

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

PhD in Computer Science, GPA 4.00/4.00

Advisor: Ninghui Li

Aug 2015–May 2021

Software School, Fudan University

BS in Software Engineering, GPA 3.79/4.00 (Rank 1/79)

Advisor: Yunlei Zhao

Sep 2011–July 2015

Professional Experience

University of Virginia

Assistant Professor

Jan 2022–

Carnegie Mellon University

Post doc

Mentor: Elaine Shi

May 2021–Dec 2021

Tumult Labs

Research Intern

Mentor: Ashwin Machanavajjhala

May 2020–Aug 2020

Alibaba

Research Intern

Mentor: Bolin Ding

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 People'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. **PrivSyn: Differentially Private Data Synthesis (USENIX'21)**

Zhikun Zhang, Tianhao Wang, Jean Honorio, Ninghui Li, Michael Backes, Shibo He, Jiming Chen, Yang Zhang

2. **Answering Multi-Dimensional Range Queries under Local Differential Privacy (VLDB'21)**

Jianyu Yang, Tianhao Wang, Ninghui Li, Xiang Cheng, Sen Su

3. **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

4. **Collecting and analyzing data jointly from multiple services under local differential privacy (VLDB'20)**

Min Xu, Bolin Ding, Tianhao Wang, Jingren Zhou

5. **Towards Effective Differential Privacy Communication for User Data Sharing Decision and Comprehension (SP'20)**

Aiping Xiong, Tianhao Wang, Ninghui Li, Somesh Jha

6. **Recovering Distributions under Local Differential Privacy (SIGMOD'20)**

Zitao Li, Tianhao Wang, Milan Lopuhaä-Zwakenberg, Ninghui Li, Boris Skoric

7. **Consistent and Accurate Frequency Oracles under Local Differential Privacy (NDSS'20)**

Tianhao Wang, Milan Lopuhaä-Zwakenberg, Zitao Li, Ninghui Li, Boris Skoric

8. **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

9. **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

10. **Locally Differentially Private Frequent Itemset Mining (SP'18)**

Tianhao Wang, Ninghui Li, Somesh Jha

11. **Marginal Release via Local Differential Privacy (CCS'18)**

Zhikun Zhang, Tianhao Wang (co-first author), Ninghui Li, Shebo He, Jiming Chen

12. **Locally Differentially Private Protocols for Frequency Estimation (USENIX'17)**

Tianhao Wang, Jeremiah Blocki, Ninghui Li, Somesh Jha

13. **On the Security and Usability of Segment-based Visual Cryptographic Authentication Protocols (CCS'16)**

Tianhao Wang, Huangyi Ge, Omar Chowdhury, Hemanta Maji, Ninghui Li

14. **Secure Dynamic SSE via Access Indistinguishable Storage (AsiaCCS'16)**

Tianhao Wang, Yunlei Zhao

15. **Weight Balancing on Boundaries and Skeletons (SoCG'14)**

Tianhao Wang, et al (alphabetical order)

Journal Articles.....

16. **PURE: A Framework for Analyzing Proximity-based Contact Tracing Protocols (CSUR'21 Minor Revision)**

Fabrizio Cicala, Weicheng Wang, Tianhao Wang, Ninghui Li, Elisa Bertino, Faming Liang, Yang Yang

17. Locally Differentially Private Heavy Hitters Identification (TDSC'19)

Tianhao Wang, Ninghui Li, Somesh Jha

18. 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.....

19. Privacy at Scale: Local Differential Privacy in Practice (SIGMOD'18)

Graham Cormode, Somesh Jha, Tejas Kulkarni, Ninghui Li, Divesh Srivastava, Tianhao Wang (alphabetical order)

Submitted Papers.....

20. Graph Unlearning (arXiv'21)

Min Chen, Zhikun Zhang, Tianhao Wang, Michael Backes, Mathias Humbert, Yang Zhang

21. Continuous Release of Data Streams under both Centralized and Local Differential Privacy (arXiv'20)

Tianhao Wang, Joann Chen, Zhikun Zhang, Dong Su, Yueqiang Cheng, Zhou Li, Ninghui Li, Somesh Jha

22. When Machine Unlearning Jeopardizes Privacy (arXiv'20)

Min Chen, Zhikun Zhang, Tianhao Wang, Michael Backes, Mathias Humbert, Yang Zhang

Student Mentorship

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

Services

PC Member: PETS'21-22, CCS'21, AsiaCCS'21-22, ESORICS'21, TPD'21, Globecom CISS'19-20, TPD'19

Reviewer: TDSC'21, WWW'21, CSUR'20, Information Sciences'20, TKDE'20, TDSC'20, TOPS'20, PETS'20, ICDE'20, ESORICS'20, JPC'20, JCS'20, TDSC'19, TIFS'19, JSAC'19, TKDE'19, FC'19, PETS'19, TOPS'19, Computers and Security'19, PETS'18, TIFS'18, ESORICS'18, TOPS'18, IoTJ'18, ToN'18, TDS'18, TIFS'17, TOPS'17, TMC'17

Invited Talks

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