2023 School of EE Lab Introductions

Signal

KAIST EE

<Professor Dae-Shik Kim's Lab.>

Brain Reverse Engineering and Imaging Laboratory

■ Contact information

Professor : ITC building 511 TEL : 042-350-3490

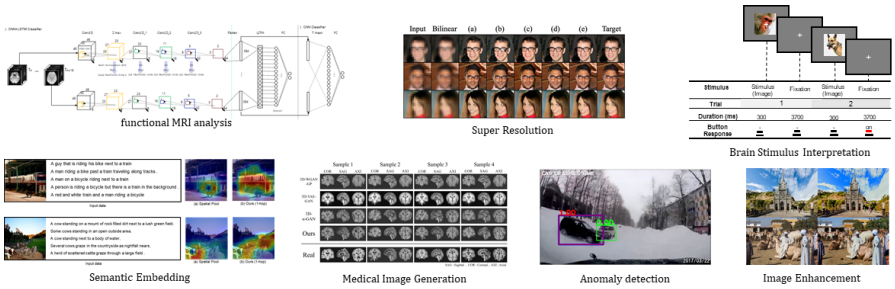
Lab. : ITC building 521 TEL : 042-350-8172~4

Website : http://brain.kaist.ac.kr

■ Current state of the Lab. (in 2023 Fall Semester)

PhD Students: 10 Master's Student: 9 Staff: 3

■ Research Areas



Brain Reverse Engineering and Deep Learning

Our laboratory aims to understand how the brain functions and use the knowledge to build an artificial brain close to human brain performance. In the Visual Intelligence group, we study computer vision, including object tracking, super resolution, and medical imaging. In the Brain Decoding group, we carry out research using fMRI and EEG to understand the brain, including studies on human emotion decoding and reconstruction of arm movement. Linguistic Intelligence group conducts research in natural language processing such as dialogue system and semantic embedding. Finally, the neuromorphic engineering group seeks to improve current technologies by drawing inspiration from the brain.

■ Recommended courses & Career after graduation

We recommend laboratory candidates to take Introduction to Brain IT and coursework in machine learning, information theory, and signal processing. We have Ph. D graduates (postdoc at Samsung medical center, CTO at Omnious, etc.) and graduates with master's degree (Samsung DMC Lab, Lunit, LG, ETRI, Hynix, Hyundai Motors, UCL Wellcome Trust Centre for Neuroimaging, Ph. D candidates, CEO of Omnious and bHaptics, etc.).

■ Introduction to other activities besides research

Professor Dae-Shik Kim is currently serving as the director of SHINSEGAE I&C-KAIST AI Research Center and Kyobo/Dplanex-KAIST AI Center for Future of Insurance. In our Laboratory, we freely share and socialize cultural life such as MT, dining, sports and birthday parties.

■ Introduction to the Lab.

Our laboratory conducts studies that lead the current flow of science and technology. We are actively engaged in cutting-edge research in areas such as deep learning, neuromorphic engineering and brain decoding, enriched by active collaboration with leading groups. Striving for excellence and innovation, we have entered the DARPA Robotics Challenge with the HUBO laboratory KAIST and dispatched our members for overseas research at Cambridge U.K, UCL, Leiden (Netherlands), EPFL (Switzerland), and Stanford. Alongside collaborating with top authorities in the industry and academia, we also nurture a venture spirit that has led to the establishment of successful venture startups such as Omnious and bHaptics.

■ Recent research achievements (2023)

[1] Jae-Hyeok Lee and Dae-Shik Kim, "ICE-NeRF: Interactive Color Editing of NeRFs via Decomposition-Aware Weight Optimization", International Conference on Computer Vision (ICCV), Paris, France, 2023.

[2] Kassymzhomart Kunanbayev, Jeongwon Lee, Dae-Shik Kim, "ROI-to-ROI fMRI Brain Functional Connectivity Analysis of Flickering Light Stimulation for Entraining Gamma Waves", 2023 Conference on Cognitive Computational Neuroscience, CCN 2023, Oxford, UK, Aug 24-27, 2023

[3] Yucheol Cho*, Gyeongdo Ham*, Jae-Hyeok Lee, and Daeshik Kim "Ambiguity-aware Robust Teacher (ART): Enhanced Self-knowledge Distillation Framework with Pruned Teacher Network", Elsevier Pattern Recognition, Vol. 140C, 109541, Mar.2023, (*These authors equally contributed to this work.)

[4] Sunhyeok Lee, Donggon Jang, Dae-Shik Kim, "Temporally Averaged Regression for Semi-Supervised Low-Light Image Enhancement", Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 2023, pp. 4207-4216

[5] Yucheol Cho, Gyeongdo Ham and Daeshik Kim, "First-principles Study on As Antisites in InGaAs Alloys, GaAs and InAs", International Workshop on Computational Nanotechnology (IWCN), Barcelona (Spain), June 12-16, 2023

<Professor Munchurl Kim's Lab.>

VICLAB

■ **Contact information**
Professor : Munchurl Kim TEL : 042-350-7419
Lab. : N24 # 1106 TEL : 042-350-7198
Website : https://www.viclab.kaist.ac.kr/

■ **Current state of the Lab. (in 2023 Fall Semester)**
Postdoctoral Fellows : 2 PhD Students: 16 Master's Student: 12

■ **Research Areas**

We are Video & Image Computing Lab at KAIST.

