

Mengwei Xu (徐梦炜)

Associate Professor, Doctoral Advisor

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Research Interests

System Software for AI and Resource-constrained Scenarios

Education

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|-------------------|---|
| 09/2015 – 07/2020 | PhD in Computer Science , Peking University <ul style="list-style-type: none">• Advisor: Prof. Gang Huang, Prof. Xuanzhe Liu |
| 09/2011 – 07/2015 | BS in Computer Science , Peking University |

Employment & Experience

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|-------------------|--|
| 01/2024 – present | Associate Professor , BUPT |
| 07/2020 – 12/2023 | Assistant Professor , BUPT |
| 12/2020 – 03/2021 | “Star-track” Visiting Scholar , Microsoft Research Asia |
| 11/2018 – 11/2019 | Visiting Scholar , Purdue University <ul style="list-style-type: none">• Advisor: Prof. Felix Xiaozhu Lin |
| 03/2015 – 03/2016 | Research Intern , Microsoft Research Asia <ul style="list-style-type: none">• Mentor: Dr. Yunxin Liu |

Honors & Awards

- USENIX ATC Best Paper Award, 2024
- ICSOC Distinguished Paper Award, 2023
- IEEE Open Software Services Award, 2022
- Microsoft Research Star-track Visiting Faculty Program, 2021
- ACM SIGMobile China Distinguished PhD Thesis, 2021

Conference Proceedings (*=co-primary)

1. “Federated Fine-tuning of Billion-Sized Language Models across Mobile Devices”
Mengwei Xu, Yaozong Wu, Dongqi Cai, Xiang Li, Shangguang Wang, in *USENIX Annual Technical Conference (USENIX ATC)*. Acceptance rate = 15.8% (77/488), 2024.
2. “An Empirical Study of Rust-for-Linux: The Success, Dissatisfaction, and Compromise”
Hongyu Li*, Liwei Guo*, Yexuan Yang, Shangguang Wang, **Mengwei Xu**, in *USENIX Annual Technical Conference (USENIX ATC)*. Acceptance rate = 15.8% (77/488), 2024.

3. “More is Different: Prototyping and Analyzing a New Form of Edge Server with Massive Mobile SoCs”
Li Zhang, Zhe Fu, Boqing Shi, Xiang Li, Rujin Lai, Chenyang Yang, Ao Zhou, Xiao Ma, Shangguang Wang, **Mengwei Xu**, in *USENIX Annual Technical Conference (USENIX ATC)*. Acceptance rate = 15.8% (77/488), 2024.
4. “High-density Mobile Cloud Gaming on Edge SoC Farms”
Li Zhang, Shangguang Wang, **Mengwei Xu**, in *USENIX Annual Technical Conference (USENIX ATC)*. Acceptance rate = 15.8% (77/488), 2024.
5. “Deciphering the Enigma of Satellite Computing with COTS Devices: Measurement and Analysis”
Ruolin Xing, **Mengwei Xu**, Ao Zhou, Qing Li, Yiran Zhang, Feng Qian, Shangguang Wang, in *International Conference on Mobile Computing and Networking (MobiCom)*. Acceptance rate = 23.2% (48/207, summer round), 2024.
6. “Mobile Foundation Model as Firmware”
Jinliang Yuan*, Chen Yang*, Dongqi Cai*, Shihe Wang, Xin Yuan, Zeling Zhang, Xiang Li, Dingge Zhang, Hanzi Mei, Xianqing Jia, Shangguang Wang, **Mengwei Xu**, in *International Conference on Mobile Computing and Networking (MobiCom)*. Acceptance rate = 23.2% (48/207, summer round), 2024.
7. “Towards Energy-efficient Federated Learning via INT8-based Training on Mobile DSPs”
Jinliang Yuan, Shangguang Wang, Hongyu Li, Daliang Xu, yuanchun Li, **Mengwei Xu**, Xuanzhe Liu, in *the Web Conference (WWW)*. Acceptance rate = 20.2% (2008 submissions in total), 2024.
8. “SoCFlow: Efficient and Scalable DNN Training on SoC-Clustered Edge Servers”
Daliang Xu*, **Mengwei Xu***, Chiheng Lou, Li Zhang, Gang Huang, Xin Jin, Xuanzhe Liu, in *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*. Acceptance rate = 16.2% (28/173, spring cycle), 2024.
9. “Demystifying the QoS and QoE of Edge-hosted Video Streaming Applications in the Wild with SNESet”
Yanan Li, Guangqing Deng, Changming Bai, Jingyu Yang, Gang Wang, Hao Zhang, Jin Bai, Haitao Yuan, **Mengwei Xu**, Shangguang Wang, in *International Conference on Management of Data (SIGMOD)*, 2024.
10. “Niagara: Scheduling DNN Inference Services on Heterogeneous Edge Processors”
Daliang Xu, Qing Li, **Mengwei Xu**, Kang Huang, Gang Huang, Shangguang Wang, Xin Jin, Yun Ma, Xuanzhe Liu, in *International Conference on Service-Oriented Computing (ICSOC)*, 2023.
11. “Boosting DNN Cold Inference on Edge Devices”
Rongjie Yi, Ting Cao, Ao Zhou, Xiao Ma, Shangguang Wang, **Mengwei Xu**, in *International Conference on Mobile Systems, Applications, and Services (MobiSys)*. Acceptance rate = 20.7% (41/198), 2023.
12. “ELASTIC: Edge Workload Forecasting based on Collaborative Cloud-Edge Deep Learning”
Yanan Li, Haitao Yuan, Zhe Fu, Xiao Ma, **Mengwei Xu**, Shangguang Wang, in *the Web Conference (WWW)*. Acceptance rate = 19.2% (365/1900), 2023.

