




Kyuin Lee

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EDUCATION	University of Wisconsin–Madison <i>Madison, WI</i> Ph.D. in Electrical and Computer Engineering Carnegie Mellon University <i>Pittsburgh, PA</i> M.S. in Electrical and Computer Engineering B.S. in Electrical and Computer Engineering	May 2022 May 2017 May 2016
EMPLOYMENT	University of Houston <i>Houston, TX</i> Assistant Professor, Department of Information Science Technology Samsung Research America <i>Mountain view, CA</i> Software Engineering Internship, KNOX Security team	Aug 2022–Present May 2016–Aug 2016
AWARDS & HONORS	CPS (Cyber-Physical Systems) Rising Star , CPS-VO @ National Science Foundation ECE Fall Dissertator Travel Award , UW-Madison Student Research Grants Competition , UW-Madison Richard Newton Young Fellow Award , Design Automation Conference NSF Travel Grant , International Conference on Computer Design Best Demonstration Award in SIGDA University Demo , Design Automation Conference ECE Wisconsin Distinguished Graduate Fellowship , UW-Madison Osher Lifelong Learning Institute Award , Meeting of the Minds Research Symposium	2022 2021 2019 2019 2018 2018 2017 2017
RESEARCH INTERESTS	Embedded systems, Security and privacy, Mobile computing, Internet-of-Things	
PUBLICATIONS	<p>[9] Jakob Veselsky, Jack West, Isaac Ahlgren, Abhinav Goel, Wenxin Jiang, Kyuin Lee, Younghyun Kim, James Davis, George K. Thiruvathukal, and Neil Klingensmith, “Establishing Trust in Vehicle-to-Vehicle Coordination: A Sensor Fusion Approach,” in <i>Proceedings of the Workshop on Data-Driven and Intelligent Cyber-Physical Systems (DI-CPS)</i>, 2022</p> <p>[8] Kyuin Lee, Yucheng Yang, Omkar Prabhune, Aishwarya Lekshmi Chithra, Jack West, Kassem Fawaz, Neil Klingensmith, Suman Banerjee, and Younghyun Kim, “AeroKey: Using Ambient Electromagnetic Radiation for Secure and Usable Wireless Device Authentication,” in <i>Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)</i>, Vol. 6, No. 1, 2022 (Presented at the ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) 2022)</p> <p>[7] Kyuin Lee, and Younghyun Kim, “Balancing Security and Usability of Zero-interaction Pairing and Authentication for the Internet-of-Things,” in <i>Proceedings of the Workshop on CPS & IoT Security and Privacy (CPSIoTSec)</i>, pp. 29–34, Virtual, 2021</p> <p>[6] Yucheng Yang*, Kyuin Lee*, Younghyun Kim, and Kassem Fawaz, “PEDRO: Secure Pedestrian Mobility Verification in V2P Communication using COTS Mobile Devices,” in <i>Proceedings of the Workshop on CPS & IoT Security and Privacy (CPSIoTSec)</i>, pp. 41–46, Virtual, 2021 (*Equal contribution by Yang and Lee)</p> <p>[5] Jack West, Kyuin Lee, Suman Banerjee, Younghyun Kim, George K. Thiruvathukal, and Neil Klingensmith, “Moonshine: An Online Randomness Distiller for Zero-Involvement Authentication,” in <i>Proceedings of ACM International Conference on Information Processing in Sensor Networks (IPSN)</i>, pp. 93–105, Virtual, 2021</p>	

- [4]  **Kyuin Lee**, Neil Klingensmith, Dong He, Suman Banerjee, and Younghyun Kim, “**ivPair: Context-Based Fast Intra-Vehicle Device Pairing for Secure Wireless Connectivity**,” in *Proceedings of ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)*, pp. 25–30, Linz, Austria, 2020
Patent: US #11617085, KR #102404884B1
- [3] Younghyun Kim, Joshua San Miguel, Setareh Behroozi, Tianen Chen, **Kyuin Lee**, Yongwoo Lee, Jingjie Li, and Di Wu, “**Approximate Hardware Techniques for Energy-Quality Scaling Across the System**,” in *Proceedings of IEIE/IEEE International Conference on Electronics, Information, and Communication (ICEIC)*, pp. 1–5, Barcelona, Spain, 2020
- [2]  **Kyuin Lee**, Neil Klingensmith, Suman Banerjee, and Younghyun Kim, “**VoltKey: Continuous Secret Key Generation based on Power Line Noise for Zero-Involvement Pairing and Authentication**,” in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*, Vol. 3, No. 3, pp. 93:1–93:26, 2019 (Presented at the ACM International Joint Conference on Pervasive and Ubiquitous Computing (**UbiComp**) 2019)
US Patent: US #11700120, KR #102399762B1
- [1] **Kyuin Lee**, Vijay Raghunathan, Anand Raghunathan, and Younghyun Kim, “**SyncVibe: Fast and Secure Device Pairing through Physical Vibration on Commodity Smartphones**,” in *Proceedings of IEEE International Conference on Computer Design (ICCD)*, pp. 234–241, Orlando, FL, 2018

