# KIM, JIWON

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## Research Interests

- **On-device machine learning**
  Operating DNN models on mobile devices is critical for mitigating various problems, such as privacy and network issues, in ML-based applications. My research focuses on energy efficient on-device inference with DNN architectures capable of adaptive operation. To optimize inference efficiency, I comprehensively cover multiple layers of Android mobile devices, from the kernel to the framework and application levels, and develop targeted solutions.

- **Energy storage management systems**
  Energy storage is utilized in a diverse range of devices, from mobile systems to electric vehicles. My research focuses on intelligent energy storage management systems, including remaining capacity estimation, hybrid energy storage system design, and sensing techniques development based on various machine learning techniques. I have conducted a comprehensive array of research activities, which include battery experiments, hardware design, and software development.

- **Battery-less IoT systems**
  IoT sensor nodes are a core technology for future applications such as smart farms. Due to maintenance challenges, battery-free, light energy-harvesting sensor nodes are promising. My research concentrates on energy optimization for both energy-consuming devices and energy-supplying harvesters to ensure stable IoT device operation. I have developed both low-power IoT devices and energy-efficient harvesting mechanisms that adapt various environments based on reinforcement learning.

## Education

**Yonsei University** — Seoul, Republic of Korea
Ph.D. in Computer Science — Mar 2018 - Feb 2024

**Ewha Womans University** — Seoul, Republic of Korea
B.S. in Electronics Engineering (major), and Computer Science & Engineering (minor) — Mar 2011 - Aug 2016

## Professional Experience

**Uppsala University** — Uppsala, Sweden
Postdoctoral researcher, Department of Electrical Engineering — June 2024 - Present

**Yonsei University** — Seoul, Republic of Korea
Postdoctoral researcher, Department of Computer Science — Mar 2024 - May 2024

## Publications (SCIE Journals and International Conferences)

*NRF list denotes the top CS conference list from National Research Foundation of Korea. /* indicates co-primary authors*

1. **Ember: Task Wakeup Sequence–Based Energy Optimization for Mobile Web Browsing**,
   Seonghoon Park, **Jiwon Kim**, Jeho Lee, and Hojung Cha,
   *The ACM SIGBED International Conference on Embedded Software (EMSOFT'25)*
   *(IF: 2, NRF list).*

2. **SecureRide: Detecting Safety-threatening Behavior of E-Scooters Using Battery Information**,
**Jiwon Kim***, Geon Kim*, Jeho Lee, Thiemo Voigt, and Hojung Cha,
*The ACM SIGBED International Conference on Embedded Software (EMSOFT'25)*
*(IF: 2, NRF list).*

3. **ARIA: Optimizing Vision Foundation Model Inference on Heterogeneous Mobile Processors for Augmented Reality**,
Chanyoung Jung*, Jeho Lee*, Gunjoong Kim, **Jiwon Kim**, Seonghoon Park, and Hojung Cha,
*The 23rd ACM International Conference on Mobile Systems, Applications, and Services (MobiSys'25)*
*(IF: 3, NRF list),* ***Best Paper Award****.*

4. **Panopticus: Omnidirectional 3D Object Detection on Resource-constrained Edge Devices**,
Jeho Lee, Chanyoung Jung, **Jiwon Kim**, and Hojung Cha,
*The 30th ACM Annual International Conference on Mobile Computing and Networking (MobiCom'24)*
*(IF: 4, NRF list).*

5. **HarvAR: Mobile Augmented Reality-assisted Photovoltaic Energy Harvesting Sensor Management**,
Daeyong Kim, Junick Ahn, **Jiwon Kim**, Rhan Ha, and Hojung Cha,
*IEEE Internet of Things Journal, Vol. 11, Issue 17, Sep. 2024.*

