Tianhao Wang

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Research Interests

My research focuses on differential privacy (DP). I take a holistic approach and investigate different aspects of DP, all the way from theoretical understanding to end-to-end applications, data-driven optimizations, system building, and user perception, with an emphasis on creating solid foundations for practical solutions. Besides DP, I also work in machine learning privacy and applied cryptography.

Education

Department of Computer Science, Purdue University	**Advisor: Ninghui Li**
PhD in Computer Science, GPA 4.00/4.00	*Aug 2015–May 2021*
Software School, Fudan University	**Advisor: Yunlei Zhao**
BS in Software Engineering, GPA 3.79/4.00 (Rank 1/79)	*Sep 2011–July 2015*

Professional Experience

University of Virginia	
Assistant Professor	*Jan 2022–*
Carnegie Mellon University	**Mentor: Elaine Shi**
Post Doctoral Fellow	*May 2021–Dec 2021*
Tumult Labs	**Mentor: Ashwin Machanavajjhala**
Research Intern	*May 2020–Aug 2020*
Alibaba	**Mentor: Bolin Ding**
Research Intern	*Aug 2018–Jan 2019*

Awards

NIST Challenge for a Better Meter Stick for Differential Privacy: 1st place	*2021*
NIST Differential Privacy Temporal Map Challenge: 2nd, 4th, and 3rd places in three phases	*2021*
iDASH Secure Genome Analysis Competition (**Track III**): 2nd place	*2020*
Bilsland Dissertation Fellowship: 1 of 3 in Department	*2019*
NIST Differential Privacy Synthetic Data Challenge: 2nd place in all three phases	*2019*
Symantec Research Labs Graduate Fellowship: Finalist	*2019*
NIST Unlinkable Data Challenge: Runner-up and Pepple's choice	*2018*
Emil Stefanov Memorial Fellowship: Only One in Department	*2018*
Excellent Graduation Thesis: Only One in Software School	*2015*
Graduate Star: 1 of 20 in Fudan University	*2015*
Google Excellence Scholarship: 1 of 58 nationwide (undergrads and grads combined)	*2014*
Outstanding Student: 1 of 10 in Fudan University	*2014*
National Scholarship: Only One in Software School	*2012*

Publications

Conference Papers...

1. **Continuous Release of Data Streams under both Centralized and Local Differential Privacy (CCS'21)**
Tianhao Wang, Joann Chen, Zhikun Zhang, Dong Su, Yueqiang Cheng, Zhou Li, Ninghui Li, Somesh Jha

2. **When Machine Unlearning Jeopardizes Privacy (CCS'21)**
Min Chen, Zhikun Zhang, Tianhao Wang, Michael Backes, Mathias Humbert, Yang Zhang

3. **PrivSyn: Differentially Private Data Synthesis (USENIX'21)**
Zhikun Zhang, Tianhao Wang, Jean Honorio, Ninghui Li, Michael Backes, Shibo He, Jiming Chen, Yang Zhang

4. **Answering Multi-Dimensional Range Queries under Local Differential Privacy (VLDB'21)**
Jianyu Yang, Tianhao Wang, Ninghui Li, Xiang Cheng, Sen Su

5. **Differential Privacy for Text Analytics via Natural Text Sanitization (ACL'21 Findings)**
Xiang Yue, Minxin Du, Tianhao Wang, Yaliang Li, Huan Sun, Sherman Chow

6. **Improving Utility and Security of the Shuffler-based Differential Privacy (VLDB'20)**
Tianhao Wang, Bolin Ding, Min Xu, Zhicong Huang, Cheng Hong, Jingren Zhou, Ninghui Li, Somesh Jha

7. **Collecting and analyzing data jointly from multiple services under local differential privacy (VLDB'20)**
Min Xu, Bolin Ding, Tianhao Wang, Jingren Zhou

8. **Towards Effective Differential Privacy Communication for User Data Sharing Decision and Comprehension (SP'20)**
Aiping Xiong, Tianhao Wang, Ninghui Li, Somesh Jha

9. **Recovering Distributions under Local Differential Privacy (SIGMOD'20)**
Zitao Li, Tianhao Wang, Milan Lopuhaä-Zwakenberg, Ninghui Li, Boris Skoric

