# WEI-NING CHEN

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## Education

**National Taiwan University** **Taipei, Taiwan**
*Master of Science in Graduate Institute of Communication Engineering (GICE)* *2016–present*

- Overall GPA: 4.23/4.3
- Thesis: Fundamental Limits of Anonymous Statistical Inference: Privacy-Preserving Crowdsourcing

**National Taiwan University** **Taipei, Taiwan**
*Bachelor of Science in Electric Engineering and Mathematics (double major)* *2012–2016*

- Overall GPA: 3.96/4.3 (EE: 4.05/4.3, Math: 3.96/4.3)

## Research Interests

I am interested in information-theoretic and algorithmic aspects of data science, and currently focus on the generalizability of deep neural networks. My research adopts tools mainly from *information theory*, *statistical machine learning* and *theoretical statistics*.

## Publications

[1] <u>Wei-Ning Chen</u> and I-Hsiang Wang, " On the Price of Source Anonymity in Heterogeneous Parametric Point Estimation ", submitted to *IEEE International Symposium on Information Theory 2019*

[2] <u>Wei-Ning Chen</u> and I-Hsiang Wang, "Anonymous Heterogeneous Distributed Detection: Optimal Decision Rules, Error Exponents, and the Price of Anonymity", arXiv:1805.03554 (submitted to *IEEE Transaction on Information Theory*), Feb 2018

[3] <u>Wei-Ning Chen</u>, Ho-Chun Chen, and I-Hsiang Wang, "On the Fundamental Limits of Heterogeneous Distributed Detection: Price of Anonymity", *IEEE International Symposium on Information Theory* (ISIT), Vail, June 2018

[4] <u>Wei-Ning Chen</u> and I-Hsiang Wang, "Partial Data Extraction via Noisy Histogram Queries: Information Theoretic Bounds", *IEEE International Symposium on Information Theory* (ISIT), Aachen, June 2017

## Honors and Awards

**GICE Best Master Thesis Award**
*Graduate Institute of Communication Engineering, National Taiwan University* *Jan. 2019*

**The First Prize of CIEE Best Master Thesis Award**
*Chinese Institute of Electrical Engineering* *Oct. 2018*

**TIEEE Best Master Thesis Award**
*Taiwan Institute of Electrical and Electronic Engineering* *Oct. 2018*

**ISIT Student Travel Grant**
*IEEE Symposium on Information Theory (ISIT)* *Jun. 2018*

**Outstanding Students Conference Travel Grant**
*Foundation for the Advancement of Outstanding Scholarship* *Jun. 2018*

**Funding for Participation at International Conferences by Domestic Graduate Students**
*Ministry of Science and Technology (MOST)* *Jun. 2017*

**Silver Medal in Macronix Science Awards (with scholarship about US $6500)**
*Macronix Science Foundation* *Sep. 2011*

# Academic Activities

**IEEE International Conference on Communications (ICC)**
*Reviewer*                                                                    *Oct. 2018*

**IEEE East Asian School of Information Theory and Communication (EASITC)**
*Student Volunteer*                                                            *Aug. 2018*

**2017 Summer School on Information Theory, Communication Theory and Technologies**
*Attendee*                                                                    *Aug. 2017*

**IEEE Taiwan/Hong Kong Joint Workshop on Info. Theory and Communications**
*Attendee*                                                          *Aug. 2016, Aug. 2017*

# Selected Research Experiences

**Anonymous Parameter Estimation from Heterogeneous Sources**
*Networked Information and Communication Lab, Advisor: I-Hsiang Wang*      *Oct. 2018 – Jan. 2019*
- Studied parameter estimation problem with an unknown permutation on joint samples
- Characterized the performance decrease, in terms of Fisher information, due to anonymity
- Submitted to ISIT 2019, preprint available upon request

**Fundamental Limits of Privacy Preserving Crowdsourcing**
*Networked Information and Communication Lab, Advisor: I-Hsiang Wang*      *Feb. 2018 – Jul. 2018*
- Proposed optimal label recovery algorithm when crowds' relaibilities are anonymous
- Evaluated asymptotic probability of errors under Neyman-Pearson regime and Chernoff regime
- Master thesis, online version available at `https://weiningchen.github.io/paper/thesis_v4.pdf`

