Hyeonwoo Yu, Ph.D.

CONTACT INFORMATION

Assistant Professor
Laboratory of Artificial Intelligence and Robotics (LAIR)
Dept. of Intelligent Robotics & Mechanical Eng., Sungkyunkwan University
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RESEARCH INTEREST

Robot Perception, Robot Adaptation, 3D semantic SLAM, Autonomous driving, Navigation, 3D Reconstruction, Zero-shot Learning, Online Learning, Self-supervised Learning

EDUCATION

Seoul National University, Seoul, Rep. of Korea *Feb 2020*

- Ph.D., Electrical and Computer Engineering
- Advisor: Prof. Beomhee Lee
- Thesis: "A Variational Observation Model of 3D Multi-Object in 2D Single Scene for Semantic SLAM"

Seoul National University, Seoul, Rep. of Korea *Feb 2014*

- B.S in Electrical and Computer Engineering

PROFESSIONAL EXPERIENCE

Sungkyunkwan University, Suwon, Rep. of Korea
Assistant Professor, Dept. of Intelligent Robotics & Mechanical Eng. *Mar 2024~present*

Ulsan National Institute of Technology (UNIST), Ulsan, Rep. of Korea
Assistant Professor, Dept. of Electrical Eng. and Grad. School of AI *Feb 2022~Feb 2024*

- Development of AI Technology for the Utilization of Electromagnetic Noise to Enhance the Stability and Efficiency of Future Car Batteries (MSIT, `22.06~`22.12)
- Self-supervised learning for new environment based on robot navigation (NRF, '22.06~`23.05)
- An adaptive perception method based on 3D simultaneous localization and mapping (UNIST, `22.02~'24.02)

Carnegie Mellon University, Pittsburgh, Pennsylvania, U.S.A.
Postdoctoral Research Fellow, Robotics Institute *Mar 2020 ~Dec 2021*

- Leveraging Advanced Algorithms, Autonomy, and Artificial Intelligence (A4I) to enhance National Security and Defense (AI-Assisted Detection and Threat Recognition Program through the US ARMY ACC-APG-RTP, `20~`21)

Seoul National University, Seoul, Rep. of Korea
Graduate Research Assistant, Dept. of ECE *Mar 2014 ~ Feb 2020*

- Semantic Image Composition Based on Deep Generative Model (Samsung DS, `18~20)
- 3D Semantic Reconstruction for Human Perception Imitation Based on Deep Generative Model (National Research Foundation of Korea grant funded by the Korea government, `17~20)
- Development and Test Disaster Countermeasure for narrow dwelling space (Fire Fighting Technology Research and Development Program, funded by the Ministry of Public Safety and Security, `17~`18)
- Biomimetic Robot Research (Agency for Defense Development, `16~20)
- Multi agent SLAM, environment recognition and implementation

(Ministry of Science, ICT and Future Planning, `14~`15)

PREPRINT AND SUBMITTED

[S]

INTERNATIONAL JOURNAL PUBLICATIONS

[J6] **Hyeonwoo Yu** and Jean Oh*, “Anytime 3D Object Reconstruction using Multi-modal Variational Autoencoder,” IEEE Robotics and Automation Letters, vol. 7, no. 2, pp.2162-2169, 2022.

[J5] **Hyeonwoo Yu** and Jean Oh*, “Anchor Distance for 3D Multi-Object Distance Estimation from 2D Single Shot," IEEE Robotics and Automation Letters, vol. 6, no. 2, pp.3405-3412, 2021.

[J4] Hyunki Hong, **Hyeonwoo Yu*** and Beom-Hee Lee, “Regeneration of Normal Distributions Transform for Target Lattice Based on Fusion of Truncated Gaussian Components,” IEEE Robotics and Automation Letters, vol.4, no. 2, pp.684-691, 2019.

[J3] **H. W. Yu*** and B. H. Lee, "MRF-based Terrain Map Inference using Variational Feature Projection," Electronics Letters, vol.54, no.9, pp.595-597, 2018.

[J2] **H. W. Yu***, J. D. Jeon and B. H. Lee, "Surface Normal Smoothing for Superpixels in Noisy Depth Images," Electronics Letters, vol. 52, no. 5, pp. 359 – 361, 2016.

[J1] H. S. Lee*, **H. W. Yoo**, and B. H. Lee, "Deployment method of UAVs with energy constraint for multiple tasks," Electronics Letters, vol. 51, no. 21, pp. 1650-1652, 2015.

INTERNATIONAL CONFERENCE PUBLICATIONS

[C7] **Hyeonwoo Yu*** and Beomhee Lee, “Zero-shot Learning via Simultaneous Generating and Learning,” In *Advances in neural information processing systems (NeurIPS), 2019 International Conference on,* pp. 46-56.

