Felix Xiaozhu Lin

February, 2022

Interest

Computer systems software, at the intersection of OS \times compilers \times architecture.

Education

PhD Dec 2014 Rice University, Computer ScienceMS July 2008 Tsinghua UniversityBS July 2006 Tsinghua University

Employment

Aug 2020 – present	Associate Professor, CS, University of Virginia
Aug 2014 – Aug 2020	Assistant & Associate Professor, ECE, Purdue University
May 2012 – Dec 2012	Intern, Microsoft Research
Jun 2011 – Aug 2011	Visiting researcher, IBM Research
Jan 2011 – Apr 2011	Intern, Nokia Research

Honors and Awards

- [1] NSF CAREER Award, 2019.
- [2] Google Faculty Award, 2016.
- [3] NSF CISE Research Initiation Initiative (CRII), 2015.
- [4] Best Paper Award, ACM Proc. Int. Conf. Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2014.
- [5] Reflex (2009), a pioneering project as part of my PhD thesis anticipated the heterogeneous architectures ubiquitous in today's smartphones and smart devices.

Research Grants

- PI, "Collaborative Research: CNS Core: Medium: Understanding and Strengthening Memory Security for Non-Volatile Memory", NSF, 2106893, 10/01/2021– 9/30/2024, \$262,890
- PI, "Smart City Infrastructures for Safeguarding Autonomous Vehicles Against Cyber Attacks", Commonwealth Cyber Initiative, Virginia, 01/01/2021 12/31/2021, \$200,000.
- PI, "CAREER: A Trustworthy and Verifiable Software Backplane for the Cloud Edge", NSF, 1846102, 06/01/2019 05/31/2024, \$479,658.

- co-PI, "SPX: Write Once, Run on Anything: Verified, Tuned Accelerator Kernels from High Level Specifications", NSF, 1919197, 10/01/2019 09/30/2023, \$312,500.
- PI (as the only Purdue PI), "SaTC: CORE: Small: Collaborative: Guarding the Integrity of Mobile Graphical User Interfaces", NSF, 1718702, 08/01/2017 07/30/2020, \$250,000.
- PI (as the only Purdue PI), "CSR: Small: Collaborative Research: Efficient Exploitation of Heterogeneous Memory through OS/Compiler Support", NSF, 1619075, 09/01/2016 08/30/2019, \$249,548.
- PI (sole), "NSF Student Travel Grants for the Twentieth ACM Workshop on Mobile Computing Systems and Applications", NSF, 1902722, 01/01/2019 12/30/2019, \$20,000.
- PI (sole), "Busting Idle Anomalies on Android Wear", \$42,743, 2016, Google faculty award.
- PI (sole), "CRII: CSR: Rethinking Operating System Structure for Wearable Devices", NSF, 1464357, 04/01/2015 03/31/2017, \$175,000.
- Co-PI, "Democratizing Intelligent Buildings with Internet of Things", \$75,000, Purdue University CPS/IoT Seed Grant Program.

Conference Proceedings and Presentations

Author legend: \mathbf{G}/\mathbf{U} – grad/undergrad students for whom I serve as the primary faculty advisor \mathbf{C} – students for whom I serve as a co-advisor

- [1] "Minimum Viable Device Drivers for ARM TrustZone," Liwei Guo ^G and <u>Felix Xi</u>aozhu Lin, in *Proc. European Conference on Computer Systems (EuroSys)*, 2022.
- [2] "GPUReplay: A 50-KB GPU Stack for Client ML," Heejin Park G and Felix Xiaozhu Lin, in Proc. ACM Int. Conf. Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2022.
- [3] "Video Analytics with Zero-streaming Cameras," Mengwei Xu* ^C, Tiantu Xu* ^G, Yunxin Liu, Xuanzhe Liu, Gang Huang, and Felix Xiaozhu Lin, (*=co-primary) in Proc. USENIX Annual Technical Conference (USENIX ATC), 2021.
- [4] "Approximate Query Service on Autonomous IoT Cameras," Mengwei Xu^C, Xiwen Zhang^C, Yunxin Liu, Xuanzhe Liu, and Felix Xiaozhu Lin, in Proc. ACM Int. Conf. Mobile Systems, Applications and Services (MobiSys), acceptance rate 19% (34/175), 2020.
- [5] "Transkernel: Bridging Monolithic Kernels to Peripheral Cores," Liwei Guo ^G, Shuang Zhai ^G, Yi Qiao ^U, and Felix Xiaozhu Lin, in *Proc. USENIX Annual Technical Conference (USENIX ATC)*, page 675–692, acceptance rate 20% (71/356), 2019.
- [6] "StreamBox-TZ: A Secure IoT Analytics Engine at the Edge," Heejin Park ^G, Shuang Zhai ^G, Long Lu, and Felix Xiaozhu Lin, in Proc. USENIX Annual Technical Conference (USENIX ATC), page 537–554, acceptance rate 20% (71/356), 2019.

