and Switching Technology, Beijing, China.

Thus far, he has published articles in several international journals and conference proceedings, including IEEE TCCN, IEEE TNSM, IJWGS, PPNA, IEEE ICWS, IEEE SCC, IEEE ISPA, etc.

Research Interests

- Distributed Systems and Networks
- Distributed Machine Learning
- Services/Cloud/Edge Computing
- QoS Modeling and Optimization

Education

Ph.D. in Computer Science — *September 2021 - Present*

College of Engineering, Mathematics and Physical Sciences, University of Exeter — *Exeter, U.K.*

- Supervisors: Dr. Jia Hu, and Prof. Geyong Min.

M.Eng. in Computer Science and Technology — *September 2018 - June 2021*

State Key Laboratory of Networking and Switching Technology, Beijing University of Posts and Telecommunications — *Beijing, Mainland China*

- Supervisors: Prof. Jiwei Huang, and Prof. Bo Cheng.
- Thesis: "QoS-Aware Service Resource Scheduling and Optimization".

B.Eng. in Computer Science and Technology — *September 2014 - June 2018*

School of Computer Science, Beijing University of Posts and Telecommunications — *Beijing, Mainland China*

- Cumulative Overall GPA: 85/100; Major GPA: 88/100.
- Thesis: "QoS Evaluation and Optimization for IoT Services in Edge Computing Architecture".

Research Experience

High Performance Computing and Networking (HPCN) Research Group — *September 2021 - Present*

Research Assistant, University of Exeter — *Exeter, U.K.*

- To be declared.

State Key Laboratory of Networking and Switching Technology — *March 2016 - August 2021*

Research Assistant, Beijing University of Posts and Telecommunications — *Beijing, Mainland China*

- QoS-aware service selection/composition based on service ecosystem.
- Market-oriented resource pricing, and demand allocation in cloud environments.
- QoS/QoE-aware decentralized resource management and task scheduling in IoT-edge-cloud systems.

Research Projects

Performance Evaluation and Optimization of IoT Service System based on Edge Computing Architecture

National Natural Science Foundation of China (No. 61972414) — *January 2020 - Present*

- Adopt the potential game theory to solve the edge resource allocation problem with QoE maximization in a decentralized manner.
- Study the dynamic QoS-aware task scheduling and resource management problem in mobile edge computing, through designing an efficient optimization algorithm with LP relaxation techniques.

Self-Adaptive Scheme of Software Ecosystem with Collaborative Learning among Humans, Machines and Services

National Key Research and Development Program of China (No. 2018YFB1003804) *October 2018 - Present*

- Propose a price-incentive resource auction mechanism, with the objective of stimulating maximum users willing to purchase cloud resources.
- Design a market-oriented cloud pricing strategy which solves the resource pricing and demand allocation for revenue maximization.
- Develop a QoS-aware concurrent service selection approach, with the max-min fairness across multiple service requests achieved.

QoS Evaluation Research for Large-Scale Dynamic Service Environment *March 2016 - December 2018*

National Natural Science Foundation of China (No. 61502043)

- Design queueing network models for QoS evaluation of IoT services in edge-cloud systems.
- Conduct reliability-aware QoS evaluation for recoverable IoT edge services using the modeling techniques of generalized stochastic Petri nets.

Service Composition in IoT Environment *March 2016 - December 2018*

Beijing Natural Science Foundation (No. 4162042)

- Manipulate the Markov-Decision-Process-based resource allocation and task scheduling in edge computing paradigm weighing energy costs against QoS requirements.

Honours & Awards

- **Outstanding Master Dissertation Award (top 1%)** *2021*
  Beijing University of Posts and Telecommunications, China
- **Outstanding Postgraduate Student Award (top 5%)** *2021*
  Beijing Municipal Education Commission, China
- **First-Class Postgraduate Scholarship** *2018, 2019, 2020*
  Beijing University of Posts and Telecommunications, China
- **China National Scholarship (top 2%)** *2019*
  Ministry of Education of the P.R. China
- **Outstanding Postgraduate Student Award** *2019*
  State Key Laboratory of Network and Switching Technology, Beijing University of Posts and Telecommunications, China
- **Outstanding Bachelor Dissertation Award (top 3%)** *2018*
  Beijing University of Posts and Telecommunications, China
- **First Prize in China Undergraduate Mathematical Contest in Modeling (Beijing Region)** *2016*

Publications

Journal Publications

J5. **[TCCN'21] S. Li**, J. Huang, J. Hu, and B. Cheng, **QoE-DEER: A QoE-Aware Decentralized Resource Allocation Scheme for Edge Computing**, IEEE Transactions on Cognitive Communications and Networking, *Early Access, accepted on September 29, 2021*.

J4. **[TNSM'21] S. Li**, J. Huang, and B. Cheng, **Resource Pricing and Demand Allocation for Revenue Maximization in IaaS Clouds: A Market-Oriented Approach**, IEEE Transactions on Network and Service Management, *vol. 18, no. 3, pp. 3460-3475, 2021*.

J3. **[TNSM'21] S. Li**, J. Huang, and B. Cheng, **A Price-Incentive Resource Auction Mechanism Balancing the Interests Between Users and Cloud Service Provider**, IEEE Transactions on Network and Service Management, *vol. 18, no. 2, pp. 2030-2045, 2021*.

J2. **[PPNA'20]** J. Huang, **S. Li**, and Y. Chen, **Revenue-Optimal Task Scheduling and Resource Management for IoT Batch Jobs in Mobile Edge Computing**, Peer-to-Peer Networking and Applications, *vol. 13, no. 5, pp. 1776-1787, 2020*.

J1. **[IJWGS'18]** J. Huang, **S. Li**, Y. Chen, and J. Chen, **Performance Modelling and Analysis for IoT Services**, International Journal of Web and Grid Services, *vol. 14, no. 2, pp. 146-169, 2018*.

Conference Publications

C3. **[ICWS'19] S. Li**, J. Huang, B. Cheng, L. Cui and Y. Shi, **FASS: A Fairness-Aware Approach for Concurrent Service Selection with Constraints**, Proc. of IEEE International Conference on Web Services, *July 8-13, 2019, Milan, Italy*.

C2. **[ISPA'17] S. Li**, and J. Huang, **Energy Efficient Resource Management and Task Scheduling for IoT Services in Edge Computing Paradigm**, Proc. of IEEE International Symposium on Parallel and Distributed Processing with Applications, *December 12-15, 2017, Guangzhou, China*.

C1. **[SCC'17] S. Li**, and J. Huang, **GSPN-Based Reliability-Aware Performance Evaluation of IoT Services**, Proc. of IEEE International Conference on Service Computing, *June 25-30, 2017, Honolulu, Hawaii, USA*.

Professional Services

Technical Program Committee

- IEEE International Conference on Smart Computing, Networking and Services, SmartCNS 2021
- International Conference on Computer Engineering and Artificial Intelligence, ICCEAI 2021

Journal Reviewer

- IEEE Access, 2021, 2020
- Scientific Programming, 2021, 2020
- Behaviour & Information Technology, 2020

Conference Reviewer

- IEEE International Conference on Ubiquitous Computing and Communications, IUCC 2021
- IEEE International Conference on Data Science and Computational Intelligence, DSCI 2021
- IEEE International Conference on Electrical, Computer, and Energy Technologies, ICECET 2021
- IEEE International Conference on Electrical, Computer, Communications, and Mechatronics Engineering, ICECCME 2021
- EAI International Conference on Collaborative Computing, CollaborateCom 2020
- IEEE Vehicular Technology Conference, VTC2020-Fall