

Jaehyun Park

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Research Interests

Autonomous Driving System, Deep Learning, Explainable AI, and Domain Adaptation

Education

Hanyang University

Seoul, Korea

M.S. in Automotive Engineering (Advisor: Prof. Myoungcho Sunwoo)

Mar. 2019 - Feb. 2021

- Cumulative GPA (a 100-point scale) : 98.2/100
- Dissertation: Fast 3D Semantic Segmentation of Multiple LiDAR Point Cloud based on PointNet and 3D Sparse CNN for Autonomous Car

B.S. in Automotive Engineering (Advisor: Prof. Myoungcho Sunwoo)

Mar. 2012 - Feb. 2019

- Cumulative GPA (a 100-point scale) : 95.1/100 (Graduating with Honors - Summa Cum Laude)

Relevant Courses: Digital Logic Design, Linear Algebra, Signals and Systems, Vehicle Dynamics System, Data Structures, Advanced Linear and Nonlinear Programming, Software Engineering, Automotive Embedded System, Intelligent Vehicle Control System

Publications

International Journals

- **[Accepted]** Jaehyun Park, Chansoo Kim, Soyeong Kim, and Kichun Jo, "PCSCNet: Fast 3D semantic segmentation of LiDAR point cloud for autonomous car using point convolution and sparse convolution network" in **Expert Systems with Applications (ESWA)**, 2023. [\[URL\]](#)
- **[Published]** Jimin Jeong, Hamin Song, Jaehyun Park, Paulo Resende, Benazouz Bradaï, and Kichun Jo, "Fast and Lite Point Cloud Semantic Segmentation for Autonomous Driving Utilizing LiDAR Synthetic Training Data" in **IEEE Access**, 2022. [\[URL\]](#)
- **[Published]** Sungjin Cho, Chansoo Kim, Jaehyun Park, Myoungcho Sunwoo, and Kichun Jo, "Semantic Point Cloud Mapping of LiDAR Based on Probabilistic Uncertainty Modeling for Autonomous Driving" in **MDPI Sensors**, 2020. [\[URL\]](#)

Domestic Conference (Korean)

- **[Oral]** Jaehyun Park, Chansoo Kim, Jimin Jeong, Kichun Jo, and Myoungcho Sunwoo, "Real-time Semantic Segmentation of LiDAR Point Cloud using PointNet and 3D Sparse CNN" in **Korean Society Automotive Engineers (KSAE) 2020 Annual Spring Conference**, 2020.

Domestic Journal (Korean)

- **[Published]** Hamin Song, Jieun Cho, Jinsu Ha, Jaehyun Park, and Kichun Jo, "Camera-LiDAR Fusion-Based Point Cloud Semantic Segmentation through Voxel-Pixel Matching for Autonomous Driving" in **The Transactions of the Korean Society Automotive Engineers (KSAE)**, 2022.

Work Experience

Hyundai Motors Company

Seoul, Korea

LiDAR Perception Software Engineer

Feb. 2021 - Present

- Designed an optimized CNN-based model for 3D object classification
- Designed a deep learning model for real-time 3D object detection in urban autonomous driving scenarios

Research Projects

RoboRide: SAE Level 4 Autonomous Driving Taxi (IONIQ5) in Seoul

Hyundai Motors Company

LiDAR Object Detection Software Developer

Feb 2022 - Present

- Designed a multihead-based real-time object detection network that can reduce the computational load by replacing two detectors (for vehicles and pedestrians) with a single detector
- Developed an ONNX conversion tool to enable the trained detector to work on a C++-based LiDAR perception software in an industrial-embedded PC (PC Model: Nuvo 8208GC + RTX 2080ti)

Highway Driving Pilot (HDP): Fully Autonomous Driving on Highway

Hyundai Motors Company

LiDAR Object Classification Software Developer

Feb 2021 - Present

- Working on a team that develops a real-time model to classify 3D objects using noisy and sparse point cloud obtained from a low-price LiDAR sensor and running the classification model on the CPU (Intel Denverton)
- Established training DB for 3D object classification from actual driving logging data and developed a DB inspection tool using Open3d library
- Proposed an object classification model based on depthwise-separable convolution that can process a LiDAR point cloud within 32ms on a C language-based software platform implemented in the Intel Denver core
- Applied SIMD (Single Instruction Multiple Data) operations to the convolution in the classification model implemented in C language and reduced the execution time of the model by about 24%

