Li (Lilly) Wu

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Google Scholar | ORCID | GitHub | LinkedIn

140 Governors Dr, Amherst, MA 01003

Research Interests

Distributed Systems, Cloud and Edge Computing, Sustainable Computing, Reliable AI Systems.

Academic Experience

- **University of Massachusetts Amherst** 06/2023 – Present
  Postdoctoral Research Associate, College of Information and Computer Sciences (CICS) United States
  Advisor: Prashant Shenoy
  ◦ Designing systems for failure-resilient edge AI.
  ◦ Developing resource management techniques for sustainable computing.

- **Technical University of Berlin** 09/2018 – 11/2021
  Graduate Research Assistant, Faculty of Electrical Engineering and Computer Science (EECS) Germany
  Advisor: Odej Kao
  ◦ Developed systems and algorithms for automatic performance diagnosis and recovery in cloud microservices.

Education

- **Technical University of Berlin** 09/2018 – 11/2021
  Ph.D. in Computer Science Germany
  ◦ Thesis: Automatic Performance Diagnosis and Recovery in Cloud Microservices (Magna cum laude)
  ◦ Advisor: Odej Kao **Co-Advisors:** Johan Tordsson, Erik Elmroth

- **Southeast University** 09/2012 – 05/2015
  M.S. in Information and Communication Engineering China
  ◦ Thesis: Research on Furnace Temperature Field Reconstruction Based on Acoustic Wave Theory
  ◦ Advisor: Lijun Chen

- **Hohai University** 09/2008 – 06/2012
  B.S. in Telecommunication Engineering China
  ◦ Honors: *Top 1% of Class*, Best Thesis Award
  ◦ Advisor: Changping Zhu

Awards and Honors

- Interview on GREEN Internet for **UN Climate Change Conference (COP29)**, One World Network 2024
- **Marie Skodowska-Curie PhD Fellowship**, European Commission (Grant No. 765452) 2018 – 2021
- ACSOS Travel Grant Recipient 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 2009, 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

[1] 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).

[2] Hetvi Shastri, Walid A. Hanafy, Li Wu, David Irwin, Mani Srivastava, and Prashant Shenoy. "LLM-Driven Auto Configuration for Transient IoT Device Collaboration." The *Tenth ACM/IEEE Symposium on Edge Computing (SEC)* (2025).

[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." In *Proceedings of the 2025 ACM Symposium on Cloud Computing (**ACM SoCC**)* , *To appear*. 2025.

[4] Krishna Praneet Gudipaty, Walid A. Hanafy, Li Wu, Jeffrey Twigg, Benjamin M Marlin, Jesse Milzman, Suhas Diggavi, Tarek Abdelzaher, and Prashant Shenoy. "Practical Considerations for Failure Resilient ML Systems at the Edge." In *IEEE Military Communications Conference (MILCOM)*, pp. 1-6. 2025.

[5] 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 International Symposium on High-Performance Parallel and Distributed Computing (**ACM HPDC**)*, pp. 1-13. 2025. **Acceptance rate: 18.8%**

[6] Maji, Diptyaroop, Walid A. Hanafy, Li Wu, David Irwin, Prashant Shenoy, and Ramesh K. Sitaraman. "Data Centers Carbon Emissions at Crossroads: An Empirical Study." *ACM SIGENERGY Energy Informatics Review* 5, no. 2 (2025): 48-55.

[7] 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.

[8] Jinyang Li, Yizhuo Chen, Tomoyoshi Kimura, Tianshi Wang, Ruijie Wang, Denizhan Kara, Yigong Hu, Li Wu, Walid A. Hanafy, Abel Souza, Prashant Shenoy, Maggie Wigness, Joydeep Bhattacharyya, Jae Kim, Guijun Wang, Greg Kimberly, Josh Eckhardt, Denis Osipychev, Tarek Abdelzaher. "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.

[9] 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. **Acceptance rate: 26%**

[10] 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.

[11] 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. **Acceptance rate: 24%**

[12] 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)

[13] 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. **Acceptance rate: 25%**

[14] 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 (AIOps at ICSE 2021)*, pp. 31-36. 2021.

[15] 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 (ICSOC)*, pp. 85-96. 2020.

[16] 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. **Acceptance rate: 31%**

[17] 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. **Impact: 270+ citations; led to invited talks and $600,000 industry funding.**

[18] Arif Ahmed, HamidReza Arkian, Davaadorj Battulga, Ali J. Fahs, Mozhdeh Farhadi, Dimitrios Giouroukis, Adrien Gougeon, Felipe Oliveira Gutierrez, Guillaume Pierre, Paulo R. Souza Jr, Mulugeta Ayalew Tamiru, Li Wu. "Fog Computing Applications: Taxonomy and Requirements." *arXiv preprint arXiv:1907.11621* (2019). (Equal contribution)

[19] 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.

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

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

Thesis

[1] Li Wu. "Automatic Performance Diagnosis and Recovery in Cloud Microservices". Technical University of Berlin (Germany), 2022.

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

Posters

[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.

[2] Li Wu, Walid A. Hanafy, Tarek Abdelzaher, and Prashant Shenoy. "FailLite: Ensuring Resilient Model Serving in Resource-Constrained IoBT Environments", University of Illinois Urbana-Champaign (UIUC), IoBT Bootcamp, 2025.

[3] Riley Connell, Akshay Prabhu, Li Wu, Abel Sousa, Bhawana Chhaglani, and Prashant Shenoy. "CrowdView: A Tool for Non-Intrusive Crowd Visualization and Analysis", UMass Research Experience for Undergraduates (REU), 2024.

[4] Walid A. Hanafy, Qianlin Liang, Li Wu, Abel Sousa, Suhas Diggavi, and Prashant Shenoy. "Failure-resilient ML Inference in Resource-Constrained IoBT Networks", UMass Amherst, IoBT Bootcamp, 2024.

[5] Li Wu, Johan Tordsson, Erik Elmroth, and Odej Kao. "MicroRCA: Root Cause Localization for Cloud Microservices", 15th Cloud Control Workshop, 2019.

Patents

G=Granted, P=Published

[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, also published as CN119729625A and DE102024208630A1. 2025

[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, also published as CN120218272A and DE102024212013A1. 2025.

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

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

Industry Experience

- **Bosch Research** 03/2022 – 06/2023
  Senior Research Scientist, Reliable Distributed Systems (RDS) China
  ◦ Led R&D on reliable distributed systems for edge-assisted autonomous driving.
  ◦ Designed and *deployed* fault-tolerant computing solutions at 11 smart intersections.
  ◦ Inventor on five patents related to reliable distributed systems in autonomous driving.

- **Elastisys (Spin-off from Umeå University)** 09/2018 – 11/2021
  System Scientist **Mentors**: Johan Tordsson, Erik Elmroth Sweden
  ◦ Developed the Micro-X family of tools (e.g., MicroRCA and MicroDiag) for reliable cloud microservices.
  ◦ Contributed to open-source root cause localization solutions.

- **Las Naves – Centre for Social & Urban Innovation** 11/2020 – 05/2021
  Researcher **Mentor**: Guillaume Pierre Spain
  ◦ Designed, implemented, and *deployed* the LivingFog platform for smart marina management.
  ◦ Organized and presented at a hackathon centered around the LivingFog platform.

- **IBM** 05/2016 – 09/2018
  Site Reliability Engineer (SRE), Bluemix China
  ◦ Developed and *operated* the large-scale PaaS (Kubernetes) and IaaS (SoftLayer) services.
  ◦ Contributed to Cloud-Native Computing Foundation (CNCF) open-sourced projects.
  ◦ Inventor on one patent for improving cloud service reliability.

- **IBM** 05/2015 – 05/2016
  Software Developer, Cloud China
  ◦ Developed features for IBM IaaS (virtualization and OpenStack).

Teaching Experience

- **Guest Lecturer** Fall 2025
  UMass Amherst, COMPSCI 230 Computer Systems Principles
- **Program Co-Director and Lecturer** 2024, 2025
  UMass Amherst, UMass Turing Summer Program
- **Guest Lecturer** 03/2021
  Las Naves, Hack the Fog Hackathon (FogGuru LivingLab)
- **Teaching Assistant**
  Technical University of Berlin
  ◦ Cloud Computing Fall 2020
  ◦ Operating Complex IT-Systems Fall 2020, Spring 2021
- **Teaching Assistant** Spring 2014
  Southeast University, Signal Processing

Advising & Mentoring

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

Invited Talks and Panels

- **Sustainable and Resilient Distributed Computing** 08/2025
  Inria, France (Virtual)
- **Reliable Large-Scale Computing** 11/2024
  KU Leuven, Belgium
- **Automatic Performance Diagnosis and Recovery in Cloud Microservices** 08/2024
  Zscaler, US (Virtual)
- **MicroRCA: Root Cause Localization of Performance Issues in Microservices** 06/2021
  Ericsson, Sweden (Virtual)
- **Panel Discussion: Anomaly Detection in Edge/Fog Computing** 06/2019
  The 15th cloud control workshop, Sweden

Conference Presentations

- **CarbonEdge: Leveraging Mesoscale Spatial CI Variations for Low Carbon Edge Computing** 07/2025
  Conference presentation at HPDC, Notre Dame, USA
- **Enhancing Resilience in Distributed ML Inference Pipelines for Edge Computing** 10/2024
  Conference presentation at MILCOM, Washington, USA
- **Causal Inference Techniques for Microservice Performance Diagnosis** 09/2021
  Conference presentation at ACSOS, Virtual
- **MicroDiag: Fine-Grained Performance Diagnosis for Microservice Systems** 05/2021
  Conference presentation at AIOps, Virtual
- **Performance Diagnosis in Cloud Microservices using Deep Learning** 12/2020
  Conference presentation at ICSOC, Virtual
- **MicroRAS: Automatic Recovery in the Absence of Failure Data for Microservice Systems** 12/2020
  Conference presentation at UCC, Virtual
- **MicroRCA: Root Cause Localization of Performance Issues in Microservices** 04/2020
  Conference presentation at NOMS, Virtual

Professional Service

- Technical Program Committee, ACM/IFIP/USENIX International Middleware Conference (Middleware) 2026
- Shadow Program Committee, European Conference on Computer Systems (EuroSys) 2026
- Technical Program Committee, The Tenth ACM/IEEE Symposium on Edge Computing (SEC) 2025
- Artifact Evaluation Committee, The 31st Symposium on Operating Systems Principles (SOSP) 2025
- Session Chair, HotCarbon Workshop on Sustainable Computer Systems (HotCarbon) 2025
- Program Co-Director, UMass Turing Summer Program 2024, 2025
- Reviewer, IEEE Transactions on Cloud Computing 2025
- Reviewer, ICT Express 2025
- Reviewer, IEEE Internet Computing 2024, 2025
- Reviewer, IEEE Transactions on Network and Service Management 2024, 2025

- Reviewer, Journal of Parallel and Distributed Computing — 2024, 2025
- Reviewer, Performance Evaluation — 2024, 2025
- Reviewer, IEEE Transactions on Services Computing — 2024
- Reviewer, Sustainable computing — 2024
- Organizing Committee, Hackathon: Hack The Fog — 2021
- Organizing Committee, AIOPS Workshop at ICSOC — 2021
- External Reviewer, International World Wide Web Conference — 2020
- Panel Chair, 15th Cloud Control Workshop — 2019

References

- **Prashant Shenoy**, University of Massachusetts Amherst — shenoy@cs.umass.edu
- **Erik Elmroth**, Umeå University — elmroth@cs.umu.se
- **Tarek Abdelzaher**, University of Illinois at Urbana-Champaign — zaher@illinois.edu
- **David Irwin**, University of Massachusetts Amherst — deirwin@umass.edu