6. **Optimizing Profitability of E-Scooter Sharing System via Battery-aware Recommendation**,
**Jiwon Kim**, Taewoong Jung, Yonghun Choi, Daeyong Kim, and Hojung Cha,
*The 22nd ACM International Conference on Mobile Systems, Applications, and Services (MobiSys'24)*
*(IF: 3, NRF list).*

7. **DNN-based Temperature Prediction of Large-Scale Battery Pack**,
**Jiwon Kim**, and Rhan Ha,
*IET Electronics Letters, Vol. 59, Issue 16, Aug. 2023.*

8. **Detecting Structural Anomalies of Quadcopter UAVs based on LSTM Autoencoder**,
Seunghyeok Jeon, Jaeyun Kang, **Jiwon Kim**, and Hojung Cha,
*Pervasive and Mobile Computing (PMC), Vol. 88, Jan. 2023.*

9. **DynLiB: Maximizing Energy Availability of Hybrid Li-Ion Battery Systems**,
**Jiwon Kim**, Sungwoo Baek, Seunghyeok Jeon, and Hojung Cha,
*IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), Vol. 41, Issue 11, Nov. 2022. (EMSOFT'22) (IF: 2, NRF list).*

10. **PVoT: Reconfigurable Photovoltaic Array for Indoor Light Energy-powered Batteryless Devices**,
**Jiwon Kim***, Eunyeong Kim*, Seunghyeok Jeon, Junick Ahn, Hyungchol Jun, and Hojung Cha, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), Vol. 41, Issue 11, Nov. 2022. (CODES+ISSS'22) (IF: 2, NRF list).*

11. **Voltage Prediction of Drone Battery Reflecting Internal Temperature**,
**Jiwon Kim**, Seunghyeok Jeon, Jaehyun Kim, and Hojung Cha,
*The 59th Design Automation Conference (DAC'22) (IF: 3, NRF list).*

12. **Optrone: Maximizing Performance and Energy Resources of Drone Batteries**,
**Jiwon Kim**, Yonghun Choi, Seunghyeok Jeon, Jaeyun Kang, and Hojung Cha,
*IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), Vol. 39, Issue 11, Nov. 2020. (EMSOFT'20) (IF: 2, NRF list).*

13. **Hydrone: Reconfigurable Energy Storage for UAV Applications**,
**Jiwon Kim**, Sungwoo Baek, Yonghun Choi, Junick Ahn, and Hojung Cha,
*IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), Vol. 39, Issue 11, Nov. 2020. (CODES+ISSS'20) (IF: 2, NRF list).*

14. **Optimizing Discharging Efficiency of Reconfigurable Battery with Deep Reinforcement Learning**, Seunghyeok Jeon, **Jiwon Kim**, Junick Ahn, and Hojung Cha,
*IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD), Vol. 39, Issue 11, Nov. 2020. (EMSOFT'20) (IF: 2, NRF list).*

## Oral Presentations

1. **SecureRide: Detecting Safety-threatening Behavior of E-Scooters Using Battery Information**,
*The ACM SIGBED International Conference on Embedded Software (EMSOFT 2025)*,
Taipei, Taiwan, Sep. 28-Oct. 3, 2025.

2. **Optimizing Profitability of E-Scooter Sharing System via Battery-aware Recommendation**,
*The 22nd ACM International Conference on Mobile Systems, Applications, and Services (MobiSys 2024)*,
Tokyo, Japan, June 03–07, 2024.

3. **DynLiB: Maximizing Energy Availability of Hybrid Li-Ion Battery Systems**,
*The ACM SIGBED International Conference on Embedded Software (EMSOFT 2022)*,
Hybrid–Shanghai, Oct. 07–14, 2022.

4. **PVoT: Reconfigurable Photovoltaic Array for Indoor Light Energy-powered Batteryless Devices**,
*The International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2022)*,
Hybrid–Shanghai, Oct. 07–14, 2022.

5. **Voltage Prediction of Drone Battery Reflecting Internal Temperature**,
*The 59th Design Automation Conference (DAC 2022)*,
San Francisco, USA, July 10–14, 2022.

