

Sunwook Hwang

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Summary

Hardware–software co-design engineer for AI accelerators at Samsung Electronics — System LSI, working on architecture–compiler co-design that enhances the performance and energy efficiency of Exynos mobile NPUs. Beyond this core role, I research 3D-vision models and V2X for autonomous driving and 3D feature-data inversion attacks—work that has led to first-author papers at ICCV’23 and ICLR’25, as well as several patents in the United States and South Korea.

Education

Seoul National University (SNU)

Ph.D in Electrical and Computer Engineering

Seoul, South Korea

Aug 2023

Pohang University of Science and Technology (POSTECH)

BS in Electrical Engineering

Pohang, South Korea

Feb 2016

Employment

Samsung Electronics

Staff Engineer - SoC IP Development Team (S.LSI)

South Korea

Sep 2024 – Present

- **[HW Architecture]** Building cycle-accurate performance-simulation models and collaborating with RTL, verification, and silicon bring-up teams to tune NPU pipelines across diverse AI workloads.
- **[SW Compiler Optimization]** Developing workload-balancing passes that maximize NPU utilization under the tight resource constraints of mobile devices.

Seoul National University (SNU)

Postdoctoral Researcher

Seoul, South Korea

Sep 2023 – Aug 2024

- Feature-level Perception Sharing for Autonomous Vehicles: Interpreting feature data from heterogeneity models
- Model Inversion Attack for 3D Point Clouds Restoration: Restoring de-identified 3D feature data for original 3D point clouds
- Safe Driving Assistance Framework using Impulse Radio Ultra-Wideband (UWB): Collecting UWB real-world datasets from riding vehicles
- Adaptive Super-Resolution Framework for Efficient Video Analytic Systems: Rapid and real-time searching of keyframes for object detection

Panasonic USA

Research Engineer - Intern within Panasonic Ventures LLC

Mountain View, CA

May 2019 – Oct 2019

- Explore and research key technologies emerging from startups and university laboratories
- Conduct research and evaluation of new startups’ technologies, aiding in business development

Research Projects in University

Research on distributed learning and extended-vision based 3D object detection model for autonomous driving in 5G networks

National Research Foundation grant funded by the Korea government (MSIT)

Seoul National University

Jan 2021 — Feb 2023

- Developing a distributed learning framework to enhance 3D object detection model deployed in autonomous driving using LiDAR sensors
- Developing a semi-supervised learning that addresses data privacy by using de-identified data through intermediate feature extraction
- Leading this project and conducting research that resulted in a first-authored paper for ICCV 2023 and a US patent [US 11,495,012 B1]

Scalable Spectrum Sharing for Beyond 5G Communication

Institute of Information & Communications Technology Planning & Evaluation grant funded by the Korea government (MSIT)

Seoul National University

Jul 2018 — Oct 2020

- Developing a **system-level simulator** for C-V2X, incorporating real-world road conditions in urban environments
- Developing an **information-sharing system** that integrates communication to expand the situational awareness range of vehicles
- Based on this project, a paper was published in the **IEEE TVT** and a **US patent** was granted: [US 11,032,682 B2]

Dual Interface Synchronized Hybrid V2X Research by Simulation

Funded by LG Electronics

Seoul National University

2018

- Developing a **system level simulator** for IEEE 802.11p (DSRC) based on **Simulator for Urban MObility (SUMO)** vehicle traffic
- Developing a **hybrid system equipped with both DSRC and C-V2V communication** to expand the situational awareness range of vehicles
- Based on this project, a paper was published in the **IEEE Access**

Selected Publications

- [1] **[ICLR 2025]** *[Published in Apr. 2025]*
ConcreTizer: Model Inversion Attack via Occupancy Classification and Dispersion Control for 3D Point Cloud Restoration [\[Link\]](#)
*Youngseok Kim, ***Sunwook Hwang**, Saewoong Bahk, and Hyung-Sin Kim (***Equal Contribution**)
- [2] **[IEEE Access]** *[Published in Apr. 2025]*
FrameBoost: Advanced Video Analytics with Inference Trigger Frame Selection via Tracking Error Estimation [\[Link\]](#)
Jin Mo Yang, †**Sunwook Hwang**, Jeongjun Park, and †Saewoong Bahk (†**Corresponding authors**)
- [3] **[IEEE/CVF ICCV]** *[Published in Oct. 2023]*
UpCycling: Semi-supervised 3D Object Detection without Sharing Raw-level Unlabeled Scenes [\[Link\]](#)
Sunwook Hwang, Youngseok Kim, Seongwon Kim, Saewoong Bahk, and Hyung-Sin Kim
- [4] **[IEEE Transactions on Vehicular Technology]** *[Published in Dec. 2020]*
Beyond Vision: Hidden Car Detector with On-demand Relaying in Vehicular Communications [\[Link\]](#)
Sunwook Hwang, Seongwon Kim, Hoyoung Yoon, Byungjun Kim, Sunghyun Choi, and Saewoong Bahk
- [5] **[IEEE Access]** *[Published in Feb. 2019]*
Nearest-First: Efficient Relaying Scheme in Heterogeneous V2V Communication Environments [\[Link\]](#)
Byungjun Kim, Seongwon Kim, Hoyoung Yoon, **Sunwook Hwang**, M. Xavier Punithan, Byeong Rim Jo, and Sunghyun Choi

Full publication list: [Google Scholar](#)

Selected Patents (US & KR)

- [1] **Sunwook Hwang**, Youngseok Kim, Hyung-sin Kim, and Saewoong Bahk,
“Semi-supervised learning method for object detection in autonomous vehicle and server for performing semi-supervised learning for object detection in autonomous vehicle,”
US 11,495,012, Nov. 2022.
Korean Patent 10-23-4024, Apr. 2022.
- [2] **Sunwook Hwang**, Seongwon Kim, Hoyoung Yoon, Byungjun Kim, and Sunghyun Choi,
“Method and apparatus for communication between vehicles and apparatus for using the same,”
US 11,032,682, June, 2021.
Korean Patent 10-1975759, Apr. 2019.
- [3] Byounghoon Jung , Jihoon Kim , Sunghyun Choi , Seung-Hoon Park , Jungsoo Jung , Taejun Park , Kangjin Yoon , Jaehong Yi , **Sunwook Hwang**,
“Apparatus and Method for using Multiple Carriers in Wireless Communication System,”
US 11,330,585, May, 2022.
- [4] Seungil Park, **Sunwook Hwang**, Hoyoung Yoon, Byungjun Kim, and Sunghyun Choi,
“Method and apparatus for message relaying,”
Korean Patent 10-1935230, Dec. 2018.
PCT/KR2019/008328, July 2019.

Technical Skills

Computer skills	C++, Python, Unix based system
Framework	PyTorch, Tensorflow, Apache TVM
Editing & Productivity software	Docker, Git, Vim [my dotfiles]
Languages	English (Professional fluency), Korean (Native)

Teaching Experiences

Seoul National University (SNU)

Seoul, South Korea

Instructor

- 400.019A Introduction to Electrical Engineering, Spring 2016.
- 430.469 Networking Protocol Design, Fall 2017.

The Korean Institute of Communications and Information Sciences (KICS)

Seoul, South Korea

KICS Invited Instructor

- Basic Course for C++ based Network Simulation using ns-3. Feb. 2019.
- Basic Course for C++ based Network Simulation using ns-3. Feb. 2018.