Wenfei Wu

FIT Building 4-6014,
Tsinghua University,
Beijing 100084, P.R. China

Phone: +86 18500655635
Email: wenfeiwu@outlook.com
Homepage: http://wenfei-wu.github.io/

Education

Ph.D. Computer Science, University of Wisconsin-Madison, 2015, advisor: Prof. Aditya Akella[1]

M.S. Computer Science, University of Wisconsin-Madison, 2012

B.E. Computer Science and Technology, Beihang University, 2010

B.S. (double degree), Applied Mathematics, Beihang University, 2010.

Employments

Assistant Professor, Institute for Interdisciplinary Information Sciences, **Tsinghua University**, Dean: Andrew Chi-Chih Yao, 2017.4 - now.

Administrative Committee Member, Haihua Institute for Frontier Information Technology (link), affiliated to IIIS, 2018.12 - 2020.11.

Post-doctoral Researcher, Networking Systems Research Group, **Hewlett Packard Labs**, Manager: Sujata Banerjee, Mentor: Ying Zhang, 2016.1 - 2017.4.

Research Areas

I am broadly interested in networked systems. I am good at the following areas.

Research Areas

In-Network Computation for Distributed System, using programmable network hardware to accelerate distributed systems [2,4].

Model-Driven DevOps for Network Functions, a model-driven approach to bridge the gap between NF operation and NF development [1,3,6,8,9,10,12,21].

Cloud Network Diagnostics, building diagnostic primitives and systems for cloud networks [5,22,23,27].

Other Projects

My other contributions are classified as follows.

Network Architecture, including architecture design for the Internet, data center networks, and mobile networks [16,24,25,28,29,31].

Network Protocols, including protocol improvement for TCP and QoS appliances [11,14,18,26].

[1] Prof. Aditya Akella (link) was awarded Applied Networking Research Prize in 2015 and ACM SIGCOMM Rising Star Award in 2014, and he is a PI of CloudLab (link).

Network Management, including network diagnostics, network software development, and policy management [13,15,17,19,30].

Network Security, including malware analysis, and trusted execution environment for network services [7,20].

Teaching Experience

I taught "Yao Class" (elite undergraduate students in Tsinghua) and IIIS graduate students.

Fundamentals for Cryptography, for Yao Class, in fall 2017, fall 2018, fall 2019, and fall 2020.

Security Technologies in the Cyberspace, for IIIS graduate students, in spring 2018, spring 2019, and spring 2020.

Awards

Best Paper Runner-up. International Performance Computing and Communications Conference (IPCCC), London, UK, 2019.

Microsoft Collaborative Research Award. Microsoft Research Asia, 2018

Best Student Paper. Symposium of Cloud Computing (SoCC), Santa Clara, USA, 2013.

Grants

I received and managed 9.74 million RMB grant, including 1.61 million from NSFC, 3.2 million from the industry, and internal 4.93 million RMB in the institute.

Fusion Networks for Smart Medium, 1.34M RMB, Ministry of Science and Technology, 2020-2024. (The whole program is about 30M RMB for 10 organizations)

Rapid Development of Network Functions for Heterogeneous Networks, PI, 270K RMB, National Natural Science Foundation of China, 2019-2022.

Other grants from the industry, PI, 3.2M RMB, about NFV, SmartNIC, Network Management, and Optical Networks; provided on request.

Institute internal grants, PI, 4.93M RMB, about network verification, and machine learning infrastructure; provided on request.

Professional Services

Technical Program Committee Member

APNet'21, TPC Member

IM'21, TPC Member

SIGCOMM'20 Poster Session, TPC Member

SIGCOMM'19 Poster Session, TPC Member

ANCS'19, TPC Member

ANCS'18, TPC Member

Hot-IoT'16, TPC Member

Transaction on Computers, Reviewer

Transaction on Networking, Reviewer

Transaction on Network and Service Management, Reviewer

Internet Computing, Reviewer

Organizing Committee Member

SIGMETRICS'21, local management chair

SOSR'20, publication chair

SIGCOMM'19, registration chair

SOSR'19, publicity chair

APNet'18, local management chair

SOSR'17, travel grant chair

Reference Letters

Aditya Akella

Professor @ University of Wisconsin-Madison

Ph.D. Advisor

Email: akella@cs.wisc.edu

ACM SIGCOMM Rising Star 2014

K.K. Ramakrishnan

Professor @ University of California Riverside

Email: kk@cs.ucr.edu

ACM Fellow 2017

IEEE Fellow 2005

Li Erran Li

Alexa AI, Amazon

Adjunct Professor @ Columbia University

Email: erranlli@gmail.com

ACM Fellow 2017

IEEE Fellow 2013

Publications

I published 33 papers and 3 patents, and have 7 patents under review. My Google Scholar Citation is 1483, i10-index is 15, and h-index is 14.

