



Szu Chi Chung

POSTDOCTORAL RESEARCHER

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"If you can imagine it, you can achieve it. If you can dream it, you can become it."

Interests

Currently working as a postdoctoral researcher in Institute of Statistical Science, Academia Sinica. Have received Ph.D degree from National Chiao Tung University in Sep. 2017. I am interested in the area of data analysis and data security, including but not limited to:

Field Machine learning, Image and video data analysis, Side-channel analysis, Security system design, Big data infrastructure
Skill Software programming (Python, Java, C, C++), FPGA prototyping, ASIC chip design

Education

PHD. ELECTRICAL ENGINEERING

Sep. 2011 - Sep. 2017



National Chiao Tung University, Hsinchu, Taiwan.

- Research Group: Star group of Silicon implementation lab (SI2)
- Advisor: Chen-Yi Lee
- Thesis topic: Stream Cipher and ID-Based Crypto Systems for IoT Applications
- GPA 4.0/4.0, 34 credits



BACHELOR OF EECS UNDERGRADUATE HONORS PROGRAM

Sep. 2007 - Jun. 2011

National Chiao Tung University, Hsinchu, Taiwan.

- GPA 4.0/4.0, 144 credits



EXCHANGE STUDENT IN EECS

Aug. 2010 - DEC. 2010

University of Illinois Urbana-Champaign, USA

- GPA 4.0/4.0, 13 credits



HIGH SCHOOL GRADUATION

Sep. 2004 - Jun. 2007

National Hualien High School, Taiwan

Honors & Awards

2020 **Participants**, Global Young Scientists Summit

*National Research
Foundation,
Singapore*

2019 **Third Place**, Poster Competition of Institute of Statistical Science

Academia Sinica

2016 **Dragon Gate Program Scholarship (科技部龍門計畫)**, Visiting Student Researcher to Stanford University

*Ministry Of Science
and Technology*

2013 **Second Prize**, IE Design Contest, Core Technology Category (教育部 IE 競賽)

*Ministry Of
Education*

2012 **Bronze Medal Award**, 12th Macronix Golden Silicon Award

Macronix Inc.

2012 **First Prize**, IC Design Contest, Cell-Based IC Category (教育部 IC 競賽)

*Ministry Of
Education*

2010 **EECS Study Aboard Scholarship**, Exchange student program to University of Illinois Urban-Champaign

*National Chiao
Tung University*

2007 **Second Prize**, Programming Contest for Freshman

*National Chiao
Tung University*

Academic and Working Experiences



POSTDOCTORAL RESEARCHER

Institute of Statistical Science, Academia Sinica, Taiwan.

- Laboratory Director: I-Ping Tu [↗](#)
- Research Group: Statistical Analysis for Biological Image Data [↗](#)

Dec. 2017 - PRESENT



POSTDOCTORAL RESEARCHER

National Chiao Tung University, Taiwan.

- Laboratory Director: Chen-Yi Lee [↗](#)
- Research Group: Star group of Silicon implementation lab (SI2) [↗](#)

Oct. 2017 - Nov. 2017



VISITING STUDENT RESEARCHER

Stanford University, USA.

- Project: Scalable video analysis framework
- Advisor: Wing-Hung Wong [↗](#)
- Collaborator: Tung-Yu Wu

Nov. 2016 - Aug. 2017



TEACHING ASSISTANT

National Chiao Tung University, Taiwan.

- Course: Introduction to VLSI Design
- Lecturer: Chen-Yi Lee [↗](#)

Fall 2015



TEACHING ASSISTANT

National Chiao Tung University, Taiwan.

- Course: Integrated Circuit Design Laboratory
- Lecturer: Chen-Yi Lee [↗](#) and Shyh-Jye Jou [↗](#)

Fall 2011, Fall 2013 and Fall 2014



TEACHING ASSISTANT

National Chiao Tung University, Taiwan.

- Course: Digital Circuit and System
- Lecturer: Chen-Yi Lee [↗](#)

Fall 2014



TEACHING ASSISTANT

National Chiao Tung University, Taiwan.

- Course: Electronics Laboratory (I) and (II)
- Lecturer: Meng-Wei Wang [↗](#)

2010-2014



TEACHING ASSISTANT

National Chiao Tung University, Taiwan.

- Course: Digital Circuit Laboratory
- Lecturer: Chien Chen [↗](#)

2012

Invited Talks

2. 2018/12/11, "A Dimension Reduction Method For Cryo-EM Image Processing [↗](#)", *2018 Workshop On High Dimensional Statistical Analysis*, (2018).
1. 2018/3/14, "Scalable Video Analysis Framework [↗](#)", *Institute of Statistical Science, Academia Sinica*, (2018).

