CHUTITEP WORALERT

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EDUCATION

CLARKSON UNIVERSITY January 2019 - August 2024

Doctor of Philosophy - Ph.D, in Electrical and Computer Engineering. GPA: 3.92/4.00

- Research Area: Integration of AI for cybersecurity solutions, focusing on anomaly detection in systems using hardware-level information.

Master of Science - M.S. in Electrical and Computer Engineering GPA: 3.89/4.00

- Research Area: Optimization of Linux kernel data probing techniques for efficient hardware-level data collection.

ASSUMPTION UNIVERSITY August 2014 - December 2017

Bachelor of Engineering - BE, Computer Engineering, GPA: 3.65/4.00

- Research Area: Framework design for smart home systems incorporating LLM-based speech recognition and biometric security.

EXPERIENCE

RESEARCH ASSISTANT/ RESEARCH ASSOCIATE
Clarkson University, Potsdam, New York, USA

January 2019 - Present

- Cybersecurity Researcher:
  - Designed and developed a real-time malware detection framework in Linux using low-level hardware information with an average accuracy of over 99.91% for ransomware, cryptojacking, and Spectre attack detection.
  - Researched new malware threats, conducted in-depth malware analysis to assess risk, and implemented security measures to mitigate threats.
  - Created a secure malware lab environment using virtualization and network segregation for malware analysis and testing.
  - Deployed machine learning models for anomaly detection, leveraging time series forecasting and image pattern recognition to analyze system information and network traffic in real-time.
  - Optimized machine learning models for the application to reduce deployment costs while maintaining high accuracy.
  - Developed a lightweight secure communication system using TCP/IP for encrypted data exchange between devices in distributed system design, reducing system performance impact on user system from 8.97% to 0.65%.

- Linux kernel programming and kernel module development:
  - Developed Linux kernel module to collect hardware events from hardware registers and other kernel space data for malware analysis and program optimization applications.
  - Implemented a high-performance kernel space data probing mechanism using C and Inline Assembly, achieving sub-millisecond data collection and reducing system performance overhead by 98.7% (from 3.99% to 0.05%).
- Cluster administration:
  - Managed cluster setup and installation, ensuring efficient and reliable operation.
  - Managed access control, resource allocation, and network configuration to optimize performance and security.
  - Monitored cluster status and performed regular maintenance to ensure system availability.
  - Set up and maintained web server, ensuring availability and security.

RESEARCHER INTERNSHIP
Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud (HEIG-VD), Switzerland

April 2018 - July 2018

- Designed and developed Man-Machine Interaction (MMI) software for civil engineer structural design using C++.
- Implemented a mapping mechanism for data reprojection between 2D schemas and 3D model geometry coordinates using interpolation techniques, enabling synchronized visualization in both 2D and 3D spaces.

FULLL STACK WEB DEVELOPER
Freelance, Remote

January 2018 - June 2018

- Designed and developed the front end and back end of the website using HTML, CSS, PHP, JavaScript, and SQL.
- Created and maintained a database system, implementing security measures, including input validation and sanitization, to prevent injection attacks.

TEACHING ASSISTANT
Clarkson University and Assumption University

January 2019 - May 2024

- Computer architecture (2020- 2024)
  - Proctored and graded exams.

January 2015 - December 2017

- Microprocessor (2017)
  - Designed handout guidelines for study materials, conducted tutorial sessions, and graded homework assignments.
- Design and Analysis of Algorithms (2017)
  - Conducted tutorial sessions, and graded homework assignments.
- Microprocessor System Design Laboratory (2017)
  - Oversaw lab section, prepared lab equipment, graded lab reports, and proctored quizzes and exams.
- Electric Circuit Laboratory (2015)
  - Managed lab sections, prepared lab equipment, provided lab demonstrations, graded lab reports, and proctored quizzes and exams.
- Computer Programming (2015-2017)
  - Supervised lab and lecture sections, provided lab demonstrations, conducted tutorial sessions, graded quizzes and lab reports, and proctored quizzes and exams.

