Wooju Lee

Ph.D. candidate in Electrical Engineering at KAIST

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SUMMARY

Ph.D. candidate in Electrical Engineering at KAIST, specializing in robust localization and object detection in real-world environments. Developed domain generalization and sensor fusion models to improve localization accuracy under domain shifts, extreme weather conditions, and adversarial attacks. This research contributed to the deployment of autonomous vehicles and robotic systems. Research interests include, but are not limited to:

- **Geo-localization:** Cross-view pose optimization, cross-view image retrieval, and visual place recognition
- **Domain robustness:** Domain generalization, sensor fusion, and adversarial training
- **Image recognition:** Image classification, object detection, and segmentation

PROJECTS

- **Development of autonomous driving technology for unstructured environment** *Jul. 2023 - Present*
  Supported by Hanwha Aerospace
  ∘ Led team to develop a robust geo-localization framework in GPS-denied environments, integrating cross-view image retrieval, cross-view pose optimization, and local odometry.
  ∘ Achieved **SOTA** performance with mean position error of 0.43m in the **real world**, validated in **both mobile robots and autonomous vehicles.**

- **Development of Robust AI Technology for Dynamic Real-World Situations** *Mar. 2022 - Dec. 2023*
  Supported by IITP, which is a government-affiliated organization [ⓞ]
  ∘ Led team to develop object detection framework in out-of-distribution, integrating domain generalization and data augmentation.
  ∘ Achieved **SOTA** performance with a 21.8mAP on KITTI-C dataset
  ∘ Validated object detection model for **autonomous vehicles in the real world**.

PUBLICATIONS C=CONFERENCE, J=JOURNAL, *=EQUAL CONTRIBUTION

[C.1] **W. Lee**, J. Park, D. Hong, C. Sung, Y. Seo, D. Kang, and H. Myung, "PIDLoc: Cross-view pose optimization network inspired by PID controllers," accepted to CVPR, 2025.

[C.2] **W. Lee***, D. Hong*, H. Lim, and H. Myung, "Object-aware domain generalization for Object Detection," in AAAI, 2024, **Oral**, [Pull requests], [ⓞ].

[C.3] I. Lee, **W. Lee**, and H. Myung, "Domain generalization with vital phase augmentation", in AAAI, 2024, [ⓞ].

[C.4] C. Sung, W. Kim, J. An, **W. Lee**, H. Lim, H. Myung, "Contextrast: Contextual contrastive learning for semantic segmentation", in CVPR, 2024, [ⓞ].

[C.5] **W. Lee** and H. Myung, "Parametric surround modulation improves the robustness of the deep neural networks", in RITA, 2023.

[C.6] **W. Lee** and H. Myung, "Adversarial attack for asynchronous event-based data", in AAAI, 2022.

[J.1] S. Noh, **W. Lee**, and H. Myung, "Sample-efficient and occlusion-robust reinforcement learning for robotic manipulation via multimodal fusion dualization and representation normalization", in Neural Networks, 2025.

[J.2] A. J. Lee, S. Song, H. Lim, **W. Lee**, and H. Myung, "$(LC)^2$: LiDAR-camera loop constraints for cross-modal place recognition", in IEEE RA-L, 2023, [ⓞ].

[J.3] D. Noh, C. Sung, T. Uhm, **W. Lee**, H. Lim, and H. Myung.,"X-MAS: Extremely large-scale multi-modal sensor dataset for outdoor surveillance in real environments", in IEEE RA-L, 2023.

EDUCATION

- **Korea Advanced Institute of Science and Technology (KAIST)** *Mar. 2021 - Present*
  Ph.D candidate in Electrical Engineering, Advisor: Prof. Hyun Myung Daejeon, Republic of Korea
- **Korea Advanced Institute of Science and Technology (KAIST)** *Mar. 2019 - Feb. 2021*
  M.S. in Robotics Program, Advisor: Prof. Hyun Myung Daejeon, Republic of Korea
- **Korea University** *Mar. 2013 - Feb. 2019*
  B.S. in Mechanical Engineering Seoul, Republic of Korea

SKILLS

- Python3, Pytorch, ROS, Docker, Git, AWS

HONORS AND AWARDS

- **AFCV'21 Best Paper Award** *May 2021*
  Asian Federation of Computer Vision (AFCV)
  ◦ W. Lee and H. Myung, "Surround modulation-inspired neural network for robust image classification", in KROC, 2021.