13. “Federated Few-shot Learning for Mobile NLP”

Dongqi Cai, Shangguang Wang, Yaozong Wu, Felix Xiaozhu Lin, **Mengwei Xu**, in *International Conference on Mobile Computing and Networking (MobiCom)*, 2023.

14. “Efficient Federated Learning for Modern NLP”

Dongqi Cai, Yaozong Wu, Shangguang Wang, Felix Xiaozhu Lin, **Mengwei Xu**, in *International Conference on Mobile Computing and Networking (MobiCom)*. Acceptance rate = 29.4% (40/136, summer round), 2023.

15. “Mandheling: Mixed-Precision On-Device DNN Training with DSP Offloading”

Daliang Xu*, **Mengwei Xu***, Qipeng Wang, Shangguang Wang, Yun Ma, Kang Huang, Gang Huang, Xin Jin, Xuanzhe Liu, in *International Conference on Mobile Computing and Networking (MobiCom)*. Acceptance rate = 18.4% (41/223, winter round), 2022.

16. “Melon: Breaking the Memory Wall for Resource-Efficient On-Device Machine Learning”

Qipeng Wang*, **Mengwei Xu***, Chao Jin, Xinran Dong, Jinliang Yuan, Xin Jin, Gang Huang, Yunxin Liu, Xuanzhe Liu, in *International Conference on Mobile Systems, Applications, and Services (MobiSys)*. Acceptance rate = 21.7% (38/175), 2022.

17. “A Comprehensive Benchmark of Deep Learning Libraries on Mobile Devices”

Qiyang Zhang, Xiang Li, Xiangying Che, Xiao Ma, Ao Zhou, **Mengwei Xu**, Shangguang Wang, Yun Ma, Xuanzhe Liu, in *the Web Conference (WWW)*. Acceptance rate = 17.7% (323/1822), 2022.

18. “From Cloud to Edge: A First Look at Public Edge Platforms”

Mengwei Xu, Zhe Fu, Xiao Ma, Li Zhang, Yanan Li, Feng Qian, Shangguang Wang, Ke Li, Jingyu Yang, Xuanzhe Liu, in *the Internet Measurement Conference (IMC)*, acceptance rate 28.1% (55/196), 2021.

19. “Video Analytics with Zero-Streaming Cameras”

Mengwei Xu*, Tiantu Xu*, Yunxin Liu, and Felix Xiaozhu Lin, in *USENIX Annual Technical Conference (USENIX ATC)*, pages 459-472, acceptance rate 18.8% (64/341), 2021.

20. “TaintStream: Fine-grained Taint Tracking for Big Data Platforms through Dynamic Code Translation”

Chengxu Yang, Yuanchun Li, **Mengwei Xu**, Zhenpeng Chen, Yunxin Liu, Gang Huang, Xuanzhe Liu, in *The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE)*, pages 806-817, acceptance rate 24.5% (97/396), 2021.

21. “Boosting Mobile CNN Inference through Semantic Memory”

Yun Li, Chen Zhang, Shihao Han, Li Lyna Zhang, Baoqun Yin, Yunxin Liu, **Mengwei Xu**, in *The ACM Multimedia (MM)*, acceptance rate 27.9% (542/1942), 2021.

22. “Characterizing Impacts of Heterogeneity in Federated Learning upon Large-Scale Smartphone Data”

Chengxu Yang, Qipeng Wang, **Mengwei Xu**, Shangguang Wang, Kaigui Bian, Xuanzhe Liu, in *The Web Conference (WWW)*, pages 935-946, acceptance rate 20.6% (357/1736), 2021.