**Anonymous Hypothesis Testing**
*Networked Information and Communication Lab, Advisor: I-Hsiang Wang*      *Sep. 2017 – Jul. 2018*
- Proved *optimal decision rules* and specified rates of detection errors for anonymous hypothesis testing
- Presented in ISIT 2018, Vail. Full version available at `https://weiningchen.github.io/paper/isit18_AHD.pdf`
- Submitted to *IEEE Transactions on Information Theory* (under revision), preprint available at arXiv

**Data Extraction via Noisy Pooling**
*Networked Information and Communication Lab, Advisor: I-Hsiang Wang*      *Sep. 2016 – Jun. 2017*
- Characterized phase transitions between data recovery ratio and noise magnitude for the pooled data problem
- Presented at ISIT 2017, Aachen. Full version available at `https://weiningchen.github.io/paper/isit17_NHQ.pdf`

**Differential Private Distributed Estimation**
*Undergraduate Research Project, Advisor: I-Hsiang Wang*                   *Sep. 2015 – Jun. 2016*
- Proposed an statistical-efficient differential private point estimator for distributed system
- Technical report available at `https://weiningchen.github.io/paper/project_DPE.pdf`

**Direct Anonymous Attestation**
*Undergraduate Research Project, Advisor: Chen-Mou Cheng*                  *Sep. 2014 – Jun. 2015*
- Implemented "Direct Anonymous Attestation" protocol in C++
- Source codes available at `https://github.com/WeiningChen/DAA`

**Optimal Grid Partition via Buffon's Needle**
*High School Research Project, Advisor: Lee-Fu Mou*                        *Sep. 2010 – Feb. 2012*
- Extended Buffon's approach to find optimal geological grid partition which maximizes spatial resolving power
- Won silver medal in *Macronix Science Awards* with scholarship $200,000 (about US $6500) and excellent work award in *International Science Exhibition*

## Teaching Experiences

**Mathematical Principle of Machine Learning (CommE5051)**      **GICE , NTU**
*Teaching Assistant*      *Spring 2018*
- Instructed lecture on concentration inequalities

**Information Theory (EE5028)**      **GICE , NTU**
*Teaching Assistant*      *Fall 2016, Fall 2017*
- Led recitation sessions (in English)

**Calculus (MATH1202)**      **EE , NTU**
*Teaching Assistant*      *Spring 2016*
- Led recitation sessions

## Related Courses

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|---|---|
| **Analysis** | Advanced Calculus (I)(II)/ Linear Algebra (I)(II)/ Complex Analysis/ Partial Differential Equation/ Nonlinear Programing |
| **Probability and Statistics** | Probability and Statistics/ Mathematical Principle of Machine Learning/ Statistical Foundation of Data Science/ Stochastic Calculus/ Information Theory |
| **Computer Science** | Discrete Mathematics/ Operating System/ Cryptography/ Artificial Intelligence/ Advanced Algorithms/ Computation Theory |

**Reading Group:** (Organized by Prof. I-Hsiang Wang)
- Studied "Prediction, Learning, and Games" by N. Cesa-Bianchi and G. Lugosi      *Fall 2017*
- Studied "High-Dimensional Probability" by R. Vershynin      *Spring 2017*

## Technical Strengths

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|---|---|
| **Programming Skills** | C/C++, Python, Javascript, Matlab, LaTeX |
| **GRE Subject Math** | 910 (97%) |
| **GRE General** | 334/340 (V164, Q170, AW 3.5) |
| **TOEFL iBT** | 106/120 (R29, L30, S21, W26) |

## References

**I-Hsiang Wang** (Master Advisor)
🌐 website · ✉ available upon request
Associate Professor
Department of Electrical Engineering
National Taiwan University

**Shih-Chun Lin**
🌐 website · ✉ available upon request
Associate Professor
Department of Electronic and Computer Engineering,
National Taiwan University of Science and Technology