

Sunghwan Kim

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Research Interests

Multimodal Learning, Embodied AI, Domain Generalization, Uncertainty Estimation, Efficient ML

Education

Korea Advanced Institute of Science and Technology (KAIST)

Bachelor of Science in Electrical Engineering

Bachelor of Science in Mathematics

GPA: 3.61/4.00; major: 3.66/4.00

Feb 2017-Feb 2021

Advisor: Steven E. Whang

Korea Science Academy of KAIST

High school for gifted students in mathematics and science

Mar 2014-Feb 2017

Publications

1. **Texture Learning Domain Randomization for Domain Generalized Segmentation** [paper]
Sunghwan Kim, Dae-hwan Kim, Hoseong Kim
International Conference on Computer Vision (ICCV), 2023
2. **Data Gathering Trials for the Development of Military Imaging Systems** [paper]
Maria Niebla, Duncan L. Hickman, Eunjin Koh, Chanyong Lee, Hoseong Kim, Chaehyeon Lim, Sunghwan Kim
SPIE Sensors+Imaging, 2023

Works In-preparation

1. **Context-enhanced Decoder via Language Guidance for Domain Generalized Segmentation**
Sunghwan Kim, Byunghyun Pak, Byungju Woo, Hoseong Kim
- Designed the segmentation head to better capture contextual information leveraging pre-trained language models.

Patent

1. **Method and System for Detecting Target Using Time Series Images**
Chaehyeon Lim, Sunghwan Kim, Hoseong Kim, Eunjin Koh
KR Patent, 2023 (1025640380000)

Work Experience

Republic of Korea Army (ROKA)

First Lieutenant

Jun 2021-Present

Daejeon, Republic of Korea

- Selected one of the 20 officers in Korea who dedicated to science and technology research for national defense.
- Assigned to ADD, the South Korean counterpart to the U.S. DARPA, to work on defense technology.
- Mentored a number of junior officers and advised them on their research projects on machine learning.

Agency for Defense Development (ADD)

Machine Learning Engineer

Jun 2021-Present

Daejeon, Republic of Korea

- **Object detection in infrared imagery:** Designed real-time object detection models for UAVs. Generated synthetic infrared images using a 3D engine for training data, and established an end-to-end training pipeline.
- **Model acceleration on edge devices:** Implemented model compression techniques such as feature distillation and structural pruning to accelerate ML models on edge devices, including NPU, FPGA board and edge GPU.
- **ML-integrated software for UAVs:** Developed multi-threading C++ software that optimizes CPU and NPU resources during the inference phase of ML models, interfacing with the flight control unit of UAVs.
- **Flight test for UAVs:** Conducted various 3D simulations emulating actual deployment environments, and real-world flight tests of UAVs to verify the stability of ML models.

Bluepoint Partners*Research Assistant*

Aug 2020-Mar 2021

Seoul, Republic of Korea

- Bluepoint Partners is an early-stage venture capital firm that invests in deep tech sectors, such as AI and robotics.
- Conducted market analysis on ongoing investments and researched overall technological trends.

Intelligent Network Architecture (INA) Lab at KAIST*Machine Learning Engineer*

Oct 2018-Apr 2019

Daejeon, Republic of Korea

- Implemented a real-time super-resolution algorithm that combines ML-based super-resolution with traditional video codecs to achieve real-time capability on edge devices.

Neosapience*Machine Learning Engineer*

Dec 2017-Feb 2018

Seoul, Republic of Korea

- Neosapience is a Series B startup that operates an AI-powered virtual actor service, specializing in ML-based audio and video synthesis technology.
- Constructed an audio and text pair dataset for training Korean Text-to-Speech models.

Honor

Korea Army Startup Challenge Gold Prize (\$3000)

Korea Student Aid Foundation (KOSAF) Scholarship (\$1500)

Korea National Scholarship of Science and Technology (\$10000)

KAIST scholarship (Full tuition)

Community Involvement

KAIST Freshman Coach Senior

Feb 2020-Feb 2021

Samsung Semiconductor Education Program and Scholarship

Jun 2019-Present

Research Officers for National Defense (ROND) cadat

Dec 2018-May 2021

KAIST Electrical Engineering Department Student Council

Mar 2018-Feb 2019

KAIST Cyber Tutoring Program

Feb 2018-Jun 2018

KAIST Foreign Buddy Program

Sep 2017-Dec 2017

KAIST Automobile Maker Club

Mar 2017-Aug 2018

Selected Coursework

Electrical Engineering: Deep Learning, Database and Bigdata System, Signal Processing, Computer Architecture, Operating System, Computer Network, Digital System, Electrical Circuits, Electromagnetics

Mathematics: Linear Algebra, Mathematical Analysis, Probability Theory, Statistics, Convex Optimization, Numerical Analysis, Discrete Mathematics, Mathematical Modeling, Differential Geometry, Modern Algebra

Skills

Programming Languages: Python, C/C++, JavaScript, MATLAB

Frameworks & Tools: Pytorch, Tensorflow, NumPy, OpenCV, Docker, Git

References

Dr. Steven E. Whang, Associate Professor at KAIST

Email: swhang@kaist.ac.kr

Dr. Eunjin Koh, Principal Researcher at ADD

Email: eikoda@add.re.kr

Dr. Hoseong Kim, Senior Reseacher at ADD

Email: hoseongkim@add.re.kr