10. **Consistent and Accurate Frequency Oracles under Local Differential Privacy (NDSS'20)**
Tianhao Wang, Milan Lopuhaä-Zwakenberg, Zitao Li, Ninghui Li, Boris Skoric

11. **Koinonia: Verifiable E-Voting with Long-term Privacy (ACSAC'19)**
Huangyi Ge, Sze Yiu Chau, Victor E Gonsalves, Huian Li, Tianhao Wang, Xukai Zou, Ninghui Li

12. **Answering Multi-Dimensional Analytical Queries under Local Differential Privacy (SIGMOD'19)**
Tianhao Wang, Bolin Ding, Jingren Zhou, Cheng Hong, Zhicong Huang, Ninghui Li, Somesh Jha

13. **Locally Differentially Private Frequent Itemset Mining (SP'18)**
Tianhao Wang, Ninghui Li, Somesh Jha

14. **Marginal Release via Local Differential Privacy (CCS'18)**
Zhikun Zhang, Tianhao Wang (co-first author), Ninghui Li, Shebo He, Jiming Chen

15. **Locally Differentially Private Protocols for Frequency Estimation (USENIX'17)**
Tianhao Wang, Jeremiah Blocki, Ninghui Li, Somesh Jha

16. **On the Security and Usability of Segment-based Visual Cryptographic Authentication Protocols (CCS'16)**
Tianhao Wang, Huangyi Ge, Omar Chowdhury, Hemanta Maji, Ninghui Li

17. **Secure Dynamic SSE via Access Indistinguishable Storage** (AsiaCCS'16)
Tianhao Wang, Yunlei Zhao

18. **Weight Balancing on Boundaries and Skeletons** (SoCG'14)
..., Tianhao Wang, ... (alphabetical order)

Journal Articles..
19. **Locally Differentially Private Heavy Hitters Identification** (TDSC'21)
Tianhao Wang, Ninghui Li, Somesh Jha

20. **PURE: A Framework for Analyzing Proximity-based ContactTracing Protocols** (CSUR'21)
Fabrizio Cicala, Weicheng Wang, Tianhao Wang, Ninghui Li, Elisa Bertino, Faming Liang, Yang Yang

21. **DPSyn: Experiences in the NIST Differential Privacy Data Synthesis Challenges** (JPC'21)
Ninghui Li, Zhikun Zhang, Tianhao Wang

22. **A Simple Algorithm for Finding All k-edge-connected Components** (PLoS ONE'15)
Tianhao Wang, Yong Zhang , Francis Y. L. Chin, Hing-Fung Ting, Yung H. Tsin, Sheung-Hung Poon

Tutorials...
23. **Privacy at Scale: Local Differential Privacy in Practice** (SIGMOD'18)
Graham Cormode, Somesh Jha, Tejas Kulkarni, Ninghui Li, Divesh Srivastava, Tianhao Wang(alphabetical order)

Student Mentorship

Joann Chen (**female**): PhD student from UC Irvine, working on DP side channels	*2020-now*
Rui Wen: PhD student from CISPA, working on shuffler DP	*2020-now*
Min Chen (**female**): PhD student from CISPA, working on machine learning privacy	*2020-now*
Jianyu Yang: Visiting Student from BUPT, worked on LDP range queries	*2018-2020*
Zhikun Zhang: Visiting Student from Zhejiang University, worked on LDP marginals	*2017-2018*

Services

PC Member: CCS'21-22, PETS'21-22, AsiaCCS'21-22, ESORICS'21-22, EUROSP'22, AAAI'22 (Senior PC), DLS'22, AISec'21, TPDP'21, TPDP'19

Invited Talks

Rutgers System Research Seminar: Supporting Database Systems with Differential Privacy	*Dec 2020*
UC Irvine ECE Seminar: Answering Multi-Dimensional Queries under Local Differential Privacy	*Feb 2020*
CISPA Helmholtz Center for Information Security: Collecting Data with Local Differential Privacy	*July 2019*
Baidu Security Lab: Differential Privacy and Local Differential Privacy	*Dec 2017*
Purdue CERIAS Security Seminar: Locally Differential Private Protocols for Frequency Estimation	*Oct 2017*