Li (Lilly) Wu

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140 Governors Dr, Amherst, MA 01003

Research Interest

My research focuses on enhancing the resilience and sustainability of large-scale distributed systems, including cloud computing, edge computing, and cyber-physical systems, with a particular emphasis on artificial intelligence (AI) workloads and microservices.

Academic Experience

- **University of Massachusetts Amherst** *Since 06/2023*
  Postdoctoral Associate, College of Information and Computer Sciences (CICS)
  Advisor: Prashant Shenoy
  ◦ Designing systems for failure-resilient model-serving in edge computing.
  ◦ Developing resource management techniques for sustainable computing.
- **Technical University of Berlin** *2018 – 2021*
  Graduate Research Assistant, Faculty of Electrical Engineering and Computer Science (EECS)
  Advisor: Odej Kao **Co-advisors:** Johan Tordsson, Erik Elmroth
  ◦ Developed methods for automatic performance diagnosis and recovery in cloud microservices.

Education

- **Technical University of Berlin** *2018 – 2021*
  Ph.D. in Computer Science
- **Southeast University** *2012 – 2015*
  M.S. in Information and Communication Engineering
- **Hohai University** *2008 – 2012*
  B.S. in Telecommunication Engineering
  ◦ Honors: *Top 1% of Class*, Best Thesis Award

Awards and Honors

- Featured Interview on GREEN Internet, One World Network *2024*
- **Marie Skodowska-Curie PhD Fellowship**, European Commission (Grant No. 765452) *2018 – 2021*
- Best of IBMer: Best new SRE of Cloud Foundation Services, IBM *2017*
- SEU Alumnus Scholarship for Outstanding Students *2014*
- 3rd Prize, National Graduate Student Mathematical Contest in Modeling *2013*
- Best Bachelor Thesis Award (Top 1%) *2012*
- **National Scholarship (Top 0.2% nationwide)**, Chinese Ministry of Education *2011*
- 2nd Prize, Physical and Experimental Science Technology Innovation *2011*
- 1st Prize, TI Cup Electronic Design Competition *2010*
- 1st Prize, Physics Contest, HHU *2010*
- 1st Prize, Mathematics Contest, HHU *2010*
- Academic Excellence and Innovation Scholarships (4 years), HHU *2008 – 2012*

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, P=PREPRINT, T=THESIS

[P.1] Hetvi Shastri, Walid A. Hanafy, **Li Wu**, David Irwin, Mani Srivastava, and Prashant Shenoy. *"LLM-Driven Auto Configuration for Transient IoT Device Collaboration."* arXiv preprint arXiv:2507.03064 (2025).

[P.2] Walid A. Hanafy, **Li Wu**, David Irwin, and Prashant Shenoy. *"CarbonFlex: Enabling Carbon-aware Provisioning and Scheduling for Cloud Clusters."* arXiv preprint arXiv:2505.18357 (2025).

[P.3] **Li Wu**, Walid A. Hanafy, Tarek Abdelzaher, David Irwin, Jesse Milzman, and Prashant Shenoy. *"FailLite: Failure-Resilient Model Serving for Resource-Constrained Edge Environments."* arXiv preprint arXiv:2504.15856 (2025).

[P.4] Ahmed, Arif, HamidReza Arkian, *et al.*, including **Li Wu**. *"Fog Computing Applications: Taxonomy and Requirements." arXiv* preprint arXiv:1907.11621 (2019). (Equal contribution)

[C.1] Hetvi Shastri, Walid A. Hanafy, **Li Wu**, David Irwin, Mani Srivastava, and Prashant Shenoy. *"Rethinking Collaboration Among Mobile Devices in IoT Environments."* In Proceedings of the 23rd ACM Conference on Embedded Networked Sensor Systems (SenSys), pp. 676-677. 2025.

[C.2] **Li Wu**, Walid A. Hanafy, Abel Souza, Khai Nguyen, Jan Harkes, David Irwin, Mahadev Satyanarayanan, and Prashant Shenoy. *"CarbonEdge: Leveraging Mesoscale Spatial Carbon-Intensity Variations for Low Carbon Edge Computing."* In Proceedings of the 34th ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC), *To appear*. 2025.

[C.3] Diptyaroop Maji, Walid A. Hanafy, **Li Wu**, David Irwin, Ramesh Sitaraman, and Prashant Shenoy. *"Data Centers Carbon Emissions at Crossroads: An Empirical Study."* In HotCarbon Workshop on Sustainable Computer Systems (HotCarbon), *To appear*. 2025.

[C.4] **Li Wu**, Walid A. Hanafy, Abel Souza, Tarek Abdelzaher, Gunjan Verma, and Prashant Shenoy. *"Enhancing Resilience in Distributed ML Inference Pipelines for Edge Computing."* In IEEE Military Communications Conference (MILCOM), pp. 1-6. 2024.

