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Youngeun Kim

Personal Website

- Machine Learning
- Computer Vision
- Neuromorphic Computing

Research Interests

My research focuses on developing energy-efficient foundation models for edge and wearable AI systems. To address the growing complexity and computational demands of AI models, my research explore efficient training methods and model compression techniques such as pruning and quantization, ensuring high performance even under stringent power and memory constraints. Beyond conventional deep learning, I explore neuromorphic computing to develop AI algorithms inspired by biological neural networks, leveraging the brain's energy-efficient information processing for ultra-low-power AI. This research has strong implications for always-on applications, such as continuous health monitoring in wearable devices and low-power voice recognition on mobile platforms. My ultimate goal is to bridge theoretical advancements with practical applications, contributing to key domains such as AR/VR, healthcare, and mobile computing through energy-efficient AI solutions.

Education

Ph.D., Electrical & Computer Engineering, Yale University **Sep. 2020 — May. 2024**
Advisor: Prof. Priyadarshini Panda

M.S., Electrical Engineering, Korea Advanced Institute of Science and Technology (KAIST) **Mar. 2018 — Feb. 2020**
Advisor: Prof. Changick Kim

B.S., Electrical Engineering, Sogang University **Mar. 2012 — Feb. 2018**

Experience

Applied Scientist **Jul. 2025 — Current**
Amazon AWS AI Labs
- Working on vision-language modelsfor AWS AI service.

Machine Learning Research Scientist **Jun. 2024 — Jul. 2025**
Meta Reality Labs
- Worked on a time-series foundation model for the neuromotor interface of next-generation AR/VR controllers.

Applied Scientist Intern **Jun. 2023 — Aug. 2023**
Amazon (AWS AI Labs)
- Worked on Continual Learning with a Large-Scale Foundation Model
- [Publication] Kim, Y., et al. Open-World Dynamic Prompt and Continual Visual Representation Learning (2024 European Conference on Computer Vision - ECCV)

Research Intern **Jun. 2021 — Aug. 2021**
Samsung Advanced Institute of Technology (SAIT)
- Developed Hardware-aware Neural Network Training Algorithm
- [Publication] Kim, Y. et al. Gradient-based bit encoding optimization for noise-robust binary memristive crossbar. In 2022 Design, Automation & Test in Europe Conference & Exhibition (DATE) (pp. 1111-1114). IEEE.

Research Intern **Jan. 2020 — July. 2020**
SK-Tbrain
- Developed Source-free Domain Adaptation, Graph Neural Networks
- [Publication] Kim, Y. et al. Domain adaptation without source data. IEEE Transactions on Artificial Intelligence, 2(6), 508-518.

Research Intern **June. 2019 — Sep. 2019**
Kakao Corporation
- Developed Graph Neural Networks

Publications [Conference]

Kim, Y.*, Lee, S.*, Jung, A.*, Ryu, B., Hong. S., *Task Vector Quantization for Memory-Efficient Model Merging*. Accepted to International Conference on Computer Vision (ICCV) 2025.

Lee, D., Li, Y., **Kim, Y.**, Xiao, S., and Panda, P., *Spiking Transformer with Spatial-Temporal Attention*. Accepted to IEEE/CVF conference on computer vision and pattern recognition (CVPR) 2025.

Yin, R., **Kim, Y.**, Wu, D., and Panda, P., *LoAS: Fully Temporal-Parallel Datatflow for Dual-Sparse Spiking Neural Networks*.IEEE/ACM International Symposium on Microarchitecture (MICRO) 2024.

Kim, Y., et al., *One-stage Prompt-based Continual Learning*. Accepted to European Conference on Computer Vision (ECCV) 2024.

Kim, Y., et al., *DPG: Dynamic Prompt Generation for Continual Open-World Visual Representation Learning*. Accepted to European Conference on Computer Vision (ECCV) 2024.

Li, Y., **Kim, Y.**, Lee, D. and Panda, P., *GenQ: Quantization in Low Data Regimes with Generative Synthetic Data*. Accepted to European Conference on Computer Vision (ECCV) 2024.

Lee, D., Yin, R., **Kim, Y.**, Moitra, A., Li, Y., & Panda, P. *TT-SNN: tensor train decomposition for efficient spiking neural network training.* Design, Automation and Test in Europe Conference (DATE) (2024).

Li, Y., Geller, T., **Kim, Y.**, and Panda, P., *SEENN: Towards Temporal Spiking Early-Exit Neural Networks*. Neural Information Processing Systems (NeurIPS) 2023 .

