# JUNHYUK HYUN

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## PERSONAL INFORMATION

**Birth:** August 6, 1992, in Republic of Korea
**Nationality:** Korea
**Language:** Korean(Native), English

## EXPERIENCES

**Omni Instrument** *January 2026 - Present*
Senior Computer Vision Engineer.

**Phantom AI** *February 2023 - September 2025*
Senior Computer Vision Engineer.

**Yonsei University** *September 2022 - October 2022*
Researcher at Computational Intelligence Lab.

**Yonsei University** *March 2014 - August 2022*
Research Assistant at Computational Intelligence Lab.

**Yonsei University** *March 2013 - February 2014*
Intern at Computational Intelligence Lab.

## EDUCATION

**Yonsei University** *March 2014 - August 2022*
*Ph.D.*
Advisor: Prof. Euntai Kim
School of Electrical & Electronic Engineering

**Yonsei University** *March 2010 - February 2014*
*Bachelor of Electrical & Electronic Engineering*
School of Electrical & Electronic Engineering

**Gyeonggi Science High School** *March 2008 - February 2010*
Early Graduation

## SKILLS AND TECHNIQUES

Machine learning and deep learning techniques using Python, MATLAB
Various computer vision and deep learning packages (Pytorch, TensorRT)
Experience in designing neural networks using attention modules for scene understanding

## INTERESTS

**Attention mechanisms, network design, computer vision, real-time object detection, real-time semantic segmentation, autonomous systems**

## PROJECTS

**Development of deep learning technology to mount vision technology on small ships**
*October 1, 2021 - March 31, 2022*
- Funded by Avikus
- Development of real-time object detection and semantic segmentation technology in the marine environment
- Development of object detection technology that can detect small objects while operating in real time
- Development of multi-task network configuration and training technology for object detection and segmentation

**Development of artificial intelligence robot autonomous navigation technology for agile movement in crowded space**

*April 1, 2019 - December 31, 2022*
- Funded by Ministry of Trade, Industry and Energy
- Development of day and night real-time traversability estimation technology based on semantic segmentation
- Development of segmentation algorithm that can classify traversability of curbs using only a monocular camera

**Scene parsing and static local map generation using RGBD image in outdoor environment**

*March 18, 2019 - October 31, 2019*
- Funded by LG Electronics
- Development of day and night real-time semantic segmentation technology using RGB and RGBD camera
- Development of trainable up-sampling layer for precise semantic segmentation
- Real-time (14 FPS) demonstration of development algorithm on embedded board (Jetson Xavier)

**Development of robust detection and tracking system for accident prevention in autonomous vehicle**

*March 1, 2019 - February 28, 2022*
- Funded by National Research Foundation of Korea
- Research of corner case data (ex. fallen person) augmentation algorithm for robust object detection in driving situation
- Research of domain adaptation technology that enables stable segmentation even with tail classes (classes with a small number of data)

**Research on fundamental technology for deep learning-based semantic state understanding**

*August 1, 2017 - December 31, 2020*
- Funded by National Research Foundation of Korea
- Research of video scene recognition technology using deep learning
- Research of feature summary technology for effective video data processing
- Research on technology to track a specified object in a video using deep learning

**Development of real-time object recognition technology based on deep learning for autonomous vehicles**

*September 11, 2017 - September 28, 2018*
- Funded by Hyundai MNSoft
- Development of real-time traffic signs, traffic lights, road mark, and lane detection algorithms in driving vehicles
- Training a deep learning network to estimate the distance to a detected object
- Real-time (8 FPS) demonstration of development algorithm on embedded board (Jetson TX2) using TensorRT

**Multi Object Tracking (MOT) technology development in dynamic environment**

*April 01, 2017 - December 31, 2017*
- Funded by LG Electronics
- Development of dynamic object detection technology for robots driving through airports.