Conference Papers

[1] Bangwen Deng and **Wenfei Wu***. "**NFOpt: Eliminating Redundant Logic in NF Programs using Operation-Time Configurations**". In: *the 2021 IEEE International Conference on Computer Communications*. INFOCOM '21. 2021.

[2] Yongchao He, **Wenfei Wu***, Xuemin Wen, Haifeng Li, and Yongqiang Yang. "**Scalable On-Switch Rate Limiters for the Cloud**". In: *the 2021 IEEE International Conference on Computer Communications*. INFOCOM '21. 2021.

[3] Hongyi Huang, **Wenfei Wu***, Yongchao He, Bangwen Deng, Ying Zhang, Yongqiang Xiong, Guo Chen, Yong Cui, and Peng Cheng. "**NFD: A Development Framework for Cross-Platform Network Functions**". In: *the 2021 IEEE International Conference on Computer Communications*. INFOCOM '21. 2021.

[4] ChonLam Lao, Yanfang Le, Kshiteej Mahajan, Yixi Chen, **Wenfei Wu**, Aditya Akella, and Michael Swift. "**ATP: In-Network Aggregation for Multi-Tenant Learning**". In: *the 18th USENIX Symposium on Networked Systems Design and Implementation*. NSDI '21. 2021.

[5] Ming Sun, Ya Su, Shenglin Zhang, Junliang Tang, Yuanpu Cao, Yuqing Liu, **Wenfei Wu***, Dan Pei, Yongsu Zhang, and Xiaozhou Liu. "**CTF: Anomaly Detection in High-Dimensional Time Series with Coarse-to-Fine Model Transfer**". In: *the 2021 IEEE International Conference on Computer Communications*. INFOCOM '21. 2021.

[6] Bangwen Deng, **Wenfei Wu***, and Linhai Song. "**Redundant Logic Elimination in Network Functions**". In: *Proceedings of the 2020 Symposium on SDN Research*. SOSR '20. Google Scholar Citation 0. 2020.

[7] Qingxiu Liu, **Wenfei Wu***, Qingsong Liu, and Qun Huang. "**T2DNS: A Third-Party DNS Service with Privacy Preservation and Trustworthiness**". In: *Proceedings of the 29th International Conference on Computer Communications and Networks*. ICCCN '20. Google Scholar Citation 0. 2020.

[8] Harsha Sharma, **Wenfei Wu***, and Bangwen Deng. "**Symbolic Execution for Network Functions with Time-Driven Logic**". In: *Proceedings of the 2020 Symposium on Modelling, Analysis, and Simulation of Computer and Telecommunication Systems*. MASCOTS '20. Google Scholar Citation 0. 2020.

[9] Yongheng Chen, Linhai Song, Xinyu Xing, Fengyuan Xu, and **Wenfei Wu**. "**Automated Finite State Machine Extraction**". In: *Proceedings of the 2019 Workshop on Forming an Ecosystem Around Software Transformation*. FEAST '19. Google Scholar Citation 0. 2019.

[10] Yimin Jiang, Yong Cui, **Wenfei Wu**, Zhe Xu, Jiahan Gu, K. K. Ramakrishnan, Yongchao He, and Xuehai Qian. "**SpeedyBox: Low-Latency NFV Service Chains with Cross-NF Runtime Consolidation**". In: *Proceedings of the 39th IEEE International Conference on Distributed Computing Systems*. ICDCS '19. Google Scholar Citation 6. 2019.

[11] Junfeng Li, Dan Li, **Wenfei Wu**, K. K. Ramakrishnan, Jinkun Geng, Fei Gui, Fanzhao Wang, and Kai Zheng. "**Sphinx: A Transport Protocol for High-Speed and Lossy Mobile Networks**". In: *Proceedings of the 38th IEEE International Performance Computing and Communications Conference*. IPCCC '19. Google Scholar Citation 0. 2019.