23. “Approximate Query Service on Autonomous IoT Cameras”
Mengwei Xu, Xiwen Zhang, Yunxin Liu, Xuanzhe Liu, and Felix Xiaozhu Lin, in *Proc. ACM Int. Conf. Mobile Systems, Applications and Services (MobiSys)*, pages 191-205, acceptance rate 19% (34/175), 2020.
24. “A First Look at Deep Learning Apps on Smartphones”
Mengwei Xu, Jiawei Liu, Yuanqiang Liu, Felix Xiaozhu Lin, Yunxin Liu, and Xuanzhe Liu, in *Proc. the World Wide Web Conference (WWW)*, pages 2125–2136, acceptance rate 18% (225/1247), 2019.
25. “DeepType: On-Device Deep Learning for Input Personalization Service with Minimal Privacy Concern”
Mengwei Xu, Feng Qian, Qiaozhu Mei, Kang Huang, and Xuanzhe Liu. in *Proc. the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*, pages 4:1-4:26, 2018.
26. “DeepCache: Principled Cache for Mobile Deep Vision”
Mengwei Xu, Mengze Zhu, Yunxin Liu, Felix Xiaozhu Lin, and Xuanzhe Liu, in *Proc. ACM Int. Conf. Mobile Computing and Networking (MobiCom)*, pages 129–144, acceptance rate 22% (42/187), 2018.
27. “PrivacyShield: A Mobile System for Supporting Subtle Just-in-time Privacy Provisioning through Off-Screen-based Touch Gestures”
Saumay Pushp, Yunxin Liu, **Mengwei Xu**, Changyoung Koh, and June-hwa Song. in *Proc. the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*, pages 2:1-2:38, 2018.
28. “Power SandBox: Power Awareness Redefined”
Liwei Guo*, Tiantu Xu*, **Mengwei Xu**, Xuanzhe Liu, and Felix Xiaozhu Lin, in *Proc. European Conference on Computer Systems (EuroSys)*, pages 37:1–37:15, acceptance rate 16% (43/262), 2018.
29. “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)*, pages 143–152, acceptance rate 17% (164/966), 2017.

Journal Publications

1. “Communication-Efficient Satellite-Ground Federated Learning through Progressive Weight Quantization”
Chen Yang*, Jinliang Yuan*, Yaozong Wu, Qibo Sun, Ao Zhou, Shangguang Wang, **Mengwei Xu**, in *IEEE Transactions on Mobile Computing (TMC)*, 2024.
2. “A Comprehensive Deep Learning Library Benchmark and Optimal Library Selection”
Qiyang Zhang, Xiangying Che, Yijie Chen, Xiao Ma, **Mengwei Xu**, Schahram Dustdar, Xuanzhe Liu, Shangguang Wang, in *IEEE Transactions on Mobile Computing (TMC)*, 2023.

3. “FLASH: Heterogeneity-Aware Federated Learning at Scale”
Chengxu Yang, **Mengwei Xu**, Qipeng Wang, Zhenpeng Chen, Kang Huang, Yun Ma, Kaigui Bian, Gang Huang, Yunxin Liu, Xin Jin, Xuanzhe Liu, in *IEEE Transactions on Mobile Computing (TMC)*, 2022.
4. “A Case for Camera-as-a-Service”
Mengwei Xu, Yunxin Liu, Xuanzhe Liu, in *IEEE Pervasive Computing, Special Issue on Pervasive Video and Audio*, 2021.
5. “Autonomous Learning System towards Mobile Intelligence”
Mengwei Xu, Yuanqiang Liu, Kang Huang, Xuanzhe Liu, and Gang Huang, in *Journal of Software (JoS*, in Chinese), 2020.
6. “DeepWear: Adaptive Local Offloading for On-Wearable Deep Learning”
Mengwei Xu, Feng Qian, Mengze Zhu, Feifan Huang, Saumay Pushp, and Xuanzhe Liu, in *IEEE Transactions on Mobile Computing (TMC)*, 19(2), pages 314-330, 2019.
7. “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)*, 16(10), pages 2913–2926, 2017.
8. “MUIT: A Domain-Specific Language and its Middleware for Adaptive Mobile Web- based User Interfaces in WS-BPEL”
Xuanzhe Liu, **Mengwei Xu**, Teng Teng, Gang Huang, and Hong Mei, in *IEEE Transactions on Services Computing (TSC)*, 2016.

Workshop Publications

1. “Towards Ubiquitous Learning: A First Measurement of On-Device Training Performance”
Dongqi Cai, Qipeng Wang, Yuanqiang Liu, Yunxin Liu, Shangguang Wang, **Mengwei Xu**. *The International Workshop on Embedded and Mobile Deep Learning (EMDL)*, co-located with MobiSys 2021.

Academic Services

- **Program Chair**
EdgeFM 2024 (co-located with MobiSys 2024)
IEEE SAGC 2022
- **TPC Member**
2024: MobiSys; ICDCS; ICWS; HotMobile; DistributedML, IEEE CLOUD
2023: MobiSys; ICWS
2022: ICWS, SCC, ICCCN
2021: ICDCS, BigCom, MobiArch@MobiCom, ICWS
2019: MobiSys Rising Stars Forum
- **(External) Reviewer**
IMWUT, TMC, TSC, TIST, etc.
- **Secretary** of IEEE Technical Community on Services Computing (2022-)

Teaching

- Operating System Practice, Undergraduates, BUPT (Spring 2023)
- Operating System, Undergraduates, BUPT (Fall 2022/2023)
- TA, Operating System Practice, Undergraduates, PKU (Spring 2017; Fall 2016).
- TA, Distributed Machine Learning Systems, Graduates, PKU (Fall 2019).
- TA, Introduction to Computing, Undergraduates, PKU (Fall 2016; Fall 2014).
- TA, Foundations of Computer Application, Undergraduates, PKU (Spring 2015).