Youngseok Kim

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WORK EXPERIENCE

42dot, Computer Vision Research Engineer — Dec 2023 - Present

- Improve camera-radar sensor fusion architecture
  - Optimized radar architecture by improving operations for radar modality
  - Developed NPU-compatible structures to maximize hardware acceleration
  - Improved long-range (>100 m) detection performance through sensor fusion algorithms
  - Developed robust sensor fusion methods to mitigate calibration and time synchronization errors
- Develop quantization-efficient 3D object detection model
  - Conducted in-depth quantitative/qualitative analysis of quantization-induced performance degradation
  - Identified and restructured vulnerable layers with quantization-friendly operations
  - Reduced quantization performance loss from 10%p to 2%p, optimizing efficiency-accuracy balance
- Improve scalability of 3D object detection model
  - Built active learning pipeline for continuously enhancing model generalizability
  - Expanded target object classes from 6 to 12 using active learning and augmentation techniques
  - Developed high-performance off-board LiDAR-based models for knowledge distillation
- Develop End-to-End (perception to prediction) model
  - Participated in designing E2E model architecture for complex autonomous driving scenarios
  - Implemented efficient learning methodologies for data-sparse environments
  - Developed Supervised Fine-Tuning (SFT) techniques to enhance model adaptability

EDUCATION

Ph.D. in Mobility, KAIST (*Advisor: Dongsuk Kum*) — 2019-2023

- Thesis: *3D Object Detection via Multi-Sensor Fusion for Autonomous Driving*
- Graduate with *KAIST College of Engineering PhD Dissertation Award*

M.S. in Mobility, KAIST (*Advisor: Dongsuk Kum*) — 2017-2019

- Thesis: *Deep Learning based Vehicle Position and Orientation Estimation via Inverse Perspective Mapping Image*

B.S. in Mechatronics Engineering, KOREATECH (*Advisor: Sangsoon Lee*) — 2012-2017

- Honors: *cum laude*

PUBLICATIONS

International

[1] Sanmin Kim, **Youngseok Kim**, Sihwan Hwang, Hyeonjun Jeong, and Dongsuk Kum
LabelDistill: Label-guided Cross-modal Knowledge Distillation for Camera-based 3D Object Detection
European Conference on Computer Vision (**ECCV**), 2024

[2] **Youngseok Kim**, Juyeb Shin, Sanmin Kim, In-Jae Lee, Jun Won Choi, and Dongsuk Kum
CRN: Camera Radar Net for Accurate, Robust, Efficient 3D Perception
IEEE/CVF International Conference on Computer Vision (**ICCV**), 2023
- Ranked 1st among camera-radar methods on nuScenes detection benchmark as of March 2023

[3] Sanmin Kim, **Youngseok Kim**, In-Jae Lee, and Dongsuk Kum
Predict to Detect: Prediction-guided 3D Object Detection using Sequential Images
IEEE/CVF International Conference on Computer Vision (**ICCV**), 2023

[4] **Youngseok Kim**, Sanmin Kim, Jun Won Choi, and Dongsuk Kum
CRAFT: Camera-Radar 3D Object Detection with Spatio-Contextual Fusion Transformer
AAAI Conference on Artificial Intelligence (**AAAI**), 2023
- Ranked 1st among camera-radar methods on nuScenes detection benchmark as of July 2022

[5] **Youngseok Kim**, Sanmin Kim, Juyeb Shin, Jun Won Choi, and Dongsuk Kum
CRN: Camera Radar Net for Accurate, Robust, Efficient 3D Perception
International Conference on Learning Representations Workshop (**ICLRW**) on Scene Representations for AD, 2023

[6] Sihwan Hwang, Sanmin Kim, **Youngseok Kim**, and Dongsuk Kum
Combining Semi-Supervision and Active Learning via 3D Consistency for 3D Object Detection
IEEE/RSJ International Conference on Robotics and Automation (**ICRA**), 2023

[7] **Youngseok Kim**, Sanmin Kim, Sangmin Sim, Jun Won Choi, and Dongsuk Kum
Boosting Monocular 3D Object Detection with Object-Centric Auxiliary Depth Supervision
IEEE Transactions on Intelligent Transportation Systems (**T-ITS**) (*IF: 8.5*), 2022
- Ranked 1st/3rd among published monocular methods on KITTI BEV/3D detection benchmark as of April 2021

[8] Sangmin Sim, **Youngseok Kim**, and Dongsuk Kum
Sequential Image-based 3D Object Detection with Location Refinement
IEEE International Conference on Pattern Recognition (**ICPR**), 2022

[9] **Youngseok Kim**, Jun Won Choi, and Dongsuk Kum
GRIF Net: Gated Region of Interest Fusion Network for Robust 3D Object Detection from Radar Point Cloud and Monocular Image
IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2020

