KANG EUN JEON

Efficient Machine Learning · Sustainable IoT · Energy-Efficient Computing
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EDUCATION

2022 | 2015 **Ph.D. in Electronic & Computer Engineering**
The Hong Kong University of Science and Technology
Thesis: Smart BLE Beacons for Sustainable IoT: Hardware, Firmware and Machine Learning Co-designs
Advised by Prof. James She & Prof. Jun Zhang

2015 | 2012 **B.Eng. in Electronic Engineering**
The Hong Kong University of Science and Technology
Advised by Prof. Chi Ying Tsui

RESEARCH EXPERIENCE

now | 2022 **Postdoctoral Researcher**
SungKyunKwan University (SKKU), Suwon, Korea
- Accelerated computation algorithms for processing-in-memory architecture
- Energy-efficient/adaptive dynamic neural network architecture
- Adaptive sensing techniques for low-power operation of IoT devices

Advised by Prof. Jong Hwan Ko

2022 | 2015 **Graduate Researcher**
The Hong Kong University of Science and Technology (HKUST), Hong Kong
- Energy harvesting IoT hardware platform, *luXbeacon*, and design methodology/optimization
- Energy-saving firmware for BLE devices through a novel user existence detection mechanism
- Energy-efficient neural network architecture for long-term time-series forecasting on embedded system

2021 **Consultant**
Office of the Government Chief Information Officer (OGCIO), Hong Kong
- Integrated BLE beacon technology with Hong Kong's contact tracing app, *LeaveHomeSafe*
- Designed, manufactured and deployed 100+ energy harvesting BLE beacons, *luXbeacon*

HONORS & AWARDS

2023 **Outstanding Paper Award (Encouragement Award) –** *Samsung Electronics & Sungkyunkwan University*
Awarded to 4 best papers generated in collaboration with Samsung Electronics

2022 **Elevator Pitch Competition Champion –** *HKUST Entrepreneurship Center*
First place in the elevator pitch competition held by HKUST Entrepreneurship Center

2021 **Dream Builder Funds Award –** *HKUST Entrepreneurship Center*
Funding award to support the development and acceleration of start-up projects from HKUST

2019 **U*STAR Award –** *HKUST Technology Transfer Center*
Funding award to support start-up projects with unique and novel technologies from HKUST

2019 **FYP+ Award –** *Hong Kong X Foundation*
Selected as top 5 most outstanding projects among 100+ projects from all universities in Hong Kong

2019 **Smart Airport Accelerator Finalist –** *Airport Authority Hong Kong X Hong Kong Science and Technology Park*
Selected as top 3 most outstanding technologies to enable smart airport applications

2018 **Proof-of-Concept Fund Award –** *HKUST Technology Transfer Center*
Funding award to translate HKUST's research outcomes into viable intellectual property
Project title: User Presence-aware Firmware and IoT Analytics for Long-lasting Beacon-based IoT Network

2017 **Proof-of-Concept Fund Award –** *HKUST Technology Transfer Center*
Project title: A Crowd-assisted Software Framework for Securing Bluetooth Low Energy (BLE) Beacon Network

2017 **Postgraduate Excellence Award –** *Hong Kong Telecom Institute of Information Technology*
Awarded to 4 postgraduate students with outstanding scholarly research outputs in the areas of Networking Technology, Wireless Communications or Video/Multimedia Technology

PUBLICATIONS (484 CITATIONS)

JOURNALS AND MAGAZINES (10 + 1)

J10 **K. E. Jeon**, J. She, and S. Wong, "Energy Status Recovery using Recurrent SVR Framework with Data Loss Conditions," in *IEEE Transactions on Mobile Computing*, 2023. (under major revision)

J9 **K. E. Jeon**, J. She and T. Y. Wong, "Extending Beacon Lifetime by Predicting User Occupancy using Deep Neural Networks," in *IEEE Transactions on Mobile Computing*, 2023. (under minor revision)

J8 **K. E. Jeon**, T. N. Lin, J. She and T. Y. Wong, R. Govindan, T. Al-Ansari and B. Wang, "LuXSensing Beacon: Batteryless IoT Sensor, Design Methodology and Field-test for Sustainable Greenhouse Monitoring," in *IEEE Transactions on AgriFood Electronics*, 2023.