- [7] "VStore: A Data Store for Analytics on Large Videos," Tiantu Xu^G, Luis Materon Botelho^{II}, and Felix Xiaozhu Lin, in Proc. European Conference on Computer Systems (EuroSys), page 16:1–16:17, acceptance rate 22% (45/207), 2019.
- [8] "A First Look at Deep Learning Apps on Smartphones," Mengwei Xu^C, Jiawei Liu, Yuanqiang Liu, Felix Xiaozhu Lin, Yunxin Liu, and Xuanzhe Liu, in *Proc. the World Wide Web Conference (WWW)*, page 2125–2136, acceptance rate 18% (225/1247), 2019.
- [9] "StreamBox-HBM: Stream Analytics on High Bandwidth Hybrid Memory," Hongyu Miao G, Myeongjae Jeon, Gennady Pekhimenko, Kathryn S. McKinley, and Felix Xiaozhu Lin, in Proc. ACM Int. Conf. Architectural Support for Programming Languages and Operating Systems (ASPLOS), page 167–181, acceptance rate 21% (74/350), 2019.
- [10] "Power SandBox: Power Awareness Redefined," Liwei Guo* ^G, Tiantu Xu* ^G, Mengwei Xu ^G, Xuanzhe Liu, and Felix Xiaozhu Lin, (*=co-primary) in *Proc. European Conference on Computer Systems (EuroSys)*, page 37:1–37:15, acceptance rate 16% (43/262), 2018.
- [11] "DeepCache: Principled Cache for Mobile Deep Vision," Mengwei Xu^C, Mengze Zhu, Yunxin Liu, <u>Felix Xiaozhu Lin</u>, and Xuanzhe Liu, in *Proc. ACM Int. Conf. Mobile Computing and Networking (MobiCom*), page 129–144, acceptance rate 22% (42/187), 2018.
- [12] "ProfDP: A Lightweight Profiler to Guide Data Placement in Heterogeneous Memory Systems," Shasha Wen, Lucy Cherkasova, <u>Felix Xiaozhu Lin</u>, and Xu Liu, in *Proc. Int. Conf. on Supercomputing* (ICS), page 263–273, acceptance rate 19% (36/193), 2018.
- [13] "Rethinking Resource Management in Mobile Web: Measurement, Deployment, and Runtime," invited paper, Xuanzhe Liu, Yun Ma, and Felix Xiaozhu Lin, in Proc. IEEE Int. Conf. Distributed Computing Systems (ICDCS), page 1347–1356, acceptance rate 21% (78/378), 2018.
- [14] "StreamBox: Modern Stream Processing on a Multicore Machine," Hongyu Miao ^G, Heejin Park ^G, Myeongjae Jeon, Gennady Pekhimenko, Kathryn S. McKinley, and Felix Xiaozhu Lin, in Proc. USENIX Annual Technical Conference (USENIX ATC), page 617–629, acceptance rate 21% (60/283), 2017.
- [15] "Characterizing Smartwatch Usage in The Wild," Xing Liu, Tianyu Chen, Feng Qian, Zhixiu Guo, <u>Felix Xiaozhu Lin</u>, Xiaofeng Wang, and Kai Chen, in *Proc. ACM Int. Conf. Mobile Systems, Applications and Services (MobiSys)*, page 385–398, acceptance rate 18% (34/188), 2017.
- [16] "AppHolmes: Detecting and Characterizing App Collusion among Third-Party Android Markets," Mengwei Xu, Yun Ma, Xuanzhe Liu, Felix Xiaozhu Lin, and Yunxin Liu, in Proc. the World Wide Web Conference (WWW), page 143–152, acceptance rate 17% (164/966), 2017.
- [17] "Understanding the Characteristics of Android Wear OS," Renju Liu G and Felix Xiaozhu Lin, in Proc. ACM Int. Conf. Mobile Systems, Applications and Services (MobiSys), page 151–164, acceptance rate 16% (31/197), 2016.

