Chi-Wei Chen

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Education

03.2020 - 07.2022 **National Taiwan University** Taipei, Taiwan
M.S., Electrical Engineering - cybersecurity, July 2022
- gpa : 3.9/4.0

09.2015 - 06.2019 **National Tsing Hua University** Hsinchu, Taiwan
B.S., Computer Science, June 2019
- major : 3.62/4.0

Research Experience

02.2020 - 07.2022 **Graduate Research**, National Taiwan University Taipei ,Taiwan
Department of Electrical Engineering

1. **Adversarial Malware Generation :**
   - Engineered an efficient system for generating adversarial malware, assessed using a comprehensive evaluation framework.
   - Manipulated PE files with the LIEF tool for examination by 68 antivirus engines and verified malware functionality with the Cuckoo Sandbox.
2. **Hardware Trojan Feature Selector :**
   - Designed a cross-platform hardware Trojan circuit analysis tool, which is a console application built on .NET Core 3.1, programmed in C#, and is compatible with both Windows and Linux systems, running seamlessly from the terminal.
   - Founded by Institute For Information Industry
2. **Hardware Trojan Detection :**
   - Developed a semi-supervised gate-level hardware Trojan anomaly detection method, achieving a 99.47% TPR, 99.99% TNR, and 99.99% accuracy.
   - Enhanced detection performance through topology-based location analysis.
3. **Hardware Trojan Insertion :**
   - Designed a flexible insertion framework for hardware Trojans, efficiently reducing SCOAP values to counter SCOAP-based detection.
   - Validated the greedy method's superiority over random approaches in hardware Trojan structure generation against structure-based detection.
4. **Hardware Trojan Concealment :**
   - Introduced a pioneering method to help detected hardware Trojan to escape SCOAP-based cluster detection, achieving an average 91% reduction in CC and CO values.
   - Reduced SCOAP values while maintaining an upper bound on payload trigger probability, with an average 33% FPR and 78% FNR in SCOAP-based cluster detection.

- Advisor : Prof. Sy-Yen Kuo, IEEE fellow

03.2021 - 10.2021 **Research Assistant**, National Chengchi University Taipei, Taiwan
College of Communication
- Developed and managed a web crawler program to extract sociological research data from the PTT.
- Funded by the National Science and Technology Council research program.
- Advisor: Associate Dean Prof. Jyh-Jian. Sheu

08.2020 - 07.2021 **Research Assistant**, Minghsin University of Science and Technology Hsinchu, Taiwan
Department of Finance
- Developed and managed a decision tree-based system to advance finance research.
- Funded by the National Science and Technology Council research program.
- Advisor: Associate Prof. Ko-Tsung Chu

09.2019 - 02.2020 **Research Assistant**, Academia Sinica Taipei, Taiwan
Institute of Information Science
- Developed BeDIS positioning system with LBeacon technology.
- Built user application with React and Redux.

- Evolved technology into a startup venture. link
- Advisor: Prof. Jane Liu, IEEE fellow

07.2019 - 09.2019 **Summer Intern**, Academia Sinica — Taipei, Taiwan
Institute of Information Science
- Study areas: quantum theory, algorithms, and cryptography.
- Authored educational materials in Chinese to simplify and promote understanding of quantum algorithms. link
- Advisor: Prof. Kai-Min Chung

02.2018 - 06.2019 **Undergraduate Research**, National Tsing Hua University — Hsinchu, Taiwan
Department of Computer Science
- Created a decentralized electronic ticket blockchain system for data storage using Hyperledger Fabric, Hyperledger Composer, and MongoDB.
- Developed the user interface with a React Native mobile app.
- Advisor: Prof. Ren-Song Tsay

Teaching Experience

2021 - 2022 **Teaching Assistant**, National Taiwan University — Taipei, Taiwan
- Computer Programming, Prof. Jiun-Lang Huang, spring 2021
- Machine Learning Foundation, Prof. Hsuan-Tien Lin, fall 2021
- Discrete Mathematics, Prof. Sy-Yen Kuo, fall 2021

2017 - 2018 **Teaching Assistant**, National Tsing Hua University, — Hsinchu, Taiwan
- Data Structure, Prof. Ren-Song Tsay, fall 2018
- Programming 1&2, Prof. Hwann-Tzong Chen, spring 2017

Working Experience

08.2022 - 02.2023 **Military Service** — Pingtung, Taiwan
Indigenous People Cultural Development Center

09.2017 - 03.2018 **Assistant Engineers**, Kingston
Mechanical Design Engineering Department
- Led a cross-university focus group, coordinating product testing with 200 students and providing feedback to senior engineers.
- Supported senior engineers by conducting experiments, analyzing data, and maintaining the database.

06.2017 - 09.2018 **Summer Intern**, Lee And Li Attorneys-at-law
Patent and Technology Department
- Supported senior lawyers at the largest law firm in Taiwan by reviewing research papers related to customer products and drafting patent documents.

Publications

[1] Wei-Ting Hsu, Pei-Yu Lo, Chi-Wei Chen, and Chin-Wei Tien, Sy-Yen Kuo, "Hardware Trojan Detection Method against Balanced Controllability Trigger Design," IEEE Embedded Systems Letters, 2023.

[2] C.-W. Chen, P.-Y. Lo, W.-T. Hsu, C.-W. Chen, C.-W. Tien and S.-Y. Kuo, "A Hardware Trojan Insertion Framework against Gate-Level Netlist Structural Feature-based and SCOAP-based Detection," IEEE 65th International Midwest Symposium on Circuits and Systems (MWSCAS), Fukuoka, Japan, 2022

[3] P.-Y. Lo, C.-W. Chen, W.-T. Hsu, C.-W. Chen, C.-W. Tien and S.-Y. Kuo, "Semi-supervised Trojan Nets Classification Using Anomaly Detection Based on SCOAP Features," IEEE International Symposium on Circuits and Systems (ISCAS), Austin, TX, USA, 2022

[4] Chi-Wei Chen, Pei-Yu Lo, Chin-Wei Tien, and Sy-Yen Kuo, "A Novel Hardware Trojan Insertion Method against SCOAP-based Cluster Detection Method" (under review)

[5] Jui-Lung Hung, Chi-Wei Chen, Pei-Yu Lo, Chin-Wei Tien, and Sy-Yen Kuo, "Effective Adversarial Malware Generation and Verification Framework based on Heuristic Manipulation of Executable Binaries." (preprint)

Honors

08.2020 **Best Project Awards**, Advanced information security, Ministry of Education
06.2019 **Summer Intern Scholarship**, Academia Sinica