J7 **K. E. Jeon**, and J. She, "Sensor Information-aware Machine Learning Framework for Long-lasting IoT Sensing Device," in *IEEE Transactions on Mobile Computing*, 2023.

J6 T. Y. Wong, J. She, and **K. E. Jeon**, "An Efficient Framework of Energy Status Reporting for BLE Beacon Networks," in *IEEE Internet of Things Journal*, 2023.

J5 C. H. Lam, **K. E. Jeon**, T. Y. Wong and J. She, "Distance Estimation using BLE Beacon on Stationary and Mobile Objects," in *IEEE Internet of Things Journal*, vol. 9, no. 7, pp. 4928-4939, 2022.

J4 **K. E. Jeon** and J. She, "User Existence-aware BLE Beacon for Maximized Battery Lifetime," in *IEEE Transactions on Mobile Computing*, vol. 21, no. 1, pp. 366-377, 2022

J3 **K. E. Jeon**, J. She, J. Xue, S. Kim and S. Park, "luXbeacon—A Batteryless Beacon for Green IoT: Design, Modeling, and Field Tests," in *IEEE Internet of Things Journal*, vol. 6, no. 3, pp. 5001-5012, 2019.

J2 **K. E. Jeon**, J. She, P. Soonsawad and P. C. Ng, "BLE Beacons for Internet of Things Applications: Survey, Challenges, and Opportunities," in *IEEE Internet of Things Journal*, vol. 5, no. 2, pp. 811-828, 2018.

J1 P. C. Ng, J. She, **K. E. Jeon**, and M. Baldauf, "When Smart Devices Interact with Pervasive Screens: A Survey," in *ACM Transactions on Multimedia Computing, Communications, and Applications*, vol. 13, no. 4, pp. 55:1-55:23, 2017.

M1 P. Tedeschi, **K. E. Jeon**, J. She, T. Y. Wong, S. Bakiras and R. Di Pietro, "Privacy-Preserving and Sustainable Contact Tracing Using Batteryless BLE Beacons," in *IEEE Security & Privacy*, 2021.

CONFERENCES (16)

C16 J. Park, **K. E. Jeon**, Z. Yang, B. Yin, J. H. Ko, and L. K.B. Li, "Early detection of global instability via recurrence plots and neural networks," *2023 76th Annual Meeting of the Division of Fluid Dynamics*, 2023. (accepted)

C15 H. Bang, **K. E. Jeon**, J. Rhe, and J. H. Ko, "DCR: Decomposition-Aware Column Re-Mapping for Stuck-At-Fault Tolerance in ReRAM Arrays," *2023 IEEE International Conference on Computer Design (ICCD)*, 2023. (accepted)

C14 J. Rhe, **K. E. Jeon**, S. M. Jeong, J. C. Lee and J. H. Ko, "Kernel Shape Control for Row-Efficient Convolution on Processing-In-Memory Arrays," *2023 International Conference on Computer-Aided Design (ICCAD)*, 2023. (accepted)

C13 **K. E. Jeon**, J. Rhe, H. S. Bang and J. H. Ko, "Weight-Aware Activation Mapping for Energy-Efficient Convolution on PIM Arrays," *2023 International Symposium on Low Power Electronics and Design (ISPLED)*, 2023.

C12 J. Rhe, **K. E. Jeon**, H. S. Bang and J. H. Ko, "PAIRS: Pruning-AIded Row-Skipping for SDK-Based Convolutional Weight Mapping in Processing-In-Memory Architectures," *2023 International Symposium on Low Power Electronics and Design (ISPLED)*, 2023.

C11 S. Jeong, **K. E. Jeon**, and J. H. Ko, "Rate-Controllable and Target-Dependent JPEG-Based Image Compression Using Feature Modulation," *2023 International Conference on Multimedia and Expo Workshops*, 2023.