DEMOS & FORUMS

- [5] **Kyuin Lee**, “**Secure and Usable Zero-interaction Pairing and Authentication Methods for the Internet-of-Things**,” *CPS Rising Stars Workshop*, Charlottesville, VA, 2022
- [4] **Kyuin Lee**, “**Secure and Usable Zero-interaction Pairing and Authentication Methods for the Internet-of-Things**,” *Ph.D. Forum @ Design Automation Conference*, Virtual, 2021
- [3] **Kyuin Lee**, “**Secure Pairing Methods for Ubiquitous IoT Devices**,” *Richard Newton Young Student @ Design Automation Conference*, San Francisco, CA, 2018
- [2] Yongwoo Lee, and **Kyuin Lee**, “**CamPUF: Physically Unclonable Function based on CMOS Image Sensor Fixed Pattern Noise**,” *SIGDA University Demonstration @ Design Automation Conference*, San Francisco, CA, 2018
Best Demonstration Award
- [1]  **Kyuin Lee**, and Shihan Wang, “**Preventing Epidemics Via Sensing and Learning Mosquito Behaviors**,” *Meeting of the Minds Research Symposium*, Pittsburgh, PA, 2017
Osher Lifelong Learning Institute Award

PATENTS

- [2] **Kyuin Lee**, Younghyun Kim, Suman Banerjee, and Neil Klingensmith, “**Pairing Apparatus Using Secret Key Based on Power Line Noise**,” U.S. Patent and Trademark Office, US11700120B2, 2023
- [1] **Kyuin Lee**, Younghyun Kim, Suman Banerjee, and Neil Klingensmith, “**Context-based Pairing Apparatus and Method Thereof**,” U.S. Patent and Trademark Office, US11617085B2, 2023

**RESEARCH
EXPERIENCE**

- Wisconsin Embedded Systems and Computing Lab** *UW-Madison* Sep 2017–May 2022
Graduate Research Assistant, Prof. Younghyun Kim
- Investigated and developed series of secure and usable device authentication (or pairing) methods leveraging various environmental contexts to prove coexistence of mobile and IoT devices.
 - Proposed SyncVibe, fast and convenient device pairing protocol to transmit and receive pairing information utilizing vibration motor and accelerometer.
 - Proposed ivPair, usable in-vehicle device pairing protocol, to derive secure pairing pin using simultaneously measured vibration within the vehicle.
 - Proposed IoT device authentication method named VoltKey, which leverages spatiotemporal randomness in the 120 V power line to authenticate devices connected to identical power line.
 - Proposed mobile and IoT device authentication method named AeroKey, which uses randomness in the ambient electromagnetic radiation (EMR) to authenticate proximate devices.
 - Proposed pedestrian mobility verification mechanism named PEDRO, where only moving pedestrians can be admitted to the vehicular ad hoc network.
 - Provided solutions to address current limitations of zero-interaction authentication works such as proximity control and predictability of the generated keys.
- Wireless Sensing and Embedded Systems Lab** *CMU* Aug 2016–May 2017
Masters Researcher, Prof. Anthony Rowe
- Designed and implemented battery-operated IoT hardware prototype capable of transmitting object distance measurement through LoRa wide area network.
 - Interfaced laser ranging breakout board with ARM Cortex-M3 processor through custom developed printed circuit board.
 - Implemented energy efficient firmware on TI-RTOS to periodically measure distance between any outdoor objects.
- System Level Design Group** *CMU* Aug 2016–May 2017
Masters Researcher, Prof. Radu Marculescu
- Connected Raspberry Pi to LoRa network for large-scale mosquito sensing across campus.
 - Implemented energy efficient k -nearest neighbors algorithm in C to classify mosquito species using measured wingbeat sound.
 - Implemented 3D simulation framework in Python to visualize and analyze mosquito population distribution on campus.
- Computational Biology Lab** *CMU* Aug 2014–May 2015
Undergraduate Researcher, Prof. Natasa Miskov-Zivanov
- Implemented an algorithm in C to compute probability of cancer cell signaling.
 - Built interactive cell signal simulating web application in Python based Django framework.
- TEACHING
EXPERIENCE**
- University of Houston** *Houston, TX*
- | | |
|--|------------------------|
| CIS 2337 Fundamentals of Information Security (Instructor) | Fall 22, 23, Spring 23 |
| CIS 6321 Principles of Cybersecurity (Instructor) | Fall 23 |
| Security and Strategic Trade Management Academy (Instructor) | Summer 22 |
- University of Wisconsin–Madison** *Madison, WI*
- | | |
|---|---------------|
| ECE 353 Introduction to Microprocessor Systems (Teaching assistant) | Spring 19, 20 |
| ECE 751 Embedded Computing Systems (Guest lecturer) | Fall 20 |
- Carnegie Mellon University** *Pittsburgh, PA*
- | | |
|--|-----------|
| 18-549 Embedded Systems Design (Teaching assistant) | Spring 17 |
| 18-349 Real-Time Embedded Systems (Teaching assistant) | Fall 16 |

SERVICE**Peer review**

Design Automation Conference, External Reviewer
Asia and South Pacific Design Automation Conference, External Reviewer
International Symposium on Low Power Electronics and Design, External Reviewer
Symposium on Applied Computing, External Reviewer
International Conference on VLSI Design, External Reviewer
The Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, External Reviewer
ACM Transactions on Embedded Computing Systems, External Reviewer

SKILLS**Programming Languages**

C, C++, Java, Python, Verilog, Scala, SQL

Hardware

ARM Cortex-M series, AVR series, Raspberry Pi series

Application Software

MATLAB, EAGLE, Altium, ModelSim, SPICE, Quartus, Bantam, Android Studio