- [18] "memif: Towards Programming Heterogeneous Memory Asynchronously," Felix Xiaozhu Lin and Xu Liu, in Proc. ACM Int. Conf. Architectural Support for Programming Languages and Operating Systems (ASPLOS), page 369–383, acceptance rate 23% (53/232), 2016.
- [19] "Characterizing Emerging Heterogeneous Memory," Du Shen, Xu Liu, and <u>Felix</u> Xiaozhu Lin, in Proc. ACM SIGPLAN Int. Symposium on Memory Management (ISMM), page 13–23, acceptance rate 55% (12/22), 2016.
- [20] "Characterizing Smartphone Usage Patterns from Millions of Android Users," Huoran Li, Xuanzhe Liu, Tao Xie, Kaigui Bian, Xuan Lu, <u>Felix Xiaozhu Lin</u>, Qiaozhu Mei, and Feng Feng, in *Proc. ACM Internet Measurement Conference (IMC)*, page 459–472, acceptance rate 26% (44/169), 2015.
- [21] "Automated OS-level Device Runtime Power Management," Chao Xu, Felix Xiaozhu Lin, and Lin Zhong, in Proc. ACM Int. Conf. Architectural Support for Programming Languages and Operating Systems (ASPLOS), page 239–252, acceptance rate 17% (48/287), 2015.
- [22] "K2: A Mobile Operating System for Heterogeneous Coherence Domains," best paper award, <u>Felix Xiaozhu Lin</u>, Zhen Wang, and Lin Zhong, in *Proc. ACM Int. Conf. Architectural Support for Programming Languages and Operating Systems* (ASPLOS), page 285–300, acceptance rate 23% (49/217), 2014.
- [23] "SmartAds: Bringing Contextual Ads to Mobile Apps," Suman Nath, Felix Xiaozhu Lin, Lenin Ravindranath, and Jitu Padhye, in *Proc. ACM Int. Conf. Mobile Systems, Applications and Services (MobiSys)*, page 111–124, 2013.
- [24] "Reflex: Using Low-power Processors in Smartphones without Knowing Them," Felix Xiaozhu Lin, Zhen Wang, Robert LiKamWa, and Lin Zhong, in Proc. ACM Int. Conf. Architectural Support for Programming Languages and Operating Systems (ASPLOS), page 13–24, acceptance rate 21% (32/152), 2012.
- [25] "How far can client-only solutions go for mobile browser speed?," Zhen Wang, Felix Xiaozhu Lin, Lin Zhong, and Mansoor Chishtie, in *Proc. the World Wide Web Conference (WWW)*, page 31–40, 2012.
- [26] "Power-efficient time-sensitive mapping in heterogeneous systems," Cong Liu, Jian Li, Wei Huang, Juan Rubio, Evan Speight, and Felix Xiaozhu Lin, in Proc. Int. Conf. Parallel Architectures and Compilation Techniques (PACT), page 23–32, 2012.
- [27] "RhythmLink: Securely Pairing I/O-Constrained Devices by Tapping," <u>Felix Xi-aozhu Lin</u>, Daniel Ashbrook, and Sean White, in *Proc. ACM Symp.* <u>on User</u> <u>Interface Software and Technology</u> (**UIST**), page 263–272, 2011.
- [28] "Dandelion: A framework for transparently programming phone-centered wireless body sensor applications for health," Felix Xiaozhu Lin, Ahmad Rahmati, and Lin Zhong, in Proc. ACM Wireless Health (WirelessHealth), page 74–83, 2010.

Conference Papers under Review

- "Enabling Large NNs on Tiny Microcontrollers with Swapping," Hongyu Miao ^G and Felix Xiaozhu Lin, in (*arXiv:2101.08744*), 2021.
- [2] "Clique: Spatiotemporal Object Re-identification at the City Scale," Tiantu Xu^G,

Kaiwen Shen^U, Yang Fu, Humphrey Shi, and <u>Felix Xiaozhu Lin</u>, in *(arXiv:2012.09329)*, 2020.

[3] "Let the Cloud Watch Over Your IoT File Systems," Liwei Guo^G, Yiying Zhang, and Felix Xiaozhu Lin, in *(arXiv:1902.06327)*, 2019.