Our research of interest includes **deep-learning-based computer vision, computational image & video processing as well as image & video understanding and 2D/3D video coding**.

Recently, our intensive works are in the fields of
image/video super-resolution,
frame interpolation,
SDR-to-HDR inverse tone mapping,
optical flow estimation,
depth estimation,
image deraining, image dehazing,
video motion debluring, neural radiance field (NeRF) learning of images and video,
image in-painting,
GAN-based restoration of old photos,
PAN sharpening and super-resolution of satellite images,
deep-learning-based image/video compression,
learning-based perceptual video coding,
detection and classification of SAR image targets etc.

■ **Recommended courses & Career after graduation**
EE432 Digital Signal Processing
EE474 Introduction to Multimedia
EE534 Pattern Recognition
Recent Alumni: Adobe, Qualcomm, ChungAng Univ. Prof, Samsung (SAIT, VD, MX), Naver, ADD .etc

■ **Introduction to other activities besides research**
Birthday parties
Organizational strengthening activities
Health training with non-professional trainers
Gapcheon bike riding

■ **Recent research achievements ('21~'23)**

2023

Agus Gunawan, Soo Ye Kim, Hyeonjun Sim, Jae-Ho Lee, Munchurl Kim, "Modernizing Old Photos Using Multiple References via Photorealistic Style Transfer," Computer Vision and Pattern Recognition (CVPR), Vancouver, Canada, June 18-22, 2023.

Jongmin Park, Jooyoung Lee and Munchurl Kim, "COMPASS: High-Efficiency Deep Image Compression with Arbitrary-scale Spatial Scalability," International Conference on Computer Vision (ICCV), Paris, France, Oct. 2-6, 2023.

⟨Professor Min Jun Kim⟩

Intelligent Robotic Systems Lab

■ Contact information

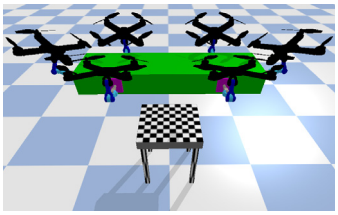
Professor	**Email: minjun.kim@kaist.ac.kr**	**Tel: 042-350-7464**
Lab.	**E3-2 3239호**	**Tel: 042-350-7664**
Website	**https://sites.google.com/view/kaist-roboticslab**	

■ Current state of the Lab. (in 2023 Fall Semester)

Postdoctoral Fellows : 0 PhD Students: 3 Master's Student: 10

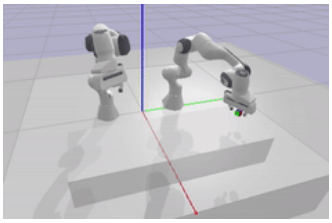
■ Research Areas

Physical Interaction with Aerial Manipulators



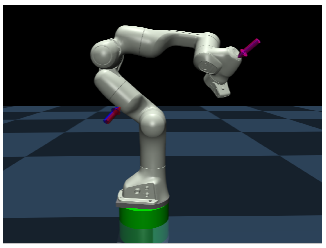
By mounting a manipulator on a multi-rotor, an aerial manipulator can perform active tasks through physical interaction. However, its application is limited due to the limited payload of the aerial manipulator and the coupling between the floating base and the manipulator. To this end, studies on the **collaboration of multiple aerial manipulators**, **fully-actuated multi-rotors**, and **trajectory optimization** have been conducted so that the aerial manipulator can interact with the environment stably.

Dual-arm Robot Intelligence



We are developing perception, planning, and control techniques for the intelligence of dual-arm robots. This includes skills such as: 1) **manipulation planning**, which allows the robot to plan where to grasp and place the unseen object, 2) **compliance control**, which allows both arms to safely interact with the environment, 3) **grasp detection**, which allows the robot to know which part of an object can be grasped using a deep vision network.

Model-based Robot Control & State Estimation



One of our primary research interests is the development of safe human-robot physical interactions. For this purpose, we conduct research on torque-controlled robots and state estimation techniques. The robot's **compliant motion behavior** is achieved through precise torque control. In addition, for **contact estimation**, proprioceptive sensors are used to estimate the contact points and forces.

■ Recommended courses & Career after graduation

Recommended courses: Control system engineering, Linear Systems, Nonlinear Control, Optimization Techniques, Machine learning

Career: The practical / theoretical experience gained in the robotics lab is applicable to a wide range of engineering careers (both academia and industry).

■ Introduction to other activities besides research

Our lab holds regular events such as outing, dinner parties, to maintain a strong bond between members. Also, there are private groups that share personal hobbies such as sports and cultural life.

■ Introduction to the Lab.