[10] Jinhyeong Kim*, **Youngseok Kim***, and Dongsuk Kum
Low-level Sensor Fusion Network for 3D Vehicle Detection using Radar Range-Azimuth Heatmap and Monocular Image
Asian Conference on Computer Vision (**ACCV**), 2020

[11] **Youngseok Kim** and Dongsuk Kum
Deep Learning based Vehicle Position and Orientation Estimation via Inverse Perspective Mapping Image
IEEE Intelligent Vehicles Symposium (**IV**), 2019
- Oral presentation, 5.8% acceptance rate

PATENTS

International

- Dongsuk Kum, **Youngseok Kim**, "Electronic Device for Obtaining Three-Dimension Object Based on Camera and Radar Sensor Fusion, and Operating Method Thereof," US, Registration Number: 17199043, DE, PCT, Application Number: 10 2021 106 518.6, PCT/KR2021/002916
- Dongsuk Kum, **Youngseok Kim**, "Electronic Device for Perceiving Three-Dimension Environment based on Camera and Radar, and Operating Method Thereof," US, Application Number: 18/502,678

Domestic

- Dongsuk Kum, **Youngseok Kim**, "Electronic Device for Obtaining Three-Dimension Object Based on Camera and Radar Sensor Fusion, and Operating Method Thereof," KR, Registration Number: 10-2168753-0000
- Dongsuk Kum, **Youngseok Kim**, "Simultaneous Traffic Participants Detection and Localization vis Bird's Eye View Image," KR, Registration Number: 10-2003387-0000
- Dongsuk Kum, **Youngseok Kim**, Seoung Jun Lee, "Distance Measuring Device Using Mono Infrared Camera and Method Thereof," KR, Registration Number: 10-1918887-0000
- Van Thang Vu, **Youngseok Kim**, "Apparatus and Method for Image Processing," KR, Application Number: 10-2024-0061957
- Dongsuk Kum, **Youngseok Kim**, "Electronic Device for Perceiving Three-Dimension Environment based on Camera and Radar, and Operating Method Thereof," KR, Application Number: 10-2023-0096379

RESEARCH EXPERIENCES

Graduate Research Assistant at *VDC (Vehicular systems Design and Control) Lab, KAIST* 2017-2023

- Developed semi-auto labeling pipeline for building multi-modal 3D object detection dataset [Link]
- Deployed various detection networks using camera-radar, camera, and LiDAR for outdoor driving scene
- Managed autonomous driving vehicle team members to build a vehicle platform [Link]
- Organized overall autonomous driving demonstration and test driving at KAIST campuses and K-City [Link]

Teaching Assistant at *AbuDhabi Polytechnic, UAE* Spring 2015

- Assisted tutorials and laboratories of Circuit Theory and Mechanical Engineering Laboratory classes
- Graded lab reports and assignments, and held office hours

AWARDS AND HONORS

2024	KAIST College of Engineering PhD Dissertation Award [Link]
2022	KAIST Research Highlights [Link]
2021	KAIST Breakthroughs (Research Webzine of the KAIST College of Engineering) [Link]
2021	2nd Place, Object Tracking Challenge for Autonomous Driving, RideFlux (sponsored by Korea Ministry of Science and ICT)
2012 - 2017	Graduation with honors: *cum laude*, KOREATECH, Full tuition scholarship
2014	Grand Prize and Popularity Award, Robot Capstone Challenge (sponsored by Korea Institute of Industrial Technology)

SKILLS

- **Language:** Korean (Native), English (Fluent)
- **Programming Languages:** Python, MATLAB, Basics of C/C++/CUDA
- **Tools/Library/Software:** PyTorch, OpenCV, ROS, LaTeX, Ubuntu, Git, Docker, k8s

ACADEMIC SERVICE

Reviewer

- Conference: AAAI, CVPR, ECCV, ICCV, ICRA, IROS, ITSC, IV
- Journal: IJAT, NeuroComputing, RA-L, T-ITS, T-IV, TPAMI

Invited Talks

- SKKU Applied AI & Computer Vison Lab: Towards LiDAR-level 3D Object Detection using Camera and Radar Oct 2023
- ADD (Agency for Defense Development): Sensor Fusion for Robust 3D Object Detection Sep 2023
- Qualcomm Korea: Towards LiDAR-level 3D Object Detection using Camera and Radar Jun 2023
- Gachon Univ. Autonomous Mobility Systems Lab: From 2D to 3D Monocular Perception Apr 2023
- KAIST Future Mobility Conference: Towards LiDAR-level 3D Object Detection using Camera and Radar Feb 2023
- KATECH (Korea Automotive Technology Institute): From 2D to 3D Monocular Perception Dec 2022
- Qualcomm USA&Korea: Camera-Radar 3D Object Detection with Spatio-Contextual Fusion Transformer Oct 2022

REFERENCES

Available on request