Autonomous Valet Parking Service in Sangam, Seoul

LGU+ and ACE Lab

Driving Simulation Environment Developer

Jan 2020 - Jan 2021

- Built an autonomous driving vehicle using Genesis GV80 and demonstrated autonomous driving and valet parking service to the public and media in Sangam, Seoul, Korea [\[NEWS\]](#) [\[VIDEO\]](#)
- Designed the autonomous vehicle's sensor configuration, network layout, driver monitoring system, and system failure alert to obtain an autonomous driving license from the Korean government
- Built an autonomous driving simulator that mimicked the target driving and parking lot environment using CARLA and allowed team members to evaluate the software within the lab
- Generated a high-definition road map in the developed CARLA simulator, which could be utilized for planning and localization of autonomous vehicles

Valeo Drive4U Locate & Trajectory Planning

Valeo (France) and ACE Lab

LiDAR Semantic Segmentation Software Developer

Jan 2020 - Jan 2021

- A collaborative project with Valeo France and worked on a team that improves the localization performance of autonomous vehicles using semantic segmentation results of LiDAR point cloud
- Conducted 2 technical seminars on deep learning-based LiDAR point cloud semantic segmentation models for Valeo researchers
- Implemented inference code for real-time semantic segmentation of LiDAR point cloud in RTMaps to filter out movable objects in driving scenes for robust localization
- Designed a two-staged semantic segmentation model for point cloud maps to improve performance for small-sized classes, such as pedestrians, resulting in an average mean IoU (Intersection of Union) 8% improvement over the single-staged model
- Transferred the two-stage model to Valeo France

Autonomous Valet Parking Software Using Dynamic Parking-lot Map

LGU+ and ACE Lab

Parking Space Detection Developer

Jan 2020 - Jul 2020

- Built a parking lot environment on the CARLA simulator and Acquired labeled datasets for SVM (Surround View Monitor) image semantic segmentation from the simulator
- Inferred the input SVM image on the simulator using the trained semantic segmentation model to detect the parking spaces and whether the spaces are empty

Traffic Light Recognition (TLR) Model Development

ACE Lab

Data Labeler and Analyst

Oct 2018 - Dec 2018

- Labeled bounding boxes for traffic sign-in images acquired from Seoul, Korea and analyzed the distributions of the dataset [\[URL\]](#)
- Trained a designed TLR model and Analyzed the performance (confusion matrix and precision and recall curve) of the model

Academic Projects

Vehicle Position Estimating Algorithm Porting to Infineon TC297

Hanyang University

Course: Automotive Embedded System

Sep 2019 - Dec 2019

- Converted vehicle position estimating algorithm that was implemented in Matlab Simulink into C code using an auto-code generation
- Ported the generated code into the Infineon TC297 processor and validated the result using the real driving vehicle (GV80, KONA EV)

Autonomous Parking System Development

Hanyang University

Course: Automotive Engineering Design Project

Mar 2017 - Jun 2017

- Developed the parking space detecting and perpendicular parking system using ultrasonic sensors and a line scan camera
- Built an RC car, equipped with those sensors and Infineon TC237 processor, and implemented the autonomous parking system using the car

Teaching Experience

Teaching Assistant for Automotive Embedded System (ECL3003), Hanyang University

2019

- Led labs, graded assignments and final-term projects, held office hours, and prepared online classes

Honors and Awards

Hanyang Graduate School Scholarship - 70% of Tuition (4 Semesters)

2019 - 2020

Hanyang Academic Excellence Award - 60% of Tuition

2017

National Science and Engineering Undergraduate Scholarship - Full Tuition

2016

Hanyang University Scholarship - Full Tuition (5 Semesters)

2012 - 2013, 2018

Independent Courseworks

Udacity Data Analyst, C++ For Programmers, C++

Coursera Neural Networks and Deep Learning, Convolutional Neural Networks, Machine Learning

Skills

Programming C/C++, Python (Pandas, PyTorch, Tensorflow, Keras, scikit-learn, etc.), MATLAB/Simulink.

Simulator and Tool CARLA, ROS, CANoe, RoadRunner, eclipse, CATIA, tortoise, Git.

References available upon request.