Bhattacharjee, A., **Kim, Y.**, & Panda, P., *XPert: Peripheral Circuit & Neural Architecture Co-search for Area and Energy-efficient Xbar-based Computing.* ACM/IEEE Design Automation Conference (DAC) (2023).

Kim, Y., Li, Y., Park, H., Venkatesha, Y., Hambitzer, A., & Panda, P. , *Exploring Temporal Information Dynamics in Spiking Neural Networks.* AAAI Conference on Artificial Intelligence (AAAI) (2023).

Li, Y., Yin, R., Park, H., **Kim, Y.**, and Panda, P., *Wearable-based Human Activity Recognition with Spatio-Temporal Spiking Neural Networks*.NeurIPS 2022 Workshop.

Kim, Y., Li, Y. Park, H., Venkatesha, Y., Yin, R., and Panda, P., *Lottery Ticket Hypothesis for Spiking Neural Networks*. **Oral Presentation (2.7% of submitted papers)**, European Conference on Computer Vision (ECCV) 2022.

Kim, Y., Li, Y. Park, H., Venkatesha, Y., and Panda, P., *Neural Architecture Search for Spiking Neural Networks*. European Conference on Computer Vision (ECCV) 2022.

Li, Y., **Kim, Y.**, Park, H., and Panda, P., *Neuromorphic Data Augmentation for Training Spiking Neural Networks*. Accepted to European Conference on Computer Vision (ECCV) 2022.

Bhattacharjee, A.* , **Kim, Y.***, Moitra, A., and Panda, P. Examining the Robustness of Spiking Neural Networks on Non-ideal Memristive Crossbars. Accepted in ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED) (2022), **Best Paper**. (* equal contribution)

Kim, Y., Park, H., Moitra, A., Bhattacharjee, A. , Venkatesha, Y., and Panda, P. Rate Coding Or Direct Coding: Which One is Better for Accurate, Robust, and Energy-efficient Spiking Neural Networks?. Accepted in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) (2022).

Kim, Y., Kim, H., Kim, S., Kim, S. J., & Panda, P. *Gradient-based Bit Encoding Optimization for Noise-Robust Binary Memristive Crossbar.* Accepted in Design, Automation and Test in Europe Conference (DATE) (2022).

Kim, Y., Venkatesha, Y., & Panda, P. , *PrivateSNN: Privacy-Preserving Spiking Neural Networks.* AAAI Conference on Artificial Intelligence (AAAI) (2022).

Choi, S., Lee, S., **Kim, Y.**, Kim, T., & Kim, C. *Hi-cmd: Hierarchical cross-modality disentanglement for visible-infrared person re-identification.* IEEE/CVF conference on computer vision and pattern recognition (CVPR) (2020).

Kim, Y., Kim, S., Kim, T., & Kim, C. *Cnn-based semantic segmentation using level set loss.* IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) (2020).

Kim, Y., Choi, S., Lee, H., Kim, T., & Kim, C. *RPM-Net: Robust Pixel-Level Matching Networks for Self-Supervised Video Object Segmentation.* IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) (2020).

Yang, S., Kim, Y., **Kim, Y.**, & Kim, C. *Combinational class activation maps for weakly supervised object localization* IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) (2020).

Lee, H., Choi, S., **Kim, Y.**, & Kim, C. *Bilinear Siamese Networks with Background Suppression for Visual Object Tracking.* British Machine Vision Conference (BMVC) (2019).

Publications [Journal]

Xiao, S., Li, Y., **Kim, Y.**, Lee, D., & Panda, P. ReSpike: residual frames-based hybrid spiking neural networks for efficient action recognition. Neuromorphic Computing and Engineering (2025).

Moitra, A., Bhattacharjee, A., **Kim, Y.**, & Panda, P., *TReX- Reusing Vision Transformer's Attention for Efficient Xbar-Based Computing*. IEEE Transactions on Emerging Topics in Computing (2024).

Moitra, A., Bhattacharjee, A., Li, Y., **Kim, Y.**, & Panda, P., *When in-memory computing meets spiking neural networks—A perspective on device-circuit-system-and-algorithm co-design*. Applied Physics Reviews (2024).

Yin, R., **Kim, Y.**, Moitra, A., & Panda, P., *Workload-balanced pruning for sparse spiking neural networks*. IEEE Transactions on Emerging

Topics in Computational Intelligence (2024).

Kim, Y. *et al.*, *Rethinking Skip Connections in Spiking Neural Networks with Time-To-First-Spike Coding*. Frontiers in Neuroscience (2024).

Kim, Y. *et al.*, *Do We Really Need a Large Number of Visual Prompts?*. Neural Networks-Elsevier (2024).

