Soonmin **Hwang**

Ph.D student

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Summary

I am a Ph.D student advised by Prof. In So Kweon at KAIST, South Korea. I worked as a full-time research intern in computer vision group at Qualcomm Research Austria.

My research interests include **computer vision, deep learning, and sensor fusion**. In particular, I have been pursuing more **robust visual perception for autonomous driving under harsh environments**, e.g. night-time, sensor fault. Besides, I have broad interests in state-of-the-art computer vision algorithms such as semantic segmentation, depth estimation, video object segmentation, and skeleton-based action recognition. About deep learning, I also have interests in white- or black-box adversarial attacks, dynamic parameter prediction, domain adaptation, etc.

Education

KAIST (Korea Advanced Institute of Science and Technology)   *Daejeon, S.Korea*

Ph.D. candidate   *Mar. 2014 - Feb. 2019 (Expected)*

- Thesis title: Learning based Adaptive Visual Sensor Fusion for Robust Pedestrian Detection
- Topic: Sensor fusion, Deep learning, Object 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 a Music Score on Android Smartphone

Research Interests

Computer vision for self-driving cars
- Object detection (e.g. pedestrians, cars)
- Semantic segmentation / Depth estimation
- Image enhancement / 3D scene understanding

Deep learning for computer vision
- Dynamic neural network
- Adversarial machine learning for computer vision
- Domain adaptation

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

Work experience

Full-time Research Intern   *Vienna, Austria*

Computer Vision Group, Qualcomm Research   *Jul. 2016 - Nov. 2016*

- Lane marker 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

Pedestrian Detection in the Wild: A Fault Tolerant Approach

TECH. REPORT   *2018*

Soonmin Hwang, Namil Kim, Yukyung Choi, Sanghyun Woo, 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

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

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

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   *Goyang, S.Korea*

INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS AND AMBIENT INTELLIGENCE (URAI)   *Oct. 2015*

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

Geometrical Calibration of Multispectral Calibration   *Goyang, S.Korea*

INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS AND AMBIENT INTELLIGENCE (URAI)   *Oct. 2015*

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

ARTRIEVAL: Painting Retrieval Without Expert Knowledge   *Québec, Canada*

IEEE International Conference on Image Processing **(ICIP)**   *Sep. 2015*

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

All-Day Visual Place Recognition: Benchmark Dataset and Baselines   *Boston, USA*

IEEE International Conference on Computer Vision and Pattern Recognition Workshops (CVPRW-VPRICE)   *Jun. 2015*

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

Multispectral Pedestrian Detection: Benchmark Dataset and Baselines   *Boston, USA*

IEEE International Conference on Computer Vision and Pattern Recognition **(CVPR)**   *Jun. 2015*

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

A Two Phase Approach for Pedestrian Detection   *Singapore, Singapore*

Asian Conference on Computer Vision Workshops (ACCV Workshops)   *Nov. 2014*

Soonmin Hwang, Tae-hyun Oh, In So Kweon

Evaluation of Vocabulary Trees for Localization in Robot Applications   *Gwangju, S.Korea*

International Conference on Control, Automation and Systems (ICCAS)   *Oct. 2013*

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

Honors & Awards

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)

Skills

| **Languages** | Python, MATLAB, C/C++ |
| **Libraries** | PyTorch, Caffe, OpenCV, QT, PCL, MFC, and others |