In our laboratory, students who are academically curious and full of self-motivation gather to create a synergistic effect in robotics research. The professor's kind advice and full research support are at the center of it. Our lab provides the best environment for students who want to study responsibly in an atmosphere of freedom.

■ Recent research achievements (2022-2023)

[1] K. Kim, D. Park, and M. J. Kim, "A Reachability Tree-Based Algorithm for Robot Task and Motion Planning", IEEE ICRA 2023

[2] S. Han, and M. J. Kim, "Proprioceptive Sensor-Based Simultaneous Multi-Contact Point Localization and Force Identification for Robotic Arms", IEEE ICRA 2023

[3] J. Jeong, and M. J. Kim, "Passivity-based Decentralized Control for Collaborative Grasping of Under-Actuated Aerial Manipulators", IEEE ICRA 2023

[4] J. Jeong, H. Mishra, C.Ott, and M. J. Kim, "A Memory-based SO(3) Parameterization: Theory and Application to 6D Impedance Control with Radially Unbounded Potential Function", IEEE ICRA 2022

[5] M. J. Kim, A. Werner, F. Loeffl, and C. Ott, "Passive Impedance Control of Robots with Viscoelastic Joints via Inner-loop Torque Control", IEEE T-RO

〈Professor. Junmo Kim 〉

Statistical Inference and Information Theory Lab (SIIT)	■ Contact information		
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	Website	siit.kaist.ac.kr	

■ **Current state of the Lab. (in 2023 Fall Semester)**

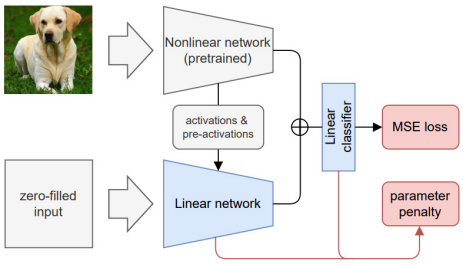
Postdoctoral Fellows : 1 PhD Students: 25 Master's Student: 7

■ **Research Areas (RP: Recent Publication)**

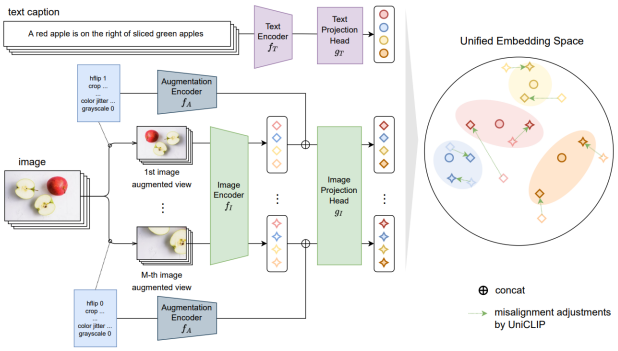
As many students are enrolled in our laboratory, various research topics are being conducted as below

- Continual Learning(RP: ECCV 2022, ICCV2023)
- Human Pose Estimation(RP: ICCV 2021)
- Depth Estimation(RP: IROS 2022, AAAI 2021)
- Representation Learning(RP: NeurIPS 2022)
- Domain Adaptation/Generalization(RP: ICRA 2022)
- Hyper-parameter Tuning(RP: ECCV 2022)
- Geneartive Model(RP: [Best Paper] CVPRW 2022)
- Point Cloud, 3D model(RP: ICCV 2021)
- Augmentation Strategy
- Deep Learning Theory(RP: ICCV 2021)
- Fairness

In addition, you can freely choose topics in areas of interest, and there is a lot of collaboration between the students in the lab.



(Figure 1) Overview of DLCFT
(Continual Learning)



(Figure 2) Overview of UniCLIP
(Multi-modal Representation Learning)

■ **Recommended courses & Career after graduation**

Recommended courses: AI & Computing course

Career after graduation(2020~): LG AI Research, SAIT, Samsung Research, NAVER CLOVA AI, etc.

■ **Introduction to other activities besides research**

- Birthday party(monthly)
- MT, Various activities(movie, ping-pong, ...)

■ **Introduction to the Lab.**

In our lab, students study in a field of interest in a very free atmosphere. Team meetings are held every two weeks in the lab, and students choose a team to attend according to the research topic they are interested in. Also, many students are conducting internships at research center, and start-up such as NAVER, LG AI Research, KAKAO, and ETRI. In addition, the lab is conducting projects with various companies and incentives are paid according to the amount of participation in the project.

■ **Recent research achievements (2020-2023)**

2023: CVPR 3, ICCV 2, AAAI 1, ICRA 2, WACV 1, ICIP 3

2022: NeurIPS 1, ECCV 2, IROS 2, UAI 1, ICIP 2, CVPR 1, ICRA 1, WACV 1, ACSAC 1

2021: ICCV 3 , ICRA 1, CVPR 1, WACV 1, AAAI 3

<Professor Changick Kim's Lab.>

CILAB Computational Intelligence Laboratory

■ **Contact information**

Professor : changick@kