KIM, JIWON

Mobile Embedded Systems Lab., Department of Computer Science, Yonsei University
Room D814, Engineering Hall #4, 50 Yonsei-ro, Seodaemun-gu, Seoul, 03722, Republic of Korea
• kim.j@yonsei.ac.kr • (+82)-2-2123-7724 • https://jwkim.page

RESEARCH INTERESTS

- **Battery management systems**
  Electrochemical batteries are employed in a wide spectrum of devices, ranging from mobile systems to electric vehicles. I have studied battery management systems, focusing on remaining usable capacity estimation, hybrid energy storage system design, and sensing techniques that leverage battery information.
- **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. I have studied machine learning techniques with a focus on energy efficient on-device inference with DNN architectures capable of adaptive operation.

EDUCATION

Yonsei University, Seoul, Republic of Korea Mar. 2018 – Present
Ph.D. Student in Computer Science
Mobile Embedded Systems Lab., Advised by Prof. Hojung Cha

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

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. **DNN-based Temperature Prediction of Large-Scale Battery Pack**,
   Jiwon Kim, and Rhan Ha
   IET Electronics Letters, Vol. 59, Issue 16, Aug. 2023.
2. **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.
3. **DynLiB: Maximizing Energy Availability of Hybrid Li-Ion Battery Systems**
   Jiwon Kim, Sungwoo Baek, Seunghyeok Jeon, and Hojung Cha,
   The ACM SIGBED International Conference on Embedded Software (EMSOFT 2022) *(IF: 2, NRF list)*.

   PVoT: Reconfigurable Photovoltaic Array for Indoor Light Energy-powered Batteryless Devices,
   Jiwon Kim*, Eunyeong Kim*, Seunghyeok Jeon Junick Ahn, Hyungchol Jun, and Hojung Cha,
   The International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2022)
   (IF: 2, NRF list).
4. **Voltage Prediction of Drone Battery Reflecting Internal Temperature**,
   Jiwon Kim, Seunghyeok Jeon, Jaehyun Kim, and Hojung Cha,
   The 59th Design Automation Conference (DAC 2022) *(IF: 3, NRF list)*.
5. **Optrone: Maximizing Performance and Energy Resources of Drone Batteries**,
   Jiwon Kim, Yonghun Choi, Seunghyeok Jeon, Jaeyun Kang, and Hojung Cha,
   The ACM SIGBED International Conference on Embedded Software (EMSOFT 2020) *(IF: 2, NRF list)*.

6. **Hydrone: Reconfigurable Energy Storage for UAV Applications**,
   Jiwon Kim, Sungwoo Baek, Yonghun Choi, Junick Ahn, and Hojung Cha,
   The International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2020) *(IF: 2, NRF list)*.
7. **Optimizing Discharging Efficiency of Reconfigurable Battery with Deep Reinforcement Learning**
   Seunghyeok Jeon, **Jiwon Kim**, Junick Ahn, and Hojung Cha,
   The ACM SIGBED International Conference on Embedded Software (EMSOFT 2020) *(IF: 2, NRF list)*.

ORAL PRESENTATIONS

1. **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.
2. **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.
3. **Voltage Prediction of Drone Battery Reflecting Internal Temperature**,
   The 59th Design Automation Conference (DAC 2022), San Fransisco, USA, July 10-14, 2022.
4. **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.
5. **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. 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.
2. **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.
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**, E. Kim, S. Jeon, J. Ahn, H. Jun, and H. Cha, "Reconfigurable Photovoltaic Array Monitoring Apparatus and Method" KR Patent Application No. 10-2021-0172113, filed December 12, 2021. Patent Pending.
5. **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.

ACADEMIC SERVICE

Peer Review
IEEE Transactions on Energy Conversion (TEC)

RESEARCH PROJECT EXPERIENCES

Task Relation Graph Prediction Based on RNN — Mar. 2023 – Feb. 2024
AP S/W Development Team, Samsung Electronics, Republic of Korea

Development of Energy Management Techniques for Batteryless IoT System — Mar. 2019 – Feb. 2022
National Research Foundation of Korea, NRF, Republic of Korea

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

Development of High-Assurance (≥EAL6) Secure Microkernel — Apr. 2018 – Present
Institute for Information &communications Technology Promotion (IITP), Ministry of Science and ICT, Republic of Korea

AWARDS AND HONORS

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 2014 LES Asia-Pacific Business Plan Competition Award, Licensing Executive Society — Nov. 24, 2014

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

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

TECHNICAL SKILLS

Software Development

- Programming Languages: C, C++, Python, MATLAB

Hardware Development

- Circuit design (PCB schematic design)
- Knowledge of simulation tools: MATLAB Simulink

Languages

- Korean – Native
- English – Advanced