

Soonmin Hwang

PH.D.

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Summary

I am a post-doc researcher at the Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, United States. I worked for Tesla, Palo Alto, CA, United States, as a Senior Machine Learning Scientist. I received my M.S and Ph.D. degrees in Electrical Engineering from KAIST, Korea in 2014 and 2019 respectively. During my graduate study, I worked at the Robotics and Computer Vision Lab under the supervision of Prof. In So Kweon. In 2016, I worked for Qualcomm Research, Vienna, Austria, as a Research Intern. I received Samsung HumanTech Paper Awards(Gold prize in 2017, honorable mention in 2018) and the 1st place at NVidia Korea Deep learning Contest in 2016. I received my B.S degree in Electronics and Computer Engineering from Hanyang University, Korea in 2012. My research area includes computer vision, deep learning, and sensor fusion.

Education

KAIST (Korea Advanced Institute of Science and Technology)

Daejeon, S.Korea

PH.D. *Mar. 2014 - Feb. 2019*

- Dissertation: Learning based Adaptive Visual Sensor Fusion for Robust Pedestrian Detection
- Advisor: Prof. In So Kweon

KAIST (Korea Advanced Institute of Science and Technology)

Daejeon, S.Korea

M.S. *Feb. 2012 - Feb. 2014*

- Thesis: A Hierarchical Classifier Model based on Deformable Part Models and Random Forest for Robust Pedestrian Detection
- Advisor: Prof. In So Kweon

Hanyang University

Seoul, S.Korea

B.S. *Mar. 2007 - Feb. 2012*

- Recognize and Play Sheet Music on Android Smartphone

Research Interests

Computer vision for self-driving cars

- Object detection (e.g. pedestrians, cars)
- Learning based depth estimation / Semantic segmentation
- Image enhancement / 3D scene understanding

Sensor fusion

- RGB camera + Thermal camera (Long wavelength IR)
- RGB camera + 3D LiDAR
- Adaptive fusion

Experience

Post-doc Researcher

Pittsburgh, Pennsylvania, US

THE ROBOTICS INSTITUTE, CARNEGIE MELLON UNIVERSITY *Sep. 2021 - Current*

Sr. Machine Learning Scientist

Palo Alto, California, US

AUTOPILOT TEAM, TESLA *May. 2019 - Feb. 2021*

- Train/Develop neural networks for autopilot

Full-time Research Intern

Vienna, Austria

COMPUTER VISION GROUP, QUALCOMM RESEARCH *Jul. 2016 - Nov. 2016*

- Lane detection using deep neural network

Full-time Intern

Hanyang Univ., Seoul, S.Korea

MIXED REALITY LAB. (PROF. JONG-IL PARK) *Nov. 2010 - Feb. 2011*

- Development of view morphing system for relics

Projects

Automatic Emergency Braking for Pedestrian Protection

MINISTRY OF TRADE, INDUSTRY AND ENERGY OF KOREA (MOTIE)

Jun. 2013 - Jun. 2018

- Accurate pedestrian detection using multiple sensor fusion

Personal Plug and Play DigiCar (P3 DigiCar)

NATIONAL RESEARCH FOUNDATION OF KOREA

Mar. 2012 - Feb. 2017

- Robust pedestrian detection using monocular camera

DATMO: Detection and Tracking Moving Object using 3D LiDAR

LIG-NEX1 CO. LTD, S.KOREA

Apr. 2015 - Nov. 2015

- On-road object detection and tracking (pedestrian, car) using 3D-LiDAR
- Camera & 3D LiDAR fusion

Monocular Vision based Natural Feature Extraction for Cognitive Model

MINISTRY OF KNOWLEDGE ECONOMY OF KOREA

Sep. 2012 - Dec. 2013

- Porting developed natural feature algorithm to embedded system

Publications

* indicates equal contribution.

Gated Bidirectional Feature Pyramid Network for Accurate One Shot Detection

MACHINE VISION AND APPLICATIONS (MVA)

2019

Sanghyun Woo, **Soonmin Hwang**, Ho-Deok Jang, In So Kweon

KAIST Multispectral Recognition Dataset in Day and Night

IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS (TITS)

2018

Yukyung Choi, Namil Kim, **Soonmin Hwang**, Kibaek Park, Jae Shin Yoon, Kyunghwan An, In So Kweon

StairNet: Top-Down Semantic Aggregation for Accurate One Shot Detection

Lake Tahoe, USA

IEEE WINTER CONF. ON APPLICATIONS OF COMPUTER VISION (WACV)

Mar. 2018

Sanghyun Woo, **Soonmin Hwang**, In So Kweon

[The 24th HumanTech Paper Award, Samsung Electronics, Honorable Mention \(\\$2,000\)](#)

Multispectral Transfer Network: Unsupervised Depth Estimation for All-day Vision

New Orleans, USA

THE THIRTY-SECOND AAAI CONFERENCE ON ARTIFICIAL INTELLIGENCE (AAAI)

Feb. 2018

Namil Kim*, Yukyung Choi*, **Soonmin Hwang**, In So Kweon

[The 23th HumanTech Paper Award, Samsung Electronics, Gold Prize \(\\$10,000\)](#)

[KAIST R&D Report, Research Highlights of 2017](#)

Thermal Image Enhancement using Convolutional Neural Network

Daejeon, S.Korea

THE INTERNATIONAL CONFERENCE OF INTELLIGENT ROBOTS AND SYSTEMS (IROS)

Oct. 2016

Namil Kim*, Yukyung Choi*, **Soonmin Hwang***, In So Kweon

[Deep Learning Contest, NVidia Korea, 1st Place](#)

[KAIST R&D Report, Research Highlights of 2017](#)

Fast Multiple Objects Detection and Tracking Fusing Color Camera and 3D LIDAR for Intelligent Vehicles

Xian, China

INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS AND AMBIENT INTELLIGENCE (URAI)

Aug. 2016

Soonmin Hwang*, Namil Kim*, Yukyung Choi, Seokju Lee, In So Kweon

Thermal-Infrared based Drivable Region Detection

Gothenburg, Sweden

IEEE INTELLIGENT VEHICLES SYMPOSIUM (IV)

Jun. 2016

Jae Shin Yoon, Kibaek Park, **Soonmin Hwang**, Namil Kim, Yukyung Choi, In So Kweon

Low-Cost Synchronization for Multispectral Cameras

INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS AND AMBIENT INTELLIGENCE (URAI)

Soonmin Hwang, Yukyung Choi, Namil Kim, Kibaek Park, Jae Shin Yoon, In So Kweon

[Goyang, S.Korea](#)

Oct. 2015

Geometrical Calibration of Multispectral Calibration

INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS AND AMBIENT INTELLIGENCE (URAI)

Namil Kim, Yukyung Choi, **Soonmin Hwang**, Kibaek Park, Jae Shin Yoon, In So Kweon

[Goyang, S.Korea](#)

Oct. 2015

ARTRIEVAL: Painting Retrieval Without Expert Knowledge

IEEE INTERNATIONAL CONFERENCE ON IMAGE PROCESSING (ICIP)

Namil Kim, Yukyung Choi, **Soonmin Hwang**, In So Kweon

[Québec, Canada](#)

Sep. 2015

All-Day Visual Place Recognition: Benchmark Dataset and Baselines

IEEE INTERNATIONAL CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION WORKSHOPS (CVPRW-VPRICE)

Yukyung Choi, Namil Kim, Kibaek Park, **Soonmin Hwang**, Jae Shin Yoon, In So Kweon

[Boston, USA](#)

Jun. 2015

Multispectral Pedestrian Detection: Benchmark Dataset and Baselines

IEEE INTERNATIONAL CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION (CVPR)

Soonmin Hwang, Jaesik Park, Namil Kim, Yukyung Choi, In So Kweon

[Current citation: 438](#)

[Boston, USA](#)

Jun. 2015

A Two Phase Approach for Pedestrian Detection

ASIAN CONFERENCE ON COMPUTER VISION WORKSHOPS (ACCV WORKSHOPS)

Soonmin Hwang, Tae-hyun Oh, In So Kweon

[Singapore, Singapore](#)

Nov. 2014

Evaluation of Vocabulary Trees for Localization in Robot Applications

INTERNATIONAL CONFERENCE ON CONTROL, AUTOMATION AND SYSTEMS (ICCAS)

Soonmin Hwang, Chaehoon Park, Yukyung Choi, Donggeun Yoo, In So Kweon

[Gwangju, S.Korea](#)

Oct. 2013

Patents

Apparatus and Method for Depth Estimation Based on Thermal Image, and Neural Network Learning Method

KR 10-1947782 (2019.02.07), US 11062470 (2021.07.13)

[Registered](#)

Apparatus and Method for Thermal Image Enhancement

KR 10-1821285 (2018.01.17)

[Registered](#)

Method and Apparatus for Detecting Smoke from Image

KR 10-1932543 (2018.12.19), US 09443149 (2016.09.13)

[Registered](#)

Pattern Board for Geometrical Calibration in Multi-Spectral Camera System, Calibration Apparatus, and Calibration Method Thereof

KR 10-2016-0122950 (2016.09.26)

[Pending](#)

Honors & Awards

2018	KAIST R&D Report	Research Highlights of 2017 (IROS'16, AAAI'18)
2018	Travel grant	Research Supporting Program for CVPR 2018, Kakao Corp.(\$4,300)
2018	Honorable mention	The 24th HumanTech Paper Award, Samsung Electronics Co. Ltd, (\$2,000, acceptance rate 6.5%)
2017	Gold prize	The 23th HumanTech Paper Award, Samsung Electronics Co. Ltd, (\$10,000, acceptance rate 0.7%)
2016	1st Place	NVIDIA Deep Learning Contest, NVIDIA Korea
2016	Bronze prize	Korea Invention Patent Exhibition (KINPEX)

Reviewers

IEEE Winter Conference on Applications of Computer Vision (WACV)

IEEE Transaction on Intelligent Transportation Systems (TITS)

IEEE Transactions on Aerospace and Electronic Systems (TAES)

IEEE Transactions on Cybernetics

Springer The Visual Computer (TCVJ)

Skills

Languages Python, MATLAB, C/C++

Libraries PyTorch, Caffe, OpenCV, QT, PCL, MFC, and others