

Sunghwan Kim

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Research Interests

My research interests lie in computer vision, especially efficient algorithms for visual perceptions. Currently, I am exploring efficient algorithms and structures to leverage pre-trained foundation models (e.g., SAM) to enhance downstream tasks, with an emphasis on hardware efficiency.

Keywords: Visual Perceptions, Domain Generalization, Knowledge Distillation

Education

Korea Advanced Institute of Science and Technology (KAIST)
B.S. in Electrical Engineering and Mathematics (double major)
GPA: overall 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

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

Patent

1. Method and System for Detecting Target Using Time Series Images
Chaehyeon Lim, **Sunghwan Kim**, Hoseong Kim, and Eunjin Koh
KR Patent, 2023 (Reg. Num. 10-2023-0031087)

Work Experience

Agency for Defense Development (ADD)

First Lieutenant and Machine Learning Research Engineer

Jun 2021-Present
Daejeon, Republic of Korea

- Selected as one of the exclusive 20 military officers in Korea who conduct military service as research engineer at the ADD, Korea's counterpart to U.S. DARPA.
- **Object detection in infrared imagery:** Developed real-time object detection algorithms for defense systems. Generated synthetic infrared imagery for training data and constructed the entire learning pipeline.
- **Model acceleration on edge devices:** Implemented network compression techniques such as knowledge distillation, network pruning, and model quantization to accelerate models on edge devices like NPU.
- **Deep learning-based application software for UAVs:** Developed application software that seamlessly integrates resource optimization by multi-threading, and I/O interfacing with flight control system.

Bluepoint Partners

Research Assistant

Aug 2020-Mar 2021
Seoul, Republic of Korea

- Bluepoint Partners is an early stage venture capital firm targeting tech sector, such as AI and robotics.
- Supported investments in tech-based startups and conducted market research for these investments.

Paple

Co-founder and Software Engineer

Jun 2019-May 2020
Seoul, Republic of Korea

- Paple is a software platform with a community feature that allowing the meta-review of AI papers.
- Developed the backend using Django and built the database system with MySQL.

- Neosapience is a Series B startup that operates deep learning-based audio and video synthesis technology and has launched an AI-powered virtual actor service.
- Conducted data processing for the development of a Korean text-to-speech system.

Research Experience

Agency for Defense Development (ADD)

Researcher in missile IR seeker team

Jun 2022-Present
Daejeon, Republic of Korea

- **Domain generalization in object recognition:** Explored methods for training robust models that learn from synthetically generated source images and perform effectively on diverse real-world images.
- **Foundation models for enhancing downstream tasks:** Exploring methods to leverage pre-trained foundation models in vision (e.g., SAM) to improve the efficiency and efficacy of segmentation tasks.

Korea Advanced Institute of Science and Technology (KAIST)

Undergraduate researcher in Intelligent Network Architecture (INA) lab

Oct 2018-Apr 2019
Daejeon, Republic of Korea

- **Super-resolution on edge devices:** Implemented an algorithm that combines neural super resolution with traditional video codecs to enhance streaming quality on edge devices.

Korea Advanced Institute of Science and Technology (KAIST)

Invited researcher in Center for Axion and Precision Physics Center

Jun 2016-Aug 2016
Daejeon, Republic of Korea

- Researched on the detection of axion using resonant frequency measurements in a cylindrical cavity.

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 (\$5000)

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. Hoseong Kim, Senior Reseacher at ADD

Email: hoseongkim@add.re.kr

Dr. Dae-hwan Kim, Senior Reseacher at ADD

Email: dhkim7@add.re.kr