C10 **K. E. Jeon**, J. She, and B. Wang, "Sensor Information-aware Machine Learning Framework for Long-lasting IoT Sensing Devices," *2023 IEEE Wireless Communications and Networking Conference (WCNC)*, Glasgow, 2023.

C9 T. Y. Wong, J. She, **K. E. Jeon**, "Energy Status Recovery using Recurrent SVR Framework for Solar BLE Beacons," *2022 IEEE Wireless Communications and Networking Conference (WCNC)*, Austin, TX, 2022.

C8 P. Soonsawad, **K. E. Jeon** and J. She, "Improved Energy Harvesting with One-time Adjusted Solar Panel for BLE Beacon," *2021 IEEE 93rd Vehicular Technology Conference (VTC)*, Helsinki, 2021.

C7 **K. E. Jeon** and J. She, "BLE Beacon with User Traffic Awareness Using Deep Correlation and Attention Network," *2021 IEEE Wireless Communications and Networking Conference (WCNC)*, Nanjing, 2021.

C6 **K. E. Jeon**, J. She and T. Y. Wong, "Extending BLE Beacon Lifetime by a Novel Neural Network-driven Framework," *2020 IEEE Wireless Communications and Networking Conference (WCNC)*, Seoul, 2020.

C5 T. Y. Wong, J. She and **K. E. Jeon**, "Efficient Updates of Battery Status for BLE Beacon Network," *2019 IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob)*, Barcelona, 2019.

C4 P. Soonsawad, **K. E. Jeon**, J. She, C. H. Lam and P. C. Ng, "Maximizing Energy Harvesting with Adjustable Solar Panel for BLE Beacon," *2019 IEEE International Conference on Cyber Physical and Social Computing (CPSCom)*, Atlanta, 2019.

C3 **K. E. Jeon** and J. She, "User Existence-aware BLE Beacon Firmware for Extended Battery Lifetime," *2019 IEEE Wireless Communications and Networking Conference (WCNC)*, Marakech, 2019.

C2 **K. E. Jeon**, J. She and T. Y. Wong, "A Crowd-assisted Architecture for Securing BLE Beacon-based IoT Infrastructure,"

2018 IEEE Wireless Communications and Networking Conference (WCNC), Barcelona, 2018.

C1 **K. E. Jeon**, T. Tong and J. She, "Preliminary design for sustainable BLE Beacons powered by solar panels," *2016 IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, San Francisco, 2016.

INTELLECTUAL PROPERTIES & TECHNOLOGY TRANSFER

Now | *2015* **luXbeacon: Open Source Design Initiatives towards Green and Sustainable IoT Infrastructure**

- Developed/published open source energy harvesting IoT device design including HW, FW, and casing designs
- Adopted by 10+ academic and industrial collaborators

2021 **luXbeacon-based contact tracing on LeaveHomeSafe**
Office of the Government Chief Information Officer (OGCIO)

- Integrated BLE technology with Hong Kong's contact tracing mobile app, *LeaveHomeSafe*
- Deployed 30+ luXbeacons on public transports and delivered 100 luXbeacons

2018 **Batteryless Indoor Positioning System Infrastructure Deployment**
Electrical and Mechanical Services Department (EMSD)

- Deployed 120+ luXbeacons at EMSD headquarters for indoor positioning application
- Demonstrated batteryless operation of luXbeacons since 2018 until now

TECHNICAL REVIEWER ACTIVITIES

IEEE Communications Magazine

IEEE Internet of Things Journal

IEEE Wireless Communications and Networking Conference (WCNC)

ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)

Elsevier Computer Networks

REFERENCES

Prof. Jong Hwan Ko - Sungkyunkwan University · jhko@skku.edu

Prof. James She (Ph.D. Supervisor) - HKUST · eejames@ust.hk

Prof. Wang Zhe - HKUST · cezhewang@ust.hk

Prof. Soochang Park - Chungbuk National University · cewinter@cbnu.ac.kr

Prof. Wang Bo - Hamad Bin Khalifa University · bwang@hbku.edu.qa