6. **Optrone: Maximizing Performance and Energy Resources of Drone Batteries**,
*The ACM SIGBED International Conference on Embedded Software (EMSOFT 2020)*,
Virtual Conference, Sep. 20–25, 2020.

7. **Hydrone: Reconfigurable Energy Storage for UAV Applications**,
*The International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2020)*,
Virtual Conference, Sep. 20–25, 2020.

## Patents

1. **J. Kim**, T. Jung, H. Jun, and H. Cha, "Method and Apparatus for Estimating Battery Availability Based on Dynamic Voltage Threshold" KR Patent Application No. 10-2022-0164163, filed November 30, 2022. Patent Pending.

2. **J. Kim**, E. Kim, S. Jeon, J. Ahn, H. Jun, and H. Cha, "Reconfigurable Photovoltaic Array Monitoring Apparatus and Method" KR Patent No. 10-2674207, filed December 12, 2021 and issued June 5, 2024.

3. **J. Kim**, Y. Choi, J. Ahn, S. Jeon, and H. Cha, "Hybrid Energy Storage Device and Method for Improving Available Capacity of Drone Battery" KR Patent Application No. 10-2020-0140548, filed October 27, 2020. Patent Pending.

4. **J. Kim**, Y. Choi, S. Jeon, J. Kang, and H. Cha, "Apparatus and Method for Providing Usable Capacity of a Battery for Drone" KR Patent No. 10-2303478, filed November 21, 2019 and issued September 13, 2021.

5. S. Jeon, **J. Kim**, and H. Cha, "Battery Level Indicator and Method Displaying Battery Level Thereof" KR Patent No. 10-2091340, filed December 11, 2018 and issued March 13, 2020.

## Research Project Experiences

**Hierarchical Federated Learning for 6G Edge Computing (*Project leader*)**
VINOVA (Sweden's Innovation Agency) Oct 2024 – May 2026

**Task Relation Graph Prediction Based on RNN**
Samsung Electronics, AP S/W Development Team Mar 2023 – Feb 2024

**Development of Energy Management Techniques for Batteryless IoT System**
National Research Foundation of Korea (NRF) Mar 2019 – Feb 2022

**Development of Energy Optimization Techniques for Multi-cell Battery System**
Samsung Research, Intelligent Machine Center Apr 2019 – Dec 2019

**Development of High-Assurance ($\geq$EAL6) Secure Microkernel**
IITP, Ministry of Science and ICT Apr 2018 – Feb 2024

## Awards and Honors

**Postdoctoral Fellowship**
Swedish Foundation for International Cooperation in Research and Higher Education (STINT) Apr 2025

**Academic Research Fellowship**
BK21 PLUS Yonsei Scholarship Fall semester, 2022

**Ph.D. Fellowship**
National Research Foundation (NRF) of Korea June 2020 – May 2022

**Excellence Prize in Capstone Design**
Dept. of Electronic Engineering, Ewha Womans University Fall semester, 2015

**Academic Excellence Scholarship**
Dept. of Electronic Engineering, Ewha Womans University Fall semester, 2014

**2nd Place in LES Asia-Pacific Business Plan Competition Award**
Licensing Executive Society Nov 24, 2014

**Gold Medal in 4th International Festival of Innovations**
Federation of Inventors' Associations (IFIA) Apr 24, 2014

**Grand Prize (Prime Minister's Award, 1st place among 3,441 teams)**
Korean Intellectual Property Office, National University Invention Competition May 5, 2013

## Academic Service

**Technical Program Committee**
EWSN 2025
WAIRE workshop at IEEE BSN 2024

**Peer Review**
IEEE Transactions on Energy Conversion (selected as a star reviewer for 2023),
IEEE Transactions on Mobile Computing,
ACM Transactions on Sensor Networks,
The Journal of Supercomputing,
Applied Soft Computing

**External Reviewer**
Ubicomp 2023