Li, Y., Yin, R., **Kim, Y.** & Panda, P., *Efficient Human Activity Recognition with Spatio-Temporal Spiking Neural Networks* Frontiers in Neuroscience (2023).

Moitra, A., Bhattacharjee, A., **Kim, Y.** & Panda, P., *RobustEdge: Low Power Adversarial Detection for Cloud-Edge Systems* IEEE Transactions on Emerging Topics in Computational Intelligence (2023).

Kim, Y., Li, Y., Moitra, A., Yin, R. & Panda, P., *Sharing Leaky-Integrate-and-Fire Neurons for Memory-Efficient Spiking Neural Networks* Frontiers in Neuroscience (2023).

Li, Y., **Kim, Y.**, Park, H., & Panda, P. , *Uncovering the Representation of Spiking Neural Networks Trained with Surrogate Gradient.* Transactions on Machine Learning Research (2023).

Venkatesha, Y., **Kim, Y.**, Park, H., & Panda, P. "Divide-and-Conquer the NAS puzzle in Resource Constrained Federated Learning Systems." Neural Networks - Elsevier (2023).

Han, K., **Kim, Y.**, Han, D., Lee, H., & Hong, S. "TL-ADA: Transferable Loss-based Active Domain Adaptation." Neural Networks - Elsevier (2023).

Kim, Y., Chough, J., & Panda, P. "Beyond Classification: Directly Training Spiking Neural Networks for Semantic Segmentation." Neuromorphic Computing and Engineering (2022).

Yin, R., Moitra, A., Bhattacharjee, A., **Kim, Y.**, and Panda, P., *SATA: Sparsity-Aware Training Accelerator for Spiking Neural Networks*. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (2022).

Christensen, D.V., et al. "2022 roadmap on neuromorphic computing and engineering." Neuromorphic Computing and Engineering (2022).

Kim, Y., & Panda, P. , *Revisiting batch normalization for training low-latency deep spiking neural networks from scratch* Frontiers in Neuroscience (2021).

Kim, Y. & Panda, P., *Visual explanations from spiking neural networks using interspike intervals.* Nature Scientific Reports 11(2021).

Kim, Y. & Panda, P., *Optimizing Deeper Spiking Neural Networks for Dynamic Vision Sensing.* Neural Networks-Elsevier(2021).

Venkatesha, Y., **Kim, Y.**, Tassiulas, L., & Panda, P., *Federated Learning with Spiking Neural Networks.* IEEE Transactions on Signal Processing(2021).

Kim, Y., Cho, D., Han, K., Panda, P., & Hong, S, *Domain adaptation without source data.* IEEE Transactions on Artificial Intelligence(2021).

Bhattacharjee, A., Bhatnagar, L., **Kim, Y.**, & Panda, P., *NEAT: Non-linearity Aware Training for Accurate, Energy-Efficient and Robust Implementation of Neural Networks on 1T-1R Crossbars.* IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems(2021).

Kim, Y., & Hong, S, *Adaptive Graph Adversarial Networks for Partial Domain Adaptation.* IEEE Transactions on Circuits and Systems for Video Technology(2021).

Kim, Y., Cho, D., & Hong, S, *Towards Privacy-Preserving Domain Adaptation.* IEEE Signal Processing Letters (2020).

Talks

Towards Efficient AI Computing
POSTECH, June 10, 2025
Towards Efficient Deep Learning: Brain-Inspired Algorithm, Fine-Tuning, and Compression
Yonsei University, June 9, 2025
Efficient machine learning: from algorithm to hardware perspective
Sungkyunkwan University, Oct 2, 2024
Searching for Feedback Connection Architectures using NAS in Spiking Neural Networks
Center for Brain-Inspired Computing (C-BRIC, SRC), Aug 18, 2022
Towards Deep, Interpretable, and Robust Spiking Neural Networks: Algorithmic Approaches
Center for Brain-Inspired Computing (C-BRIC, SRC), Feb 25, 2021

Teaching Experience

- EENG 348, Digital Systems, 2022

Academic Activities

Reviewer

- Program Committee (PC) Member for the Thirty-Seventh AAAI Conference on Artificial Intelligence (AAAI), 2023, 2024
- European Conference on Computer Vision (ECCV), 2022, 2024
- International Conference on Computer Vision (ICCV), 2023, 2025
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022, 2023, 2024, 2025
- Frontiers in Neuroscience
- IEEE Transactions on Pattern Analysis and Machine Intelligence(TPAMI)
- IEEE Transactions on Artificial Intelligence (T-AI)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)