Tianhao Wang

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Research Interests

Differential privacy, machine learning privacy, applied cryptography

Professional Experience

University of Virginia
Assistant Professor — *Jan 2022–*

Carnegie Mellon University — **Mentor: Elaine Shi**
Post Doctoral Fellow — *May 2021–Dec 2021*

Education

Purdue University — **Advisor: Ninghui Li**
PhD in Computer Science, GPA 4.00/4.00 — *Aug 2015–May 2021*

Fudan University — **Advisor: Yunlei Zhao**
BS in Software Engineering, GPA 3.79/4.00 (Rank 1/79) — *Sep 2011–July 2015*

Awards

CERIAS Diamond Award: Only One in University *2021*
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 School *2015*
Graduate Star: 1 of 20 in University *2015*
Google Excellence Scholarship: 1 of 58 nationwide (undergrads and grads combined) *2014*
Outstanding Student: 1 of 10 in University *2014*
National Scholarship: Only One in School *2012*

Publications

Conference Papers

1. **PrivTrace: Differentially Private Trajectory Synthesis by Adaptive Markov Model (USENIX'23 Minor)**
Haiming Wang, Zhikun Zhang, Tianhao Wang, Shibo He, Michael Backes, Jiming Chen, Yang Zhang

2. **Federated Boosted Decision Trees with Differential Privacy (CCS'22)**
Samuel Maddock, Graham Cormode, Tianhao Wang, Carsten Maple, Somesh Jha

3. **Graph Unlearning (CCS'22)**
Min Chen, Zhikun Zhang, Tianhao Wang, Michael Backes, Mathias Humbert, Yang Zhang

4. **Locally Differentially Private Sparse Vector Aggregation (SP'22)**
Zhou, Mingxun, Tianhao Wang, Hubert Chan, Giulia Fanti, and Elaine Shi

5. **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

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

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

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

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

10. **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

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

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

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

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

15. **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

16. **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

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

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

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

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

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

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

Journal Articles

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

24. **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

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

26. **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

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

Grant

1. **NSF: PPoSS: LARGE: Co-designing Hardware, Software, and Algorithms to Enable Extreme-Scale Machine Learning Systems (Co-PI)**
2. **NSF: CCRI: New: A Scalable Hardware and Software Environment Enabling Secure Multi-party Learning (Co-PI)**
3. **NSF: IMR: MM-1B: Foundations for Differentially Private Internet Measurement (Lead PI)**

Student Mentorship

Mingtian Tan: working on Privacy Attacks to ML *2022-now*
Xuhui Kang: working on DP ML *2022-now*
Archit Uniyal: working on Privacy Attacks to ML, (co-advising with David Evans) *2022-now*

Teaching

Spring 2023: CS 6161 Design & Analysis of Algorithms
Fall 2022: CS 4501 Data Privacy
Spring 2022: CS 6501 Data Privacy

Services

NSF Reviewer:

2022: SaTC Panelist$\times 2$, TTP Ad-hoc Reviewer, US-UK PETs Prize Challenge Reviewer

PC Member:

2023: NDSS, PETS, VLDB, ICDE, AAAI

2022: ACM CCS, PETS, AsiaCCS, ESORICS, EUROSP, Neurips, ICML, EMNLP, AAAI (Senior PC), CIKM, AISec

2021: ACM CCS, PETS, AsiaCCS, ESORICS, AISec, TPDP