Hwiyeon Yoo

Contact Information

Ph.D.
Mobile: (+82)-10-9311-4553
E-mail: hwiyeon.yoo@gmail.com
Homepage: https://hwiyeon.github.io

Research Interests

Spatial AI, Semantic Visual Perception, Vision-based Robot Learning, Multi-modal Perception, Robotics, Embodied Navigation, Vision-Language Model (VLM) for Embodied System, Anomaly Detection, Document Understanding

Experience

Machine Learning Researcher, Boeing Mar. 2024 - Present
- Developing OCR-based models for key information extraction and document understanding
- Developing vision-based anomaly detection algorithms for industrial applications

Education

Ph.D. in Electrical and Computer Engineering Mar. 2017 - Feb. 2024
- Robot Learning Laboratory, Seoul National University, Seoul, Korea
- Advisor: Prof. Songhwai Oh

B.S. in Electrical and Computer Engineering Mar. 2012 - Feb. 2017
- Seoul National University, Seoul, Korea

International Journal

Hwiyeon Yoo, Yunho Choi, Jeongho Park, and Songhwai Oh, "Commonsense-Aware Object Value Graph for Object Goal Navigation," *IEEE Robotics and Automation Letters (RA-L)*, 2024.

Wooseok Oh, **Hwiyeon Yoo**, Timothy Ha, and Songhwai Oh, "Local Selective Vision Transformer for Depth Estimation Using a Compound Eye Camera," *Pattern Recognition Letters*, 2023.

Hwiyeon Yoo, Geonho Cha, and Songhwai Oh,"Deep Ego-Motion Classifiers for Compound Eye Cameras," *Sensors*, vol. 19, no. 23, Dec. 2019.

International Conference

Hwiyeon Yoo, Yunho Choi, Jeongho Park, and Songhwai Oh, "Commonsense-Aware Object Value Graph for Object Goal Navigation," *40th Anniversary of the IEEE Conference on Robotics and Automation (ICRA@40)*, Sep. 2024.

Nuri Kim, Obin Kwon, **Hwiyeon Yoo**, Yunho Choi, Jeongho Park, and Songhwai Oh, "Topological Semantic Graph Memory for Image-Goal Navigation," in *Proc of the Conference on Robot Learning (CoRL)*, Dec. 2022. (Oral Presentation, Acceptance Rate: 6.5%)

Obin Kwon, Nuri Kim, Yunho Choi, **Hwiyeon Yoo**, Jeongho Park, and Songhwai Oh, "Visual Graph Memory with Unsupervised Representation for Visual Navigation," in *Proc. of the International Conference on Computer Vision (ICCV)*, Oct. 2021.

Hwiyeon Yoo, Jungho Yi, Jong Mo Seo, and Songhwai Oh, "Actualization of Deep Ego-motion Classification on Miniaturized Octagonal Compound Eye Camera," in *Proc. of the International Conference on Control, Automation and Systems (ICCAS)*, Oct. 2021. (Best Poster Paper Award Winner)

Wooseok Oh, **Hwiyeon Yoo**, Timothy Ha, and Songhwai Oh, "Vision-Based 3D Reconstruction Using a Compound Eye Camera," in *Proc. of the International Conference on Control, Automation and Systems (ICCAS)*, Oct. 2021.

Hwiyeon Yoo and Songhwai Oh, "Localizability-based Topological Local Object Occupancy Map for Homing Navigation," in *Proc. of the International Conference on Ubiquitous Robots*, Jul. 2021.

Hwiyeon Yoo, Nuri Kim, Jeongho Park, and Songhwai Oh, "Path-Following Navigation Network Using Sparse Visual Memory," in *Proc. of the International Conference on Control, Automation and Systems (ICCAS)*, Oct. 2020.

Donghoon Lee, Sangdoo Yun, Sungjoon Choi, **Hwiyeon Yoo**, Ming-Hsuan Yang, and Songhwai Oh, "Unsupervised Holistic Image Generation from Key Local Patches," in *Proc. of the European Conference on Computer Vision (ECCV)*, Sep. 2018.

Hyemin Ahn, Timothy Ha*, Yunho Choi*, **Hwiyeon Yoo***, and Songhwai Oh, "Text2Action: Generative Adversarial Synthesis from Language to Action", in *Proc. of the IEEE International Conference on Robotics and Automation (ICRA)*, May 2018. (* equally contributed)

Geonho Cha, **Hwiyeon Yoo**, Donghoon Lee, and Songhwai Oh, "Light-Weight Semantic Segmentation for Compound Images", in *IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI)*, Oct., 2017.

Hwiyeon Yoo, Donghoon Lee, Geonho Cha, and Songhwai Oh, "Estimating Objectness Using a Compound Eye Camera", in *IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI)*, Nov., 2017. (oral)

Preprints

Jinwoo Ahn, Hyeokjoon Kwon, and **Hwiyeon Yoo***, "Fine-grained Open-Vocabulary Object Recognition via User-Guided Segmentation", *arXiv*, Nov., 2024. (* corresponding author)

Domestic Publications

유휘연, 최윤호, 권오빈, 오성회, "모바일 로봇 네비게이션을 위한 실외환경 3차원 시뮬레이션 데이터셋 (3D Outdoor Simulation Dataset for Mobile Robot Navigation)", *제21회 정보 및 제어 학술대회*, Oct. 2021.

유휘연, 김은우, 오성회, "중첩 희소 네트워크를 이용한 계층적인 이미지 의미론적 분할 네트워크 (Hierarchical Semantic Segmentation Using Nested Sparse Network)", *제29회 통신정보 합동학술대회*, May. 2019.

Honors

Awards and Scholarships

- Best Poster Paper Award Winner, International Conference on Control, Automation and Systems (ICCAS) 2021
- Brain Korea 21 Plus Scholarship, Seoul National University 2020 - 2021

Research Experience

General-Purpose Deep Reinforcement Learning Using Metaverse for Real World Applications - Ministry of Science and ICT (MSIT)

- Implementation of a vision-based object goal navigation algorithm for embodied agents in real robot navigation.

2023 -

AI Technology for Guidance of a Mobile Robot to its Goal with Uncertain Maps in Indoor/Outdoor Environments - Ministry of Science and ICT (MSIT)

- Development of a vision-based path following navigation algorithm for embodied mobile robots with sparse implicit memory.
- Development of a vision-based path following and homing navigation algorithm for embodied mobile robots with building semantic map.

- Development of a vision-based object goal navigation algorithm for unknown environments for embodied mobile robots using semantic graph memory.

2019 - 2023

Biomimetic Recognition Technology - Agency for Defense Development (ADD)

- Development of an insect-like compound eye camera prototype.
- Development of light-weight vision algorithms on the compound eye : objectness estimation, semantic segmentation, ego-motion estimation, depth estimation, and 3D environment reconstruction.

2016 - 2021

Realistic 4D Reconstruction of Dynamic Objects - Ministry of Science, ICT, and Future Planning (MSIT)

- Development of a 3D point cloud matching algorithm.
- Development of a 3D human motion reconstruction algorithm by using human part segmentation and tracking.

2017 - 2019

Computer and Language Skills

Computer Skills

- Python, Pytorch, TensorFlow, C++/C, Matlab, ROS

Language Skills

- Korean, English