

Soonmin Hwang

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Experience

External Technical Advisory

42DOT, KOREAN AUTONOMOUS DRIVING COMPANY (ACQUIRED BY HYUNDAI MOTOR GROUP)

Seoul, South Korea

Feb. 2022 - Present

Postdoc Researcher

THE ROBOTICS INSTITUTE, CARNEGIE MELLON UNIVERSITY

Pittsburgh, Pennsylvania, US

Sep. 2021 - Present

Sr. Machine Learning Scientist

AUTOPILOT TEAM, TESLA

Palo Alto, California, US

May. 2019 - Feb. 2021

Full-time Intern

COMPUTER VISION GROUP, QUALCOMM RESEARCH

Vienna, Austria

Jul. 2016 - Nov. 2016

Full-time Intern

MIXED REALITY LAB. (PROF. JONG-IL PARK)

Hanyang Univ., Seoul, S.Korea

Nov. 2010 - Feb. 2011

Education

KAIST

PH.D. IN ELECTRICAL ENGINEERING

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

Daejeon, S.Korea

Mar. 2014 - Feb. 2019

KAIST

M.S. IN ELECTRICAL ENGINEERING

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

Daejeon, S.Korea

Feb. 2012 - Feb. 2014

Hanyang University

B.S. IN ELECTRONICS AND COMPUTER ENGINEERING

- Recognize and Play Sheet Music on Android Smartphone

Seoul, S.Korea

Mar. 2007 - Feb. 2012

Research Interests

Perception for Autonomous Driving

- Object Detection, Learning based depth estimation, Semantic segmentation, Image enhancement, 3D scene understanding

Sensor Fusion for Robust Perception

- RGB camera, Thermal infrared camera, 3D LiDAR / Adaptive fusion

Path Planning and Navigation

- Social robot navigation in dynamic real world environment

Projects

Embedded AI Based Fully Autonomous Driving Software and MaaS Technology Development

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

Apr. 2022 - Present

- Accurate 3D object detection from multiple sensors for embedded system
- Trajectory prediction of dynamic objects through continuous time-series multi-sensor data
- Learning to plan ego-path in dynamic environments

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

* Equal contribution.

Consistent Video Generation from Point Cloud via Controllable Image Diffusion

WORK IN PROGRESS

Zhixuan Liu, **Soonmin Hwang**, Ji Zhang, Jean Oh

Hyperbolic Monocular Depth Estimation with Coded Classification

WORK IN PROGRESS

Jinhwi Park, Hae-Gon Jeon, Jean Oh, **Soonmin Hwang**

Panoramic Depth: 360-Degree Dense Depth Estimation from Multiple Cameras

WORK IN PROGRESS

Soonmin Hwang, Jean Oh

T2FPV: Dataset and Method for Correcting First-Person View Errors in Pedestrian Trajectory Prediction

UNDER REVIEW (IROS 2023)

Benjamin Stoler, Meghdeep Jana, **Soonmin Hwang**, Jean Oh

UMHE: Unsupervised Multispectral Homography Estimation

UNDER REVIEW (RA-L 2023)

Jeongmin Shin, Jiwon Kim, Seokjun Kwon, Namil Kim, **Soonmin Hwang**, Yookyung Choi

Instant Domain Augmentation for LiDAR Semantic Segmentation

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

[Vancouver, Canada](#)

Jun. 2023

Kwonyoung Ryu*, **Soonmin Hwang***, Jaesik Park

TransDSSL: Transformer based Depth Estimation via Self-Supervised Learning

IEEE ROBOTICS AND AUTOMATION LETTERS (RA-L)

Aug. 2022

Daechan Han*, Jeongmin Shin*, Namil Kim, **Soonmin Hwang**, Yookyung Choi

[Will be presented at IEEE International Conference on Robotics and Automation \(ICRA\) 2023](#)

Gated Bidirectional Feature Pyramid Network for Accurate One Shot Detection

MACHINE VISION AND APPLICATIONS (MVA)

Mar. 2019

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

KAIST Multi-Spectral Day/Night Data Set for Autonomous and Assisted Driving

IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS (TITS)

Feb. 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

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

[Lake Tahoe, USA](#)

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

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

[New Orleans, USA](#)

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

THE INTERNATIONAL CONFERENCE OF INTELLIGENT ROBOTS AND SYSTEMS (IROS)

[Daejeon, S.Korea](#)

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

INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS AND AMBIENT INTELLIGENCE (URAI)

[Xian, China](#)

Aug. 2016

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

Thermal-Infrared based Drivable Region Detection

IEEE INTELLIGENT VEHICLES SYMPOSIUM (IV)

[Gothenburg, Sweden](#)

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)

[Goyang, S.Korea](#)

Oct. 2015

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

Geometrical Calibration of Multispectral Calibration

INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS AND AMBIENT INTELLIGENCE (URAI)

[Goyang, S.Korea](#)

Oct. 2015

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

ARTRIEVAL: Painting Retrieval Without Expert Knowledge

IEEE INTERNATIONAL CONFERENCE ON IMAGE PROCESSING (ICIP)

[Québec, Canada](#)

Sep. 2015

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

All-Day Visual Place Recognition: Benchmark Dataset and Baselines

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

[Boston, USA](#)

Jun. 2015

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

Multispectral Pedestrian Detection: Benchmark Dataset and Baselines

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

[Boston, USA](#)

Jun. 2015

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

[Google scholar citation: 715](#)

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

Honors & Awards

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| 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) |

Patents

Single-shot Adaptive Fusion Method and Apparatus for Robust Multispectral Object Detection

KR 10-2431419 (2022.08.08)

Registered

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), CN 104346618 (2019.10.25)

Registered

Reviewers

IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
IEEE International Conference on Computer Vision (ICCV)
European Conference on Computer Vision (ECCV)
IEEE Winter Conference on Applications of Computer Vision (WACV)
IEEE International Conference on Robotics and Automation (ICRA)
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
IEEE Transaction on Intelligent Transportation Systems (TITS)
IEEE Transactions on Multimedia (TMM)
IEEE Robotics and Automation Letters (RA-L)
IEEE Transactions on Aerospace and Electronic Systems (TAES)
IEEE Transactions on Cybernetics
Springer The Visual Computer (TCVJ)