SENIOR DESIGN PROJECT
Assumption University, Thailand

January 2017 - December 2017

- Designed and implemented an IoT speech recognition framework using Raspberry Pi for a smart home system.
- Developed and trained a chatbot AI utilizing Natural Language Processing (NLP) techniques to create a smart voice assistance system, integrating REST APIs such as weather forecast, Google Maps Geocoding, and Google Distance Matrix.
- Implemented a real-time facial recognition system using OpenCV for a smart home surveillance system.
- Designed and developed a database system for managing users and smart home devices.
- Implemented an advanced access control system for the smart home central hub, incorporating facial recognition, voice biometric authentication, and passphrase requirements to enhance security.
- Designed PCB shield for relay switches and Raspberry Pi GPIO connections to automate control of home appliances.

STUDENT COUNCIL MEMBER, ACADEMIC DEPARTMENT
Assumption University, Thailand

January 2015 - December 2017

- Designed coursework and facilitated tutoring sessions and workshops for students to enhance learning outcomes.
- Hosted and organized on-campus events, fostering community engagement and academic enrichment.

CAMPUS EMERGENCY MEDICAL SERVICES (EMS) UNIT
Assumption University, Thailand

January 2015 - December 2017

- Responded to medical emergencies during university events.
- Conducted emergency first aid training for students.

SKILLS

- **Programming Languages:** C, C++, Python, Java, JavaScript, Node.js, Swift, HTML, PHP, SQL, Bash, Assembly
- **Cybersecurity:** Malware Analysis, Threat Modelling, Risk Assessment, Network Segmentation
- **System Programming:** Linux Kernel Module Development, Kernel Programming, Task Scheduling, Memory Management
- **Networking:** TCP/IP, Firewalls, Virtualization, Network Traffic Analysis, Secure Communication Protocols
- **Machine Learning:** Time Series Analysis, Anomaly Detection, Forecasting, Image Pattern Recognition, NLP Modeling
- **Tools:** GNU Debugger, VSCode, Xcode, wxWidget, Eagle, AutoCAD, OrCAD, Xilink, MATLAB, Wireshark, AWS, Google Cloud
- **Embedded Systems:** Embedded System Design, Microcontroller Programming, Internet of Things, PCB Design
- **System Administration:** Cluster Management, Access Control, Web Development, Database Design, Virtualization, IT Support

Languages: English (Fluent), Thai (Native)

HONORS & AWARDS

- Clarkson NSF Regional I-Corps. 2024
- Nicolas-Ignite research fellowship, 2019 - 2023
- IEEE-Eta Kappa Nu Honor Society, 2023
- Academic Excellence Scholarship from Assumption University, 2014 - 2017
- Academic Excellence Award, 2017
- Certificate of Recognition as a Committee member, of Vincent Mary School of Engineering, 2017
- Special Certificate of Honors from the President of the University, 2016 - 2017

CERTIFICATION

- Certified Automotive Security Engineer (CASE) - Auto-ISAC, 2024

PUBLISH WORKS

JOURNAL ARTICLE

- **C. Woralert**, C. Liu and Z. Blasingame, "HARD-Lite: A Lightweight Hardware Anomaly Realtime Detection Framework Targeting Ransomware," in IEEE Transactions on Circuits and Systems I: Regular Papers, vol. 70, no. 12, pp. 5036-5047, Dec. 2023, doi: 10.1109/TCSI.2023.3299532.

CONFERENCE PAPERS

- **Chutitep Woralert**, Chen Liu, and Zander Blasingame. 2024. Towards Effective Machine Learning Models for Ransomware Detection via Low-Level Hardware Information. In Proceedings of the 13th International Workshop on Hardware and Architectural Support for Security and Privacy (HASP '24). Association for Computing Machinery, New York, NY, USA, 10–18. https://doi.org/10.1145/3696843.3696847

- **C. Woralert**, C. Liu, Z. Blasingame and Z. Yang, "A Comparison of One-class and Two-class Models for Ransomware Detection via Low-level Hardware Information," 2023 Asian Hardware Oriented Security and Trust Symposium (AsianHOST), Tianjin, China, 2023, pp. 1-6, doi: 10.1109/AsianHOST59942.2023.10409333.