Dessertion

1. Szu-Chi Chung, "Stream Cipher and ID-Based Crypto Systems for IoT Applications [↗](#)", *PHD Dessertion*, (2016).

Academic Services

2016-2017 **Reviewer**, IEEE Transactions on Circuits and Systems I (TCAS-I)

2016-2017 **Reviewer**, IEEE Transactions on Very Large Scale Integration Systems (TVLSI)

2016 **Reviewer**, IEEE Transactions on Computers

Research Projects



CRYO-EM IMAGE PROCESSING

Dec. 2017 - PRESENT

Academia Sinica, Taiwan

- Develop dimension reduction and clustering methods for cryo-EM
- Develop platform for integrating cryo-EM packages



SCALABLE VIDEO ANALYSIS FRAMEWORK

Nov. 2016 - Sep. 2017

Stanford, USA

- Bridging the gap between spark analytic framework and traditional computer vision modules
- Provides a solution to deal with distributed video/image analysis in big data framework



BIG DATA SECURITY PROJECT

Sep. 2014 - Sep. 2017

Ministry of Science and Technology, Taiwan

- Develop several high throughput Bilinear Pairing modules to support cloud security protocols
- Propose guidelines to design security modules for big data system



DELTA-NCTU IOT PROJECT

Mar. 2014 - Mar. 2016

Delta Inc., Taiwan

- Develop stream ciphers that is suited in IoT scenario
- Propose and design several implementation attack countermeasures
- Conduct side-channel attacks on the embedded system



E-HOME PROJECT



Aug. 2011 - Jun. 2014

National Science Council, Taiwan

- Develop AES and ECC modules that are suited for IoT use
- Integrate with other submodules including computer vision, wireless, memory modules

Full List of Publications

11. Szu-Chi Chung, Hsin-Hung Lin, Po-Yao Niu, Shih-Hsin Huang, I-Ping Tu, Wei-Hau Chang, "Pre-Pro is a Fast Pre-Processor for Single-Particle Cryo-EM by Enhancing 2D Classification , *Accepted by Nature Communications Biology*, (2020).
10. Szu-Chi Chung, Szu-Chi Chung, Shao-Hsuan Wang, Po-Yao Niu, Su-Yun Huang, Wei-Hau Chang, I-Ping Tu, "Two-stage dimension reduction for noisy high-dimensional images and application to Cryogenic Electron Microscopy , *Accepted by Annals of Mathematical Sciences and Applications*, (2020).
9. Szu-Chi Chung, Shih-Hao Huang, Po-Yao Niu, Su-Yun Huang, Wei-Hau Chang, I-Ping Tu, "A Two-Stage Dimension Reduction Method For Cryo-EM Image Processing , *In preparation*, (2019).
8. Szu-Chi Chung, Chun-Yuan Yu, Sung-Shine Lee, Hsie-Chia Chang, Chen-Yi Lee, "An Improved DPA Countermeasure Based on UDRPG for IoT Applications , *IEEE Transactions on Circuits and Systems I (TCAS-I)*, (2017).
7. Sung-Shine Lee, Szu-Chi Chung, Chun-Yuan Yu, Hsie-Chia Chang, Chen-Yi Lee, "A New Power Analysis Attack on Stream cipher Trivium-64 , *VLSI Design/CAD Symposium (VLSI-CAD)*, (2015).
6. Szu-Chi Chung, Jing-Yu Wu, Hsing-Ping Fu, Jen-Wei Lee, Hsie-Chia Chang, Chen-Yi Lee, "Efficient Hardware Architecture of η_T Pairing Accelerator Over Characteristic Three , *IEEE Transactions on Very Large Scale Integration (VLSI) System* **23**, 88–97 (2015).
5. Szu-Chi Chung, Sung-Shine Lee, Hsie-Chia Chang, Chen-Yi Lee, "Implementing Bilinear Pairing Accelerator Using Residue Number System , *VLSI Design/CAD Symposium (VLSI-CAD)*, (2014).
4. Jen-Wei Lee, Szu-Chi Chung, Hsie-Chia Chang, Chen-Yi Lee, "Efficient Power-Analysis-Resistant Dual-Field Elliptic Curve Cryptographic Processor Using Heterogeneous Dual-Processing-Element Architecture , *IEEE Transactions on Very Large Scale Integration (VLSI) System* **22**, 49–61 (2014).
3. Jen-Wei Lee, Szu-Chi Chung, Hsie-Chia Chang, Chen-Yi Lee, "A $3.40ms/GF(p_{521})$ and $2.77ms/GF(2^{521})$ DF-ECC Processor with Side-Channel Attack Resistance , *International Solid-State Circuits Conference (ISSCC)*, 50–51 (2013).

2. Jen-Wei Lee, Szu-Chi Chung, Hsie-Chia Chang, Chen-Yi Lee, “An Efficient Countermeasure against Correlation Power-Analysis Attacks with Randomized Montgomery Operations for DF-ECC Processor ”, *Conference on Cryptographic Hardware and Embedded Systems (CHES)* , 548–564 (2012).
1. Szu-Chi Chung, Jen-Wei Lee, Hsie-Chia Chang, Chen-Yi Lee, “High-performance elliptic curve cryptographic processor over $GF(p)$ with SPA resistance ”, *IEEE International Symposium on Circuits and Systems (ISCAS)* , 1456–1459 (2012).


References

Dr. I-Ping Tu

(Current Advisor)

Institute of Statistical Science

Academia Sinica

✉ iping@stat.sinica.edu.tw 

Dr. Chen-Yi Lee

(Ph.D. Advisor)

Department of Electronics Engineering

National Chiao Tung University

✉ cylee@si2lab.org 

Dr. Hsie-Chia Chang

(Ph.D. Co-Advisor)

Department of Electronics Engineering

National Chiao Tung University

✉ hcchang@mail.nctu.edu.tw 