[12] Soo-Jin Moon, Jeffrey Helt, Yifei Yuan, Yves Bieri, Sujata Banerjee, Vyas Sekar, **Wenfei Wu**, Mihalis Yannakakis, and Ying Zhang. "**Alembic: Automated Model Inference for Stateful Network Functions**". In: *Proceedings of the 16th USENIX Symposium on Networked Systems Design and Implementation*. NSDI '19. Google Scholar Citation 8. 2019.

[13] Qi-An Fu and **Wenfei Wu***. "**TUS: A Transactional Update Service for SDN Applications**". In: *Proceedings of the 9th ACM SIGOPS Asia-Pacific Workshop on Systems*. APSys '18. Google Scholar Citation 0. 2018.

[14] Qingmei Ren, Yong Cui, **Wenfei Wu**, Changfeng Chen, Yuchi Chen, Jiangchuan Liu, and Hongyi Huang. "**Improving Quality of Experience for Mobile Broadcasters in Personalized Live Video Streaming**". In: *2018 IEEE/ACM 26th International Symposium on Quality of Service*. IWQoS '18. Google Scholar Citation 1. 2018.

[15] Ye Yu, Ying Zhang, **Wenfei Wu**, and Chen Qian. "**NetCP: Consistent, Non-interruptive and Efficient Checkpointing and Rollback of SDN**". In: *2018 IEEE/ACM 26th International Symposium on Quality of Service*. IWQoS '18. Google Scholar Citation 3. 2018.

[16] Anubhavnidhi Abhashkumar, Joon-Myung Kang, Sujata Banerjee, Aditya Akella, Ying Zhang, and **Wenfei Wu**. "**Supporting Diverse Dynamic Intent-based Policies using Janus**". In: *Proceedings of the 13th ACM International on Conference on emerging Networking Experiments and Technologies*. CoNEXT '17. Google Scholar Citation 18. 2017.

[17] Anubhavnidhi Abhashkumar, Jeongkeun Lee, Jean Tourrilhes, Sujata Banerjee, **Wenfei Wu**, Joon-Myung Kang, and Aditya Akella. "**P5: Policy-driven optimization of P4 pipeline**". In: *Proceedings of the 2017 Symposium on SDN Research*. SOSR '17. Google Scholar Citation 15. 2017.

[18] Keqiang He, Weite Qin, Qiwei Zhang, **Wenfei Wu**, Junjie Yang, Tian Pan, Chengchen Hu, Jiao Zhang, Brent Stephens, Aditya Akella, and Ying Zhang. "**Low Latency Software Rate Limiters for Cloud Networks**". In: *Proceedings of the 2017 Asia-Pacific Workshop on Networking*. APNet '17. Google Scholar Citation 9. 2017.

[19] Ying Zhang, **Wenfei Wu**, Sujata Banerjee, Joon-Myung Kang, and Mario A Sanchez. "**SLA-Verifier: Stateful and Quantitative Verification for Service Chaining**". In: *Proceedings of the 2017 IEEE Conference on Computer Communications*. INFOCOM '17. Google Scholar Citation 16. 2017.

[20] Linhai Song, Heqing Huang, Wu Zhou, **Wenfei Wu**, and Yiying Zhang. "**Learning from Big Malwares**". In: *Proceedings of the 7th ACM SIGOPS Asia-Pacific Workshop on Systems*. APSys '16. Google Scholar Citation 5. 2016.

[21] **Wenfei Wu**, Ying Zhang, and Sujata Banerjee. "**Automatic Synthesis of NF Models by Program Analysis**". In: *Proceedings of the 15th ACM Workshop on Hot Topics in Networks*. HotNets '16. Google Scholar Citation 27. 2016.

[22] Aaron Gember-Jacobson, **Wenfei Wu**, Xiujun Li, Aditya Akella, and Ratul Mahajan. "**Management plane analytics**". In: *Proceedings of the 2015 ACM Conference on Internet Measurement Conference*. IMC '15. Google Scholar Citation 16. 2015.

[23] **Wenfei Wu**, Keqiang He, and Aditya Akella. "**Perfsight: Performance diagnosis for software dataplanes**". In: *Proceedings of the 2015 ACM Conference on Internet Measurement Conference*. IMC '15. Google Scholar Citation 30. 2015.

