Soonmin Hwang

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Education

03/2014-present	**Ph.D. student** Electrical Engineering, KAIST Research Topics : Object detection, Deep learning, Sensor fusion, Advisor: Professor. In So Kweon
02/2012-02/2014	**Master of Science** Electrical Engineering, KAIST Master thesis : A Hierarchical Classifier Model based on Deformable Part Models and Random Forest for Robust Pedestrian Detection Advisor: Professor. In So Kweon
03/2007-02/2012	**Bachelor of Science** Electronic Communication Engineering, Hanyang Univ. Undergraduate thesis : Recognize and Play a Music Score on Android Smartphone Advisor: Professor. Jong-Il Park

Research Interests

- Computer vision for self-driving cars
  - ✓ Object detection (e.g. pedestrians, cars) / Semantic segmentation
  - ✓ Image enhancement / 3D scene understanding
- Sensor fusion
  - ✓ Color + Long Wave-length IR (Thermal image)
  - ✓ Color + 3D-Lidar (Velodyne)
- Deep learning for computer vision
  - ✓ Dynamic neural network (e.g. hyper network, flexible neural network architecture)
  - ✓ Adversarial perturbation

Projects and Collaborations

06/2013-present	**Automatic Emergency Braking for Pedestrian Protection** Ministry of Trade, Industry and Energy of Korea (MOTIE) : Accurate pedestrian detection using multiple sensor fusion
03/2012-02/2017	**Personal Plug and Play DigiCar (P^3 DigiCar)** National Research Foundation of Korea : Robust pedestrian detection using monocular camera
04/2015-11/2015	**DATMO: Detection And Tracking Moving Object using 3D-Lidar** LIG-Nex1 Co. Ltd., South Korea : On-road object detection and tracking (Pedestrian, Car) using 3D-Lidar : Camera & 3D-Lidar fusion
09/2012-12/2013	**Monocular Vision based Natural Feature Extraction for Cognitive Model** Ministry of Knowledge Economy of Korea : Porting developed natural feature algorithm to embedded system

Employment

11/2010-02/2011	**Full-time intern**, Mixed Reality Lab. (Prof. Joing-Il Park), Hanyang Univ. Topic: Development of view morphing system for relic
07/2016-11/2016	**Full-time research intern** Computer Vision Group, Qualcomm Research Austria Topic: Lane marker detection using deep neural network

Publications

[P1] Sanghyun Woo, **Soonmin Hwang**, In So Kweon,
"StairNet: Top-Down Semantic Aggregation for Accurate One Shot Detection".
IEEE Winter Conf. on Applications of Computer Vision **(WACV)**, 2018.

[P2] Namil Kim*, Yukyung Choi*, **Soonmin Hwang**, In So Kweon,
"Multispectral Transfer Network: Unsupervised Depth Estimation for All-day Vision",
The Thirty-Second AAAI Conference on Artificial Intelligence **(AAAI)**, 2018.
(Oral presentation) [Project page]

[P3] Yukyung Choi, Namil Kim, **Soonmin Hwang**, Kibaek Park, Jae Shin Yoon, Kyunghwan An, and In So Kweon,
"KAIST Multispectral Recognition Dataset in Day and Night",
IEEE Transactions on Intelligent Transportation Systems **(TITS)**, 2018. Accepted [Project page]

[P4] **Soonmin Hwang***, Yukyung Choi*, Namil Kim*, and In So Kweon,
"Thermal Image Enhancement using Convolutional Neural Network",
The International Conference of Intelligent Robots and Systems **(IROS)**, 2016. [Project page]

[P5] **Soonmin Hwang***, Namil Kim*, Yukyung Choi, Seokju Lee, In So Kweon,
"Fast Multiple Objects Detection and Tracking Fusing Color Camera and 3D LIDAR for Intelligent Vehicles",
International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), 2016.
[Project page]

[P6] Jae Shin Yoon, Kibaek Park, **Soonmin Hwang**, Namil Kim, Yukyung Choi, and In So Kweon, "Thermal-Infrared based Drivable Region Detection", Intelligent Vehicles Symposium (IV), 2016. [Project page]

[P7] **Soonmin Hwang**, Yukyung Choi, Namil Kim, Kibaek Park, Jae-Shin Yoon, and In So Kweon, "Low-Cost Synchronization for Multispectral Cameras", International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), 2015.

[P8] Namil Kim, Yukyung Choi, **Soonmin Hwang**, Kibaek Park, Jae-Shin Yoon, and In So Kweon, "Geometrical Calibration of Multispectral Calibration", International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), 2015.

[P9] Namil Kim, Yukyung Choi, **Soonmin Hwang**, and In So Kweon, "ARTRIEVAL: Painting Retrieval Without Expert Knowledge", IEEE International Conference on Image Processing **(ICIP)**, 2015. [Project page]

[P10] Yukyung Choi, Namil Kim, Kibaek Park, **Soonmin Hwang**, Jae-Shin Yoon, and In So Kweon, "All-Day Visual Place Recognition: Benchmark Dataset and Baselines", IEEE International Conference on Computer Vision and Pattern Recognition Workshops (CVPRW-VPRICE), 2015. [Project page]

[P11] **Soonmin Hwang**, Jaesik Park, Namil Kim, Yukyung Choi, and In So Kweon, "Multispectral Pedestrian Detection: Benchmark Dataset and Baselines", IEEE International Conference on Computer Vision and Pattern Recognition **(CVPR)**, 2015. [Project page]

[P12] **Soonmin Hwang**, Tae-hyun Oh, and In So Kweon, **"A Two Phase Approach for Pedestrian Detection"**, Asian Conference on Computer Vision Workshops (ACCV Workshops), 2014.

[P13] **Soonmin Hwang**, Chaehoon Park, Yukyung Choi, Donggeun Yoo, and In So Kweon, "Evaluation of Vocabulary Trees for Localization in Robot Applications", International Conference on Control, Automation and Systems (ICCAS), 2013.

Awards

Encouragement prize	The 24th HumanTech Paper Award, Samsung, Feb 2018. [P1] ($ 2,000, Accept rate ~6.5% = 119/????)
Gold prize	The 23th HumanTech Paper Award, Samsung, Feb 2017. [P2] ($ 10,000, Accept rate 0.7% = 13/1830)
Bronze prize	Korea Invention Patent Exhibition (KINPEX), Dec 2016. [P4]
1st place	NVidia Deep Learning Contest, NVidia Korea, Nov 2016. [P4]

Skills

Languages	Python, MATLAB, C/C++
Libraries	PyTorch, Caffe, OpenCV, Qt, Point Cloud Library (PCL), MFC, and others

References

Prof. In So Kweon

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