- **C. Woralert**, C. Liu and Z. Blasingame, "HARD-Lite: A Lightweight Hardware Anomaly Realtime Detection Framework Targeting Ransomware," 2022 Asian Hardware Oriented Security and Trust Symposium (AsianHOST), Singapore, Singapore, 2022, pp. 1-6, doi: 10.1109/AsianHOST56390.2022.10022111.

- **C. Woralert**, J. Bruska, C. Liu and L. Yan, "High Frequency Performance Monitoring via Architectural Event Measurement," 2020 IEEE International Symposium on Workload Characterization (IISWC), Beijing, China, 2020, pp. 114-122, doi: 10.1109/IISWC50251.2020.00020.

- P. Putthapipat, **C. Woralert** and P. Sirinimnuankul, "Speech recognition gateway for home automation on open platform," 2018 International Conference on Electronics, Information, and Communication (ICEIC), Honolulu, HI, USA, 2018, pp. 1-4, doi: 10.23919/ELINFOCOM.2018.8330715.

PATENT

- "An anomaly detection framework targeting ransomware using low-level hardware information," (2024, June 13) U.S. Patent Application 20240193271

PRESENTATION

- Chen Liu, and **Chutitep Woralert**, "Low-Level Hardware Information Assisted Approach Towards Computer System Security," 4th Annual North Country Cybersecurity (NCCSC), Plattsburgh, NY, United States, 2022

- Chen Liu, and **Chutitep Woralert**, "High Frequency Performance Monitoring via Architectural Event Measurement," Benchmarking in the Data Center: Expanding to the Cloud (BID) Conference Principles and Practice of Parallel Programming (PPoPP), Seoul, South Korea, 2022

- Chen Liu, and **Chutitep Woralert**, "High Frequency Performance Monitoring via Architectural Event Measurement," BenchCouncil International Symposium on Benchmarking (Bench), 2021

POSTER SECTION

- Zhiliu Yang, Chen Liu, and **Chutitep Woralert** (presenter), "TUPPer-Map: Temporal and Unified Panoptic Perception for 3D Metric-Semantic Mapping," Electric, Connected and Autonomous Technologies for Mobility (eCAT), Detroit, MI, 2023

- Zhiliu Yang, Bo Yu, Wei Hu, Jie Tang, Shoshan Liu, Chen Liu, and **Chutitep Woralert** (presenter), "π-Map: A Decision-Based Sensor Fusion with Global Optimization for Indoor Mapping," Electric, Connected and Autonomous Technologies for Mobility (eCAT), Detroit, MI, 2023

EXHIBITION

- "NSF IUCRC Electric, Connected and Autonomous Technologies for Mobility (eCAT) center," IEEE/RSJ International Conference on Intelligent on Robots and Systems (IROS), Detroit, MI, 2023

PEER REVIEW

- Journal of System Architecture (JSA) - 2024
- International Workshop on Programming Models and Applications for Multicores and Manycores (PMAM) - 2024
- IEEE Transaction of Neural Systems and Rehabilitation Engineering (TNSRE) - 2023
- IEEE International Conference on Big Data - 2023
- IEEE International Conference on Mobility: Operation, Services, and Technologies (MOST) - 2023
- International Workshop on Programming Models and Applications for Multicores and Manycores (PMAM) - 2023
- International Smart Cities Conference (ISC2) - 2021
- Internet of Things (IOT-D) - 2020
- IEEE International Symposium on Workload Characterization (IISWC) - 2020
- Journal of Information Processing System (JIPS) - 2020
- International Workshop on Programming Models and Applications for Multicores and Manycores (PMAM) -2020
- Future Generation Computer Systems (FGCS) - 2019
- Workload Distribution Strategy for Compute Intensive Applications on Heterogenous Computing Platform - 2019
- IEEE International Conference on Biometrics (BTAS) - 2019
- CCF International Symposium on Advanced Parallel Processing Technology (APPT) - 2019
- International Conference on Data Intelligence and Security (ICDIS) - 2019