[24] Mehrdad Moradi, **Wenfei Wu**, Li Erran Li, and Zhuoqing Morley Mao. "**SoftMoW: recursive and reconfigurable cellular WAN architecture**". In: *Proceedings of the 10th ACM International on Conference on emerging Networking Experiments and Technologies*. CoNEXT '14. Google Scholar Citation 63. 2014.

[25] **Wenfei Wu**, Li Erran Li, Aurojit Panda, and Scott Shenker. "**PRAN: Programmable radio access networks**". In: *Proceedings of the 13th ACM Workshop on Hot Topics in Networks*. HotNets '14. Google Scholar Citation 28. 2014.

[26] **Wenfei Wu**, Yizheng Chen, Ramakrishnan Durairajan, Dongchan Kim, Ashok Anand, and Aditya Akella. "**Adaptive data transmission in the cloud**". In: *2013 IEEE/ACM 21st International Symposium on Quality of Service*. IWQoS '13. Google Scholar Citation 5. 2013.

[27] **Wenfei Wu**, Guohui Wang, Aditya Akella, and Anees Shaikh. "**Virtual network diagnosis as a service**". In: *Proceedings of the 4th annual Symposium on Cloud Computing*. SoCC '13. Google Scholar Citation 33. 2013.

[28] Dongsu Han, Ashok Anand, Fahad Dogar, Boyan Li, Hyeontaek Lim, Michel Machado, Arvind Mukundan, **Wenfei Wu**, Aditya Akella, David G. Andersen, John W. Byers, Srinivasan Seshan, and Peter Steenkiste. "**XIA: Efficient Support for Evolvable Internetworking**". In: *Proceedings of the 9th USENIX Symposium on Networked Systems Design and Implementation*. NSDI '12. Google Scholar Citation 196. 2012.

[29] Ashok Anand, Fahad Dogar, Dongsu Han, Boyan Li, Hyeontaek Lim, Michel Machado, **Wenfei Wu**, Aditya Akella, David G Andersen, John W Byers, et al. "**XIA: An architecture for an evolvable and trustworthy Internet**". In: *Proceedings of the 10th ACM Workshop on Hot Topics in Networks*. HotNets '11. Google Scholar Citation 154. 2011.

[30] Kai Chen, Chuanxiong Guo, Haitao Wu, Jing Yuan, Zhenqian Feng, Yan Chen, Songwu Lu, and **Wenfei Wu**. "**Generic and Automatic Address Configuration for Data Center Networks**". In: *Proceedings of the ACM SIGCOMM 2010 Conference*. SIGCOMM '10. Google Scholar Citation 71. 2010.

[31] Chuanxiong Guo, Guohan Lu, Helen J. Wang, Shuang Yang, Chao Kong, Peng Sun, **Wenfei Wu**, and Yongguang Zhang. "**SecondNet: A Data Center Network Virtualization Architecture with Bandwidth Guarantees**". In: *Proceedings of the 6th International COnference on emerging Networking EXperiments and Technologies (CoNEXT)*. CoNEXT '10. Google Scholar Citation 713. 2010.

Journal Papers

[1] **Wenfei Wu** and Ying Zhang. "**Network Function Modeling and Its Applications**". In: *IEEE Internet Computing* (2017). Google Scholar Citation 3.

[2] Kai Chen, Chuanxiong Guo, Haitao Wu, Jing Yuan, Zhenqian Feng, Yan Chen, Songwu Lu, and **Wenfei Wu**. "**DAC: generic and automatic address configuration for data center networks**". In: *IEEE/ACM Transactions on Networking* (2012). Google Scholar Citation 33.

Patents

[1] Joon Myung Kang, Anubhavnidhi Abhashkumar, Sujata Banerjee, Ying Zhang, and **Wenfei Wu**. "**Generating composite network policy**". In: (2018). US Patent 10812342.

[2] **Wenfei Wu**, Ying Zhang, and Sujata Banerjee. "**Middlebox modeling**". In: (2018). US Patent 10594574.

[3] Ying Zhang, **Wenfei Wu**, and Sujata Banerjee. "**Selectively monitoring a network of network function chains based on probability of service level agreement violation**". In: (2018). US Patent 10491528.