Journal Publications

- [1] "ShuffleDog: Characterizing and Adapting User-Perceived Latency of Android Apps," Gang Huang, Mengwei Xu, Felix Xiaozhu Lin, Yunxin Liu, Yun Ma, Saumay Pushp, and Xuanzhe Liu, in *IEEE Transactions on Mobile Computing (TMC)*, vol 16, issue number 10, page 2913–2926, 2017.
- [2] "K2: A Mobile Operating System for Heterogeneous Coherence Domains," Felix Xiaozhu Lin, Zhen Wang, and Lin Zhong, in ACM Transactions of Computer Systems (TOCS), vol 33, issue number 2, page 5–32, 2015.

Refereed Workshop Publications

- [1] "Hybrid Mobile Vision for Emerging Applications," Nan Wu, Felix Xiaozhu Lin, Feng Qian, and Bo Han, in *Proc. ACM Int. Workshop on Mobile Computing Systems and Applications (HotMobile)*, 2022.
- [2] "Incremental Perception on Real Time 3D Data," Arup Kumar Sarker ^G and <u>Fe-lix Xiaozhu Lin</u>, in *Proc. ACM Int. Workshop on Mobile Computing Systems and Applications (HotMobile)*, 2022.
- [3] "Practical Urban Localization for Mobile AR," Tiantu Xu^G, Guohui Wang, and <u>Fe-lix Xiaozhu Lin</u>, in Proc. ACM Int. Workshop on Mobile Computing Systems and Applications (HotMobile), page 27–32, acceptance rate 33% (16/48), 2020.
- [4] "Decelerating Suspend and Resume in OS," Shuang Zhai , Liwei Guo , Xiangyu Li , and Felix Xiaozhu Lin, in Proc. ACM Int. Workshop on Mobile Computing Systems and Applications (HotMobile), page 31–36, acceptance rate 35% (18/52), 2017.
- [5] "Tell Your Graphics Stack That the Display Is Circular," Hongyu Miao ^G and <u>Fe-lix Xiaozhu Lin</u>, in *Proc. ACM Int. Workshop on Mobile Computing Systems and Applications (HotMobile)*, page 57–62, acceptance rate 33% (18/55), 2016.
- [6] "Anatomizing System Activities on Interactive Wearable Devices," Renju Liu ^G and <u>Felix Xiaozhu Lin</u>, in Proc. ACM Asia-Pacific Workshop on Systems (ApSys), page 18, 2015.
- [7] "Draining our Glass: An Energy and Heat Characterization of Google Glass," Robert LiKamWa, Zhen Wang, Aaron Carroll, <u>Felix Xiaozhu Lin</u>, and Lin Zhong, in *Proc.* ACM Asia-Pacific Workshop on Systems (ApSys), page 10, 2014.
- [8] "Device drivers should not do power management," Chao Xu, Felix Xiaozhu Lin, and Lin Zhong, in Proc. ACM Asia-Pacific Workshop on Systems (ApSys), page 11, 2014.
- [9] "Supporting Distributed Execution of Smartphone Workloads on Loosely Coupled Heterogeneous Processors," <u>Felix Xiaozhu Lin</u>, Zhen Wang, and Lin Zhong, in Proc. Workshop on Power-Aware Computing and Systems (HotPower), page 2,

2012.

[10] "Why are Web Browsers Slow on Smartphones?," Zhen Wang, <u>Felix Xiaozhu Lin</u>, Lin Zhong, and Mansoor Chishtie, in *Proc. ACM Int. Workshop on Mobile Computing Systems and Applications (HotMobile)*, page 91–96, acceptance rate 33% (16/49), 2011.

Master's and PhD Thesis Students Currently Being Supervised

Arup Sarker	PhD, started 2021	Autonomous systems
Madellyne Waugh	PhD, started 2020	On-device NLP
Xiangfu Li	MS, started 2021	Autonomous systems
Liwei Guo	PhD, started 2016	Secure OS

PhD Thesis Supervision Completed

- Hongyu Miao, Nov 2021, Thesis title "Systems Support for Data Analytics by Exploiting Modern Hardware"
- Heejin Park, Nov 2021, Thesis title "Towards Trustworthy On-device Computation"
- Tiantu Xu, Apr 2021, Thesis title "Software Systems for Large-scale Retrospective Video Analytics"