[C6] **Hyeonwoo Yu***, Jiyoun Moon and Beomhee Lee, “A Variational Observation Model of 3D Object for Probabilistic Semantic SLAM,” In *Robotics and Automation (ICRA), 2019 IEEE International Conference on,* pp. 5866-5872.

[C5] **H. W. Yu*** and B. H. Lee, “A Variational Feature Encoding Method of 3D Object for Probabilistic Semantic SLAM,”, In *Intelligent Robots and Systems (IROS), 2018 IEEE/RSJ International Conference on*, pp. 3605-3612.

[C4] **Hyeonwoo Yu*** and Beomhee Lee, "Terrain field SLAM and Uncertainty Mapping using Gaussian Process," In *Control, Automation and Systems (ICCAS), 2018 International Conference on*, pp. 1077-1080.

[C3] **H. W. Yu*** and B. H. Lee, “A Variational Approach for 3D Object Classification with Retrieval of Missing Data,” In *Intelligent Robots and Systems (IROS), 2017 IEEE/RSJ International Conference on*, pp. 5922-5927.

[C2] **H. W. Yu*** and B. H. Lee, "A Bayesian Approach to Terrain Map Inference based on Vibration Features," In *Multisensor Fusion and Integration for Intelligent Systems (MFI), 2017 IEEE International Conference on*, pp.272-277.

[C1] **H. W. Yu*** and B. H. Lee, "An Efficient Plane Extraction Method using Smoothed Surface Normals," In *Control, Automation and Systems (ICCAS), 2016 International Conference on*

DOMESTIC CONFERENCE PUBLICATIONS

[D7] **H. W. Yu*** and B. H. Lee, "Object Image Auto-clustering with Prior Distribution Regulization," In *Korea Robotic Society Annual Conference (KRoC), 2019*

[D6] **H. W. Yu*** and B. H. Lee, "A Feature Extraction Method for 3D Object Classification based on Variational Inference," In *Control, Automation and Systems (ICCAS), 2018,* pp. 512-513.

[D5] **H. W. Yu*** and B. H. Lee, "Viewpoint Arrangement for 3D Object using Unsupervised Learning," In *Korea Robotic Society Annual Conference (KRoC), 2018*

[D4] **H. W. Yu*** and B. H. Lee, "Voxelized 3D object reconstruction using Poisson-loss function," In *Korea Robotic Society Annual Conference (KRoC), 2017*

[D3] **H. W. Yu*** and B. H. Lee, "Real-time Surface Normal Smoothing using GP-GPU," In *Korea Robotic Society Annual Conference (KRoC), 2016*

[D2] **H. W. Yu***, J. H. Moon and B. H. Lee, "Efficient PCA-based plane extraction for place recognition," In *Korea Robotic Society Annual Conference (KRoC), 2015*

[D1] **H. W. Yu***, J. H. Moon and B. H. Lee, "Superpixel method using surface normal smoothing," In *Korea Robotic Society Annual Conference (KRoC), 2015*

WORK EXPERIENCE

Military service exempted technical research personnel in Automation System Research Institute (ASRI), Seoul National University (`17~`19)

PROFESSIONAL SERVICES

Associate Editor
- International Conference on Ubiquitous Robots (UR), 2023

Review for the following international journals and conferences

- IEEE Robotics and Automation Letters (RA-L)	*2022~*
- AAAI Conference on Artificial Intelligence (AAAI)	*2022~*
- IEEE Transactions on Pattern Analysis and Machine Intelligence	*2022~*
- IEEE Transactions on Neural Networks and Learning Systems	*2020~*
- IET Computer Vision	*2020~*
- IEEE Access	*2020~*
- IEEE International Conference on Intelligent Robots and Systems (IROS)	*2019~*
- IEEE International Conference on Robotics and Automation (ICRA)	*2018~*

TEACHING

Hyundai AI Course (Robotics and Smart Factory)	Fall 2023, UNIST
Convex Optimization	Spring 2023, UNIST
LG DXI (Computer vision and AI)	Fall 2022, UNIST
Pattern Recognition and Machine Learning	Fall 2022, UNIST
Introduction to AI Programming II	Spring 2022, UNIST

AWARDS& HONORS

Samsung Research Scholarship (`18~`20)
National Graduate Science & Technology Scholarship (`10~`11)

SKILLS

Languages: C/C++, Python, Matlab
Libraries: Tensorflow, pytorch, PCL, ROS, CUDA
Operating Systems: Windows, Linux
Robot Platforms: Pioneer 3-DX, E-Puck, Nao