

Yifei Liu

✉ yifeliu@cs.stonybrook.edu • 📞 +1 631-710-8377
🌐 github.com/Yifei-Liu • 🌐 https://www.fsl.cs.stonybrook.edu/~yifei/ • 🌐 linkedin.com/in/yifei-liu

Education

Stony Brook University	Stony Brook, NY
• Ph.D. in Computer Science (Advisor: Prof. Erez Zadok)	08/2019 – 08/2025 (expected)
• M.S. in Computer Science (earned en route to Ph.D. program)	08/2019 – 12/2021
• GPA: 3.93 / 4.0	
Huazhong University of Science and Technology	Wuhan, China
• M.Eng. in Computer System Architecture (Advisor: Prof. Ke Zhou)	09/2016 – 06/2019
Huazhong Agricultural University	Wuhan, China
• B.Eng. in Computer Science and Technology	09/2012 – 06/2016

Experience

File systems and Storage Lab (FSL), Stony Brook University	Stony Brook, NY
<i>Research Assistant (C/C++, File Systems, Formal Verification)</i>	05/2020 – Present
• Developed Metis, a file system model-checking framework that identified over 15 bugs in Linux kernel file systems with greater coverage than existing tools	
• Developed ReFFS, a reliable user-space file system with state-saving and restoration features, achieving 3–28x better performance than other file systems	
• Designed and evaluated multi-tier caching systems with intelligent MRC point selection, reducing analysis effort by 5.5–7.7x to optimize cache configurations	
Samsung Semiconductor, Inc.	San Jose, CA
<i>Storage Systems Architect Intern (C++, Databases, Storage)</i>	05/2022 – 08/2022
• Implemented custom PostgreSQL plans and paths to offload aggregate operations to SmartSSD computational storage, improving query performance	
Wuhan National Laboratory for Optoelectronics	Wuhan, China
<i>Research Assistant (Python, Deep Learning, Cloud Storage)</i>	09/2016 – 06/2019
• Designed and implemented a storage system leveraging deep learning hashing and a graph database to enable fast and accurate semantic queries, reducing read latency by 82%–94%	
Tencent Cloud	Shenzhen, China
<i>Backend Developer Intern (C++, Machine Learning, Storage)</i>	12/2015 – 08/2016
• Developed infrastructure to collect long-term disk S.M.A.R.T. data from 10,000+ servers, using machine learning to predict disk failures with more than 90% precision and recall	

Selected Publications

Summary: 3 journal articles, 9 conference/workshop papers, 2 posters, and 2 granted patents
Google Scholar Profile: scholar.google.com/citations?user=WNu87vQAAAAJ

Journal Articles

- [1] T. Estro, M. Antunes, P. Bhandari, A. Gandhi, G. Kuenning, **Y. Liu**, C. Waldspurger, A. Wildani and E. Zadok. “Accelerating Multi-Tier Storage Cache Simulations Using Knee Detection.” *Performance Evaluation*, 2024.
- [2] K. Zhou, Y. Wang, Y. Liu, Y. Yang, **Y. Liu**, G. Li, L. Gao, and Z. Xiao. “A Framework for Image Dark Data Assessment.” *World Wide Web*, 2020.
- [3] Y. Liu, Y. Wang, K. Zhou, Y. Yang, and **Y. Liu**. “Semantic-aware Data Quality Assessment for Image Big Data.” *Future Generation Computer Systems*, 2020.

Conference and Workshop Papers

- [1] **Y. Liu**, M. Adkar, G. Holzmann, G. Kuenning, P. Liu, S. Smolka, W. Su and E. Zadok. “Metis: File System Model Checking via Versatile Input and State Exploration.” In *the 22nd USENIX Conference on File and Storage Technologies (FAST)*, 2024.
- [2] T. Estro, M. Antunes, P. Bhandari, A. Gandhi, G. Kuenning, **Y. Liu**, C. Waldspurger, A. Wildani and E. Zadok. “Guiding Simulations of Multi-Tier Storage Caches Using Knee Detection.” In *the 31st International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS)*, 2023.

- [3] **Y. Liu**, G. Ahuja, G. Kuenning, S. Smolka, and E. Zadok. “Input and Output Coverage Needed in File System Testing.” In *the 15th ACM Workshop on Hot Topics in Storage and File Systems (HotStorage)*, 2023.
- [4] W. Su, **Y. Liu**, G. Ganesan, G. Holzmann, S. Smolka, E. Zadok, and G. Kuenning. “Model-Checking Support for File System Development.” In *the 13th ACM Workshop on Hot Topics in Storage and File Systems (HotStorage)*, 2021.
- [5] Y. Liu, H. Jiang, Y. Wang, K. Zhou, **Y. Liu**, and L. Liu. “Content Sifting Storage: Achieving Fast Read for Large-scale Image Dataset Analysis.” In *the 57th Design Automation Conference (DAC)*, 2020.
- [6] Y. Liu, Y. Wang, K. Zhou, Y. Yang, **Y. Liu**, J. Song, and Z. Xiao. “A Framework for Image Dark Data Assessment.” In *the 3rd APWeb-WAIM joint conference on Web and Big Data (APWeb-WAIM)*, 2019. **(Best Paper Runner-Up)**
- [7] Y. Wang, Y. Liu, **Y. Liu**, K. Zhou, Y. Yang, J. Zeng, X. Xu, and Z. Xiao. “Analysis and Management to Hash-Based Graph and Rank.” In *the 3rd APWeb-WAIM joint conference on Web and Big Data (APWeb-WAIM)*, 2019.

Patents

- [1] K. Zhou, Y. Liu, Y. Yang, H. Wang, C. Li, Y. Wang, **Y. Liu**. Method for valuation of image dark data based on similarity hashing. U.S. Patent US11,138,479B2, Granted: 10/05/2021.
- [2] K. Zhou, **Y. Liu**, Y. Liu, Y. Wang, Y. Yang. Image query method and system based on content semantic metadata. Chinese Patent CN110413807B, Granted: 04/20/2021.

Skills

Programming Languages

- **Fluent (>= 10,000 LoC):** C, C++, Python, Bash
- **Intermediate (>= 2,000 LoC):** SQL, Java, MATLAB, Cypher, JavaScript, Promela, Prolog

Technologies

- **Databases:** MySQL, Neo4j, PostgreSQL, HBase, Db2
- **File and Storage:** Linux VFS and kernel file systems, NFS, OpenStack Swift, HDFS
- **Virtualization:** Docker, Kubernetes, QEMU, KVM, VMware ESXi
- **Tools:** CMake, GDB, Git, Hadoop, Spark, TensorFlow, Elasticsearch, bpfftrace, LTTng

Projects

- Metis** 🌀: **A Versatile Framework for File System Model Checking (C/C++)** 2020 – 2024
 - A framework for thoroughly checking Linux file systems with minimal constraints
- RefFS** 🌀: **A Fast and Reliable File System for Checking Reference (C++)** 2020 – 2024
 - An in-memory FUSE file system capable of independently saving and restoring its entire state
- IOCov** 🌀: **Input and Output Coverage for File System Testing (Python)** 2022 – 2024
 - A framework for computing syscall input and output coverage in file system test suites

Talks

- **Metis: File System Model Checking via Versatile Input and State Exploration**
 - USENIX FAST 2024, Graduate Research Day 2024
- **Input and Output Coverage Needed in File System Testing**
 - ACM HotStorage 2023
- **Model-Checking Support for File System Development**
 - ACM HotStorage 2021, Dutch Model Checking Day 2022

Service

- **Journal Reviewer:** ACM Trans. on Architecture and Code Optimization (TACO), IEEE Access
- **Artifact Evaluation Committee:** USENIX OSDI '23, USENIX ATC '23

Teaching

- Teaching Assistant for CSE376 Advanced Systems Programming in Unix/C S '20, S '21
- Teaching Assistant for CSE306 Operating Systems F '19

Contest Awards

- Finalist, Interdisciplinary Contest in Modeling (MCM/ICM), USA, 2015.
- First Prize, National Postgraduate Mathematic Contest in Modeling, China, 2014.
- First Prize, Contemporary Undergraduate Mathematical Contest in Modeling, China, 2014.