[C.5] Jinyang Li, *et al.*, including **Li Wu**. *"Acies-os: A content-centric platform for edge AI twinning and orchestration."* In 33rd International Conference on Computer Communications and Networks (ICCCN), pp. 1-9. 2024.

[C.6] Mehmet Savasci, Abel Souza, **Li Wu**, David Irwin, Ahmed Ali-Eldin, and Prashant Shenoy. *"SLO-Power: SLO and power-aware elastic scaling for web services."* In IEEE 24th International Symposium on Cluster, Cloud and Internet Computing (CCGrid), pp. 136-147. 2024.

[C.7] Walid A. Hanafy, **Li Wu**, Tarek Abdelzaher, Suhas Diggavi, and Prashant Shenoy. *"Failure-Resilient ML Inference at the Edge through Graceful Service Degradation."* In IEEE Military Communications Conference (MILCOM), pp. 144-149. 2023.

[C.8] Jasmin Bogatinovski, Sasho Nedelkoski, **Li Wu**, Jorge Cardoso, and Odej Kao. *"Failure identification from unstable log data using deep learning."* In 22nd IEEE International Symposium on Cluster, Cloud and Internet Computing (CCGrid), pp. 346-355. 2022

[C.9] Davaadorj Battulga, Mozhdeh Farhadi, Mulugeta Ayalew Tamiru, **Li Wu**, and Guillaume Pierre. *"LivingFog: Leveraging fog computing and LoRaWAN technologies for smart marina management (experience paper)."* In 25th Conference on Innovation in Clouds, Internet and Networks (ICIN), pp. 9-16. 2022. (Equal contribution)

[C.10] **Li Wu**, Johan Tordsson, Erik Elmroth, and Odej Kao. *"Causal inference techniques for microservice performance diagnosis: Evaluation and guiding recommendations."* In IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS), pp. 21-30. 2021.

[C.11] **Li Wu**, Johan Tordsson, Jasmin Bogatinovski, Erik Elmroth, and Odej Kao. *"MicroDiag: Fine-grained performance diagnosis for microservice systems."* In IEEE/ACM International Workshop on Cloud Intelligence (CloudIntelligence), pp. 31-36. 2021.

[C.12] **Li Wu**, Jasmin Bogatinovski, Sasho Nedelkoski, Johan Tordsson, and Odej Kao. *"Performance diagnosis in cloud microservices using deep learning."* In International Conference on Service-Oriented Computing, pp. 85-96. 2020.

[C.13] **Li Wu**, Johan Tordsson, Alexander Acker, and Odej Kao. *"MicroRAS: Automatic recovery in the absence of historical failure data for microservice systems."* In IEEE/ACM 13th International Conference on Utility and Cloud Computing (UCC), pp. 227-236. 2020.

[C.14] **Li Wu**, Johan Tordsson, Erik Elmroth, and Odej Kao. *"MicroRCA: Root cause localization of performance issues in microservices."* The 32nd IEEE/IFIP Network Operations and Management Symposium (NOMS), pp. 1-9. 2020.

[J.1] **Li Wu** and Lijun Chen. *"Experimental Study on Time-of-Flight Measurement in Acoustic Pyrometry for Furnaces."* Technical Acoustics 37, no. 3 (2018): 211-216.

[J.2] Chen Xu, **Li Wu**, and Lijun Chen. *"Experimental Evaluation of Acoustic Waveguide Propagation Characteristics."* Acoustics and Electronics Engineering (2015): 23-28.

[J.3] **Li Wu**, and Chenping Zhu. *"Research on Matching Technology for Ultrasonic Fruit and Vegetable Cleaning Machines."* Acoustics and Electronics Engineering (2013): 38-42.

[T.1] **Li Wu**. Automatic performance diagnosis and recovery in cloud microservices. Technical University of Berlin (Germany), 2022.

[T.2] **Li Wu**. Research on Temperature Field Reconstruction in Furnaces Based on Acoustic Wave Theory. Southeast University, 2015.

PATENTS

G=GRANTED, P=PUBLISHED APPLICATION

[G.1] Lin Cai, Yiming Yin, **Li Wu**, and Xuegang Ding. *"Testing an Online System for Service-Oriented Architecture (SOA) Services."* U.S. Patent 11,169,905, issued November 9, 2021.

[P.1] **Li Wu**, Yifan Du, Rui Zhang, and Xiangyu Wu. *"System and Method for Offloading Autonomous Driving Tasks."* US2025110788A1, 2025. Also published as CN119729625A and DE102024208630A1.