**Development of part-based pedestrian detection and tracking system for autonomous vehicle**

*June 1, 2016 - May 31, 2019*
- Funded by National Research Foundation of Korea
- Research of part-based pedestrian detection algorithm using a camera
- Research of accelerate the region of interest extraction algorithm for pedestrian detection

**Development of robot intelligence technology for mobility with learning capability toward robust and seamless indoor and outdoor autonomous navigation**

*May 1, 2016 - April 30, 2020*
- Funded by Ministry of Trade, Industry and Energy
- Development of dynamic object (pedestrian, vehicle) detection algorithm using deep learning
- Development of false detection removal algorithm through fusion of camera and LiDAR sensor

**Low level convergence of video and radar processing system developed for improving pedestrian recognition**

*June 1, 2015 - May 31, 2018*
- Funded by Ministry of Trade, Industry and Energy
- Development of day and night real-time pedestrian, vehicle, and two-wheeled vehicle detection algorithm
- Development of region of interest extraction technology through fusion of stereo camera and radar in driving envi-

ronment

**Development of part-based pedestrian detection and tracking system for autonomous vehicle**
*June 1, 2013 - May 31, 2016*
- Funded by National Research Foundation of Korea
- Implementation of feature extraction algorithm for pedestrian detection

**Development of image-based gesture recognition for indoor robots**
*April 1, 2013 - March 31, 2014*
- Funded by LG Electronics
- Gathering data to train gesture recognition algorithm

## PATENTS

Euntai Kim, Suhyeon Lee, **Junhyuk Hyun**, Hongje Seong, "Apparatus and Method for Domain Adaptation Using Zero Style Loss", Korea-Application No. 10-2021-0003078.

Euntai Kim, Suhyeon Lee, **Junhyuk Hyun**, Hongje Seong, "Apparatus and Method for Solving Class Imbalance Problem of Domain Adaptation Using Content Transfer", Korea-Application No. 10-2021-0003077.

Euntai Kim, Youngjo Lee, Hongje Seong, **Junhyuk Hyun**, "Apparatus for Predicting Traffic Line of Box-level Multiple Object Using Only Position Information of Box-level Multiple Object", Korea-Application No. 10-2020-0149533.

Euntai Kim, Youngjo Lee, Hongje Seong, **Junhyuk Hyun**, "Apparatus for Predicting Movement of Box-level Object Using Only Position Information of Box-level Object", Korea-Application No. 10-2020-0149532.

Euntai Kim, Hongje Seong, Youngjo Lee, **Junhyuk Hyun**, "Pixel Level Video Object Tracking Apparatus Using Box Level Object Position Information", Korea-Application No. 10-2020-0030214, International (PCT) - Application No. PCT/KR2020/005383.

Euntai Kim, Hongje Seong, **Junhyuk Hyun**, "Action Recognition Method and Apparatus in Untrimmed Videos Based on Artificial Neural Network", Korea-Application No. 10-2020-0029743.

Euntai Kim, Hongje Seong, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hyunbae Chang, "Apparatus and Method for Recognizing a Place Based on Artificial Neural Network", Korea-Application No. 10-2019-0041544, Korea-registration No. 10-2211842, International (PCT) - Application No.PCT/KR2020/001018.

Euntai Kim, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hongje Seong, "Apparatus and Method for Detecting Object Based on Heterogeneous Sensor", Korea-Application No. 10-2018-0055179, Korea-registration No. 10-2138681.

Euntai Kim, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hongje Seong, "Method and Apparatus for Generating Scene Situation Information of Video Using Differentiation of Image Feature and Supervised Learning", Korea-Application No. 10-2018-0049520, Korea-registration No. 10-2120453.

Euntai Kim, Jeonghyun Baek, Jisu Kim, **Junhyuk Hyun**, Suhyeon Lee, "Method and Apparatus for Detecting Road Using Camera Model and Filter in Depth Image", Korea-Application No. 10-2017-0052739, Korea-registration No. 10-1911860.

Euntai Kim, Jeonghyun Baek, Jisu Kim, **Junhyuk Hyun**, "Appapratus and Method for Extracting Road Area", Korea-Application No. 10-2016-0061588, Korea-registration No. 10-1748675.

## AWARDS

**3rd place award**
The 2020 DAVIS Challenge on Video Object Segmentation (CVPR Workshop)

**2nd place award**
CoVieW'18 Challenge (ACM MM Workshop)

**Best student paper second place**
iFUZZY 2014

**Bronze prize**
Korean Physics Olympiad 2008

**Excellent grades in admissions**
Gyeonggi Science High School

**Gold prize**
Korean Physics Olympiad 2007

## PUBLICATIONS - JOURNAL

**Junhyuk Hyun**, Hongje Seong, Sangki Kim, and Euntai Kim, "Adjacent Feature Propagation Network (AFPNet) for Real-Time Semantic Segmentation." *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 52, no. 9, pp. 5877-5888, September 2022. (IF: *13.451* in JCR2020)
– Proposed a learnable upsampling layer using attention mechanisms for enhanced real-time semantic segmentation.

**Junhyuk Hyun**, Hongje Seong, and Euntai Kim, "Universal pooling–a new pooling method for convolutional neural networks." *Expert Systems with Applications*, vol. 180, pp. 115084, October 2021. (IF: *6.954* in JCR2020)
– Introduced an attention-based pooling layer for end-to-end trainable feature aggregation.

**Junhyuk Hyun**, Suhan Woo, and Euntai Kim, "Street Floor Segmentation for a Wheeled Mobile Robot." *IEEE Access*, vol. 10, pp. 127601-127609, October 2022. (IF: *3.367* in JCR2020)

Suhan Woo, **Junhyuk Hyun**, Suhyeon Lee, and Euntai Kim, "Real-Time RGB-D Semantic Segmentation with Scale-Invariant Depth Encoding and Noise-Robust Fusion." *International Journal of Control, Automation and Systems*, vol. 1, no. , pp. , 2025.

Suhyeon Lee, Sangyong Lee, Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Fallen Person Detection for Autonomous Driving." *Expert Systems With Applications*, vol 213, pp. 119242, March 2023. (IF: *6.954* in JCR2020)

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Video Object Segmentation using Kernelized Memory Network with Multiple Kernels." *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 45, no 2, February 2023. (IF: *16.389* in JCR2020)

Wonje Jang, **Junhyuk Hyun**, Jhonghyun An, and Euntai Kim, "A Lane-Level Road Marking Map Using a Monocular Camera." *IEEE-CAA Journal of Automatica Sinica*, vol. 9, no. 1, pp. 187-204, January 2022. (IF: *6.171* in JCR2020)

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "FOSNet: An End-to-End Trainable Deep Neural Network for Scene Recognition." *IEEE Access*, vol. 8, no. 1, pp. 82066-82077, December 2020. (IF: *3.367* in JCR2020)

Jeonghyun Baek, **Junhyuk Hyun**, and Euntai Kim, "A pedestrian detection system accelerated by kernelized proposals." *IEEE transactions on intelligent transportation systems*, vol. 21, no. 3, pp. 1216-1228, March 2019. (IF: *6.492* in JCR2020)

## PUBLICATIONS - CONFERENCE

**Junhyuk Hyun**, and Euntai Kim, "Positional Weighted Memory Module for Semantic Segmentation." *Proc. of the 18th International Conference on Ubiquitous Robots (UR 2021)*, Gangneung, Korea, July, 2021.

**Junhyuk Hyun**, Hongje Seong, Suhyeon Lee, Suhan Woo, and Euntai Kim, "Weakly Supervised Temporal Localization in Video Scene Recognition." *Proc. of the 18th International Conference on Control, Automation and Systems (ICCAS 2018)*, GangWon, Korea, October, 2018.

**Junhyuk Hyun**, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzadeh Kassani, and Euntai Kim, "Getting Higher Performance Using a Two-Layer Extreme Learning Machine." *Proc. of the 2016 International Workshop on Advanced Image Technology (IWAIT 2016)*, Busan, Korea, January, 2016.

**Junhyuk Hyun**, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzadeh Kassani, and Euntai Kim, "Vehicle detection and classification in the Scala sensor by using binary classification." *Proc. of the 2015 15th International Conference on Control, Automation and Systems (ICCAS 2015)*, Busan, Korea, October, 2015.

**Junhyuk Hyun**, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzajeh Kassani, and Euntai Kim, "Proposing a Fast Circular HOG Descriptor for Detecting Rotated Objects." *Proc. of The 2015 International Joint Conference on Neural Networks (IJCNN 2015)*, Killarney, Ireland, July, 2015.

**Junhyuk Hyun**, Jeonghyun Baek, Jisu Kim, Peyman Hosseinzajeh Kassani, and Euntai Kim, "Multimodel approach for pedestrian detection." *Proc. of 2014 International Conference on Fuzzy Theory and Its Applications (iFuzzy2014)*, Kaohsiung, Taiwan, November, 2014.

Suhyeon Lee, **Junhyuk Hyun**, Hongje Seong, and Euntai Kim, "Unsupervised Domain Adaptation for Semantic Segmentation by Content Transfer." *Proc. of the Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI 2021)*, Vancouver, Canada, February, 2021.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Kernelized Memory Network for Video Object Segmentation." *Proc. of the European Conference on Computer Vision (ECCV 2020)*, Glasgow, Scotland, August, 2020, vol. 12367, pp. 629-645.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Is Whole Object Information Helpful for Scene Recognition?." *Proc. of the 17th International Conference on Ubiquitous Robots (UR 2020)*, Kyoto, Japan, June, 2020, pp. 149-152.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "A Kernel-based Approach for Video Object Segmentation." *The 2020 DAVIS Challenge on Video Object Segmentation (DAVIS'20, CVPR Workshop)*, Seattle, United States, June, 2020.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Video Multitask Transformer Network." *The 2nd Workshop and Challenge on Comprehensive Video Understanding in the Wild (CoVieW'19, ICCV Workshop)*, Seoul, Korea, October, 2019.

Hongje Seong, **Junhyuk Hyun**, and Euntai Kim, "Partial Convolution for Scene Recognition." *Proc. of the 19th International Conference on Control, Automation and Systems (ICCAS 2019)*, Jeju, Korea, October, 2019.

Hongje Seong, **Junhyuk Hyun**, Hyunbae Chang, Suhyeon Lee, Suhan Woo, and Euntai Kim, "Scene Recognition via Object-to-Scene Class Conversion: End-to-End Training." *Proc. of The International Joint Conference on Neural Networks (IJCNN 2019)*, Budapest, Hungary, July, 2019, pp. 1-6.

Suhyeon Lee, **Junhyuk Hyun**, and Euntai Kim, "Robust Object Detection and Tracking for Autonomous Driving." *Proc. of 2018 International Conference on Fuzzy Theory and Its Applications (iFuzzy2018)*, Daegu, Korea, November, 2018.

Hongje Seong, **Junhyuk Hyun**, Suhyeon Lee, Suhan Woo, Hyunbae Chang, and Euntai Kim, "New Feature-level Video Classification via Temporal Attention Model." *The 1st Workshop and Challenge on Comprehensive Video Understanding in the Wild (CoVieW'18, ACM MM Workshop)*, Seoul, Korea, October, 2018, pp. 31-34.

Peyman Hosseinzadeh Kassani, **Junhyuk Hyun**, and Euntai Kim, "Application of Soft Histogram of Oriented Gradient on Traffic Sign Detection." *Proc. of the 2017 14th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI 2017)*, Jeju, Korea, June, 2017.

Peyman Hosseinzadeh Kassani, **Junhyuk Hyun**, and Euntai Kim, "Proposing a GPU Based Modified Fuzzy Nearest Neighbor Rule for Traffic Sign Detection." *Proc. of the 2015 15th International Conference on Control, Automation and Systems (ICCAS 2015)*, Busan, Korea, October, 2015.

Jeonghyun Baek, Jisu Kim, **Junhyuk Hyun**, and Euntai Kim, "New efficient speed-up scheme for cascade implementation of SVM classifier." *Proc. of The 2015 International Joint Conference on Neural Networks (IJCNN 2015)*, Killarney, Ireland, July, 2015.

Peyman Hosseinzadeh Kassani, **Junhyuk Hyun**, and Euntai Kim, "Developing a Modified Fuzzy Nearest Neighbor Rule for Pattern Classification." *Proc. of the Korean Institute of Intelligent Systems Spring Conference 2015 (KIIS Spring Conference 2015)*, Ansan, Korea, April, 2015.

## ACTIVITIES

### Competition
13th Hyundai Motor Group Autonomous Vehicle Competition