Kiwan Maeng

CONTACT INFORMATION

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RESEARCH INTERESTS

My research interests lie in *co-designing different layers of the system stack for low-power hardware with unique constraints*, primarily focusing on batteryless energy-harvesting IoT devices. Batteryless energy-harvesting devices experience frequent and unexpected power failures during execution, causing correctness and efficiency issues. I design compilers, programming models, hardware, and software systems to help writing a correct and efficient program easy on such devices [2,3,5–8]. My experience of working with systems with frequent failures also has been useful in designing large-scale distributed machine learning training systems for recommendation model, which experiences frequent node failures [1].

Research Area: Intermittent Computing, Batteryless Energy-harvesting Devices, Embedded Systems, Internet-of-Things (IoT), Hardware-software Co-design, Compilers; Machine Learning, Deep Learning, Recommendation System, Distributed Training

EDUCATION

Carnegie Mellon University, Pittsburgh, PA — Aug 2016 –
Ph.D. in Electrical and Computer Engineering
- Advisor: Prof. Brandon Lucia

Seoul National University, Seoul, Korea — Aug 2016
B.S. in Electrical and Computer Engineering
Graduated with Summa Cum Laude (GPA: 4.14/4.30)

REFERRED PAPERS

[1] CPR: Understanding and Improving Failure Tolerant Training for Deep Learning Recommendation with Partial Recovery
Kiwan Maeng, Shivam Bharuka, Isabel Gao, Mark C. Jeffrey, Vikram Saraph, Bor-Yiing Su, Caroline Trippel, Jiyan Yang, Mike Rabbat, Brandon Lucia, and Carole-Jean Wu
Under review

[2] Adaptive Low-overhead Scheduling for Periodic and Reactive Intermittent Execution
Kiwan Maeng and Brandon Lucia
PLDI 2020 - Programming Language Design and Implementation

[3] Dynamic Task-based Intermittent Execution for Energy-harvesting Devices
Amjad Yousef Majid, Carlo Delle Donne, Kiwan Maeng, Alexei Colin, Kasim Sinan Yildirim, Brandon Lucia, and Przemysaw Paweczak
TOSN 2020 - ACM Transactions on Sensor Networks

[4] Enhancing Stratospheric Weather Analysis and Forecasts by Deploying Sensors from a Weather Balloon
Kiwan Maeng, Iskender Kushan, Brandon Lucia, and Ashish Kapoor
NeurIPS 2019 Workshop (spotlight talk) - Conference on Neural Information Processing Systems

[5] Supporting Peripherals in Intermittent Systems with Just-In-Time Checkpoints
Kiwan Maeng and Brandon Lucia
PLDI 2019 - Programming Language Design and Implementation

[6] Adaptive Dynamic Checkpointing for Safe Efficient Intermittent Computing
Kiwan Maeng and Brandon Lucia
OSDI 2018 - USENIX Symposium on Operating Systems Design and Implementation

[7] Alpaca: Intermittent Execution without Checkpoints
Kiwan Maeng, Alexei Colin and Brandon Lucia
OOPSLA 2017 - Object-Oriented Programming, Systems, Languages & Applications

[8] Intermittent Computing: Challenges and Opportunities
Brandon Lucia, Vignesh Balaji, Alexei Colin, Kiwan Maeng, and Emily Ruppel
SNAPL 2017

Other Papers

[9] Getting Started with Intermittent Computing
Brandon Lucia, Emily Ruppel, Kiwan Maeng, Graham Gobieski and Milijana Surbatovich
MICRO 2018 Tutorial

[10] The Midnight Engineers (Book, Korean)
Kiwan Maeng
Science comicbook for non-majors (LINK).
Won several awards including *10 Authors of the Year 2017*.

Teaching Experience

Carnegie Mellon University, Pittsburgh, PA — Spring 2020
Teaching Assistant for 15-745, *Optimizing Compilers* with Prof. Todd C. Mowry
• Tasks: Designed homeworks and delivered lectures on the LLVM framework for graduate level compiler class.

Work Experience

Facebook AI Research SysML Team, Boston, MA — May – Aug 2020
Research Scientist Intern with Prof. Carole-Jean Wu
• Tasks: Improving efficiency in large-scale distributed recommendation model training in the presence of frequent machine failures [1].

Microsoft Research, Seattle, WA — May – Aug 2019
Research Scientist Intern with Ashish Kapoor
• Tasks: Developing a hardware system and a machine learning algorithm for improving the precision of the weather forecast [4].

Carnegie Mellon University, Pittsburgh, PA — Sep 2016 –
Research Assistant with Prof. Brandon Lucia
• Tasks: Developing systems for batteryless energy-harvesting devices [2,3,5–8].

Awards & Honors

Korea Foundation for Advanced Studies Scholarship, KFAS — 2016 – 2021
Summa Cum Laude, Seoul National University — Aug 2016
National Scholarship for Science & Engineering, KOSAF — 2010 – 2016

References

Available on request