Yinghua Hu

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PRINCIPAL INTERESTS

Hardware security and trust, supply chain security, cryptography, computer-aided design, formal method, logic locking.

ACADEMIC BACKGROUND

University of Southern California — **Los Angeles, CA**
Ph.D. in Electrical Engineering — 2017 - Dec. 2022 (expected)

- Advisor: Prof. Pierluigi Nuzzo.
- Dissertation Title: Toward A Risk-Aware Design Methodology for Secure Logic Locking.

University of Southern California — **Los Angeles, CA**
M.S. in Electrical Engineering — 2017 - 2019

Nankai University — **Tianjin, China**
B.S. in Electrical Engineering — 2013 - 2017

AWARDS AND HONORS

- Young Fellow, Design Automation Conference, July 2022 & July 2020.
- Charles L. Weber Memorial Outstanding Teaching Assistant Award (Honorable Mention), USC, Apr. 2021.
- Outstanding Graduates Award, Nankai University, May 2017.
- Samsung Scholarship, Samsung Electronics, Dec. 2015.
- National Scholarship, Chinese Ministry of Education, Dec. 2014.

PUBLICATIONS

Book Chapters

1. **Y. Hu**, K. Yang, S. Nazarian, P. Nuzzo, **"SANSCrypt: Sporadic-Authentication-Based Sequential Logic Encryption"**, *VLSI-SoC: Design Trends*, Springer, 2021. [link]

Conference Papers

9. Y. Zhang*, **Y. Hu***, P. Nuzzo, P. A. Beerel, **"TriLock: IC Protection with Tunable Corruptibility and Resilience to SAT and Removal Attacks"**, *IEEE Design, Automation & Test in Europe Conference & Exhibition (DATE)*, Mar. 2022. [link]
8. **Y. Hu***, Y. Zhang*, K. Yang, D. Chen, P. A. Beerel, P. Nuzzo, **"Fun-SAT: Functional Corruptibility-Guided SAT-Based Attack on Sequential Logic Encryption"**, *IEEE International Symposium on Hardware Oriented Security and Trust (HOST)*, Dec. 2021. [link] [code]
7. S. Dutta Chowdhury, G. Zhang, **Y. Hu**, P. Nuzzo, **"Enhancing SAT-Attack Resiliency and Cost-Effectiveness of Reconfigurable-Logic-Based Circuit Obfuscation"**, *IEEE International Symposium on Circuits and Systems (ISCAS)*, May. 2021. [link]
6. **Y. Hu**, K. Yang, S. Dutta Chowdhury, P. Nuzzo, **"Risk-Aware Cost-Effective Design Methodology for Integrated Circuit Locking"**, *IEEE Design,*

Automation & Test in Europe Conference & Exhibition (DATE), Feb. 2021. [link]

5. **Y. Hu**, K. Yang, S. Nazarian, P. Nuzzo, **"SANSCrypt: A Sporadic-Authentication-Based Sequential Logic Encryption Scheme"**, *IFIP/IEEE International Conference on Very Large Scale Integration (VLSI-SoC)*, Oct. 2020. [link]
4. V. Menon, G. Kolhe, J. Fifty, A. G. Schmidt, J. Monson, M. French, **Y. Hu**, P. A. Beerel, P. Nuzzo, **"Logic Obfuscation: Modeling Attack Resiliency"**, *GOMACTech*, Mar. 2020.
3. **Y. Hu**, V. Venugopalan, A. Schmidt, J. Monson, M. French, P. Nuzzo, **"Security-driven Metrics and Models for Efficient Evaluation of Logic Encryption Schemes"**, *ACM-IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE)*, Oct. 2019. [link]
2. V. Venugopalan, G. Kolhe, A. Schmidt, J. Monson, M. French, **Y. Hu**, P. A. Beerel, P. Nuzzo, **"System-Level Framework for Logic Obfuscation with Quantified Metrics for Evaluation"**, *IEEE Secure Development Conference (SecDev)*, Sept. 2019. [link]
1. V. Venugopalan, G. Kolhe, A. Schmidt, J. Monson, M. French, **Y. Hu**, P. A. Beerel, P. Nuzzo, **"Quantifying Security and Overheads for Obfuscation of Integrated Circuits"**, *GOMACTech*, Mar. 2019. [link]

Workshops, Posters, and Demos

2. **Y. Hu**, S. Dutta Chowdhury, K. Yang, M. Munir, J. Bollareddy, P. Nuzzo, **"Circumventing Machine Learning-Based Attacks to Logic Locking"**, *Design Automation Conference (DAC)*, July 2022. [link]
1. V. Venugopalan, G. Kolhe, A. Schmidt, J. Monson, M. French, **Y. Hu**, P. A. Beerel, P. Nuzzo, **"MIRAGE: A System-Level Framework for Inserting and Evaluating Logic Obfuscation"**, *IEEE International Symposium on Hardware Oriented Security and Trust (HOST)*, May 2019.

WORKING EXPERIENCE

Security Research Intern May 2022 - present
Intel Corporation, Portland, OR

- Worked in the Client Computing Group (CCG) Security Assurance and Research team.

Research Assistant Aug. 2017 - present
University of Southern California, Los Angeles, CA

- Conducted research on hardware security solutions on the integrated circuit (IC) supply chains, including the design and formal verification of IC encryption solutions that prevent successful IC reverse engineering.
- Funded by the Air Force Research Laboratory (AFRL) and the Defense Advanced Research Projects Agency (DARPA).

Software Engineering Intern May 2021 - Aug. 2021
Synopsys Inc., Mountain View, CA

- Worked on DSO.ai, the world's first autonomous AI application for chip design.
- Developed features to calculate design similarities between different designs, allowing DSO.ai to leverage the design space search history of previous designs.
- Built a user interface to visualize design similarities among a group of customer designs, which is expected to help the team conveniently develop and debug new features of design similarity.

Teaching Assistant Jan. 2020 - May 2020
University of Southern California, Los Angeles, CA

- Course: EE577A (VLSI System Design), Spring 2020.
- Held weekly discussions and guided students on fully customized VLSI system design using Cadence tools.
- Received Honorable Mention for Charles L. Weber Memorial Outstanding Teaching Assistant.

MENTORING

Summer High School Intensive in Next-Generation Engineering [link]
University of Southern California, Los Angeles, CA 2018 - 2020

- Mentored three local high school students to complete a hardware security related project for seven weeks.
- Helped the mentees prepare for relevant skill sets for college study and research.

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