[P.2] **Li Wu**, Naresh Ganesh Nayak, Yifan Du, and Xiangyu Wu. *"Method and Device for Scheduling Service in Edge Computing System."* WO2025091368A1, 2025.

[P.3] Yifan Du and **Li Wu**. *"Method and Device for Model Aggregation in Federated Learning."* US2025217719A1, 2025. Also published as CN120218272A and DE102024212013A1.

[P.4] Yifan Du, **Li Wu**, and Jianwei Shi. *"Method and Apparatus for Deployment of Applications on Edge Cluster."* DE102024210068A1, 2025. Also published as CN120066757A.

[P.5] **Li Wu**, Jia Hu, and MICHAEL P. Zapf. *"Distributed System and Roadside System Comprising Same."* CN118555294A, 2024.

INDUSTRY EXPERIENCE

- **Bosch Research Center** — *2022 – 2023*
  Senior Research Scientist, Reliable Distributed Systems (RDS)
  - Led R&D on reliable distributed systems for infrastructure-assisted autonomous driving.
  - Designed and deployed fault-tolerant computing solutions at 11 smart intersections.
  - Inventor on 5 patents related to reliable distributed systems in autonomous driving.
- **Elastisys (Spin-off from Umeå University)** — *2018 – 2021*
  System Scientist
  Mentors: Johan Tordson, Erik Elmroth
  - Developed the Micro-X family of tools (e.g., MicroRCA and MicroDiag) for reliable cloud microservices.
  - Contributed to open-source root cause localization solutions.
- **IBM Cloud (Bluemix)** — *2015 – 2018*
  Software Developer and Site Reliability Engineer (SRE)
  - Developed and operated the large-scale PaaS (Kubernetes) and IaaS (SoftLayer) services for IBM Cloud.
  - Inventor on 1 patent related to cloud service reliability improvements.

TEACHING EXPERIENCE

- **Program Co-director and Lecturer** — *2024, 2025*
  UMass Turing Summer Program [🌐]
  - Delivered lectures on Introduction to Python Programming and Cloud Computing.
- **Teaching Assistant** — *2020 – 2021*
  Technical University of Berlin [🌐]
  - Assisted in delivering and evaluating the Distributed and Operating System Seminar.
- **Guest Lecturer** — *2021*
  Hack the Fog Hackathon (FogGuru LivingLab) [🌐]

Mentoring Experience

- **07/2023 – Present:** Hetvi Shastri (Ph.D., UMass Amherst)
- **07/2023 – 05/2024:** Mehmet Savasci (Ph.D., UMass Amherst)
- **09/2023 – 07/2025:** Khai Nguyen (M.S., UMass Amherst) **Employer: Microsoft**
- **06/2024 – 06/2025:** Riley Kim Connell (B.S., REU, UMass Amherst) **Employer: Dell**
- **08/2022 – 06/2023:** Xiangyu Wu (M.S., Bosch Research) **Employer: Initial: Tencent**
- **07/2022 – 12/2022:** Rui Zhang (B.S., Bosch Research) **Ph.D. student at UC Santa Cruz (UCSC)**
- **09/2020 – 11/2021:** 4 B.S./M.S. students in research seminar (Technical University of Berlin)
- **09/2023 – Present:** 6 M.S. students in *Independent studies* (UMass Amherst)

Invited Talks and Panels

- **Reliable Large-Scale Computing** *11/2024*
  KU Leuven, Belgium
- **Automatic Performance Diagnosis and Recovery in Cloud Microservices** *08/2024*
  Zscaler, US
- **MicroRCA: Root Cause Localization of Performance Issues in Microservices** *08/2021*
  Ericsson, Sweden
- **Panel Discussion: Anomaly Detection in Edge/Fog Computing** *06/2019*
  The 15th cloud control workshop

Professional Service

- 2025: The 31st Symposium on Operating Systems Principles (SOSP) (*Artifact Evaluation Committee*)
- 2025: HotCarbon Workshop on Sustainable Computer Systems (*Session Chair*)
- 2024, 2025: UMass Turing Summer Program (*Program Co-director*)
- 2025: IEEE Internet Computing (*Reviewer*)
- 2025: ICT express (*Reviewer*)
- 2024, 2025: IEEE Transactions on Network and Service Management (*Reviewer*)
- 2024, 2025: Journal of parallel and distributed computing (*Reviewer*)
- 2024, 2025: Performance Evaluation (*Reviewer*)
- 2024: IEEE Transactions on Services Computing (*Reviewer*)
- 2024: Sustainable computing (*Reviewer*)
- 2021: Hackathon: Hack the fog (*Organizer*)
- 2021: AIOPS 2021 at ICSOC (*Organizer*)
- 2020: International World Wide Web Conference (*External reviewer*)
- 2019: 15th Cloud Control Workshop (*Panel Chair*)