Master's Thesis Supervision Completed

- Shuang Zhai, June 2019. Thesis title "Transkernel: an executor for commodity kernels on peripheral cores"
- Michael Glapa (co-chaired with Prof. Saurabh Bagchi), Sept 2018. Thesis title "Malicious Reconfiguration of Executing Program in FPGA and its Defense"
- Ravi Gupta (co-chaired with Prof. Saurabh Bagchi), May 2016. Thesis title "Digital signal processors as HPC accelerator and performance tuning via static analysis and machine learning"

Undergraduate Supervision Completed

- Luis Fernando Materon Botelho, "Large-Scale Video Analytics with Artificial Intelligence", ECE496, 2018.
- Joven Garces, "Characterization and Optimization of Massively Parallel Merge Algorithms", ECE496, 2018.
- Yi Qiao, "Understanding Suspend/Resume Path of Linux Device Drivers", Purdue Undergraduate Summer Research Fellowship, 2018.
- Victor Pan, "Sort vs. Hash Join on Knights Landing Architecture", Purdue Undergraduate Summer Research Fellowship, 2018.
- Xiangyu Li, "Decelerating Suspend and Resume", ECE496, 2016.

Courses In Charge Of

All course survey reports with student comments are available upon request.

ECE 368: Da	ta Structure	s (undergraduate)			
Semester	STUDENTS	COURSE RATING	INSTRUCTOR RATING		
Fall 2014	60	4.2/5	4.3/5		
Fall 2015	67	4.6/5	4.6/5		
Fall 2016	69	4.2/5	4.5/5		
Fall 2017	83	4.4/5	4.3/5		
Fall 2018	96	4.1/5	4.2/5		
ECE 695 Operating Systems Design and Implementation (graduate)					
ECE 695 Op	erating Syste	ems Design and I	mplementation (graduate)		
ECE 695 Op Semester	erating System STUDENTS	ems Design and I Course rating	mplementation (graduate) INSTRUCTOR RATING		
ECE 695 Ope SEMESTER Spring 2015	erating Syston STUDENTS 32	ems Design and I Course rating 4.2/5	mplementation (graduate) INSTRUCTOR RATING 4.3/5		
ECE 695 Ope SEMESTER Spring 2015 Spring 2016	erating System STUDENTS 32 19	ems Design and I Course rating 4.2/5 4.5/5	mplementation (graduate) INSTRUCTOR RATING 4.3/5 4.6/5		
ECE 695 Op SEMESTER Spring 2015 Spring 2016 Spring 2017	erating Syste STUDENTS 32 19 15	ems Design and I COURSE RATING 4.2/5 4.5/5 4.8/5	mplementation (graduate) INSTRUCTOR RATING 4.3/5 4.6/5 4.8/5		
ECE 695 Op SEMESTER Spring 2015 Spring 2016 Spring 2017 Spring 2018	erating Syste STUDENTS 32 19 15 8	ems Design and I COURSE RATING 4.2/5 4.5/5 4.8/5 4.3/5	mplementation (graduate) INSTRUCTOR RATING 4.3/5 4.6/5 4.8/5 4.8/5 4.9/5		

Courses Developed

- ECE 695Operating Systems Design and ImplementationCS 4414Operating Systems
- CS 6456 Graduate Operating Systems

Professional Society Activities

ACM

Activity: TPC Member, HotMobile, 2022;

Co-chair, Workshop on Simplifying Edge & Mobile Intelligence, 2020; TPC Member, USENIX ATC, 2020; TPC Member, HPCA, 2020; Reviewer, ACM Transactions on Mobile Computing; TPC Member, ISMM, 2019; Session Chair, ASPLOS, 2019; External Review Committee Member, ASPLOS, 2019; Student Travel Grant Chair, HotMobile, 2019; TPC Member, HotMobile, 2019; Publication Co-chair, ASPLOS, 2018; TPC Member, WearSys, 2017; External Review Committee Member, MobiSys, 2017; Web chair & TPC Member, ISLPED, 2016: External Review Committee Member, ASPLOS, 2016: TPC Member, Workshop on Mobile Gaming, 2015; TPC Member, ISLPED, 2015; TPC Member, HotPower, 2015; External Review Committee Member, ASPLOS, 2015;

IEEE

Activity: TPC Member, IoTDI, 2022; TPC Member, ICDCS, 2018; TPC Member, SECON, 2016; TPC Member, SECON, 2015

Outreach Activities

Faculty advisor, Purdue Mechatronics Club Judge, Purdue EXPO Scholarship, 2018 Judge, Spark Challenge, 2018, 2019 Faculty advisor, Purdue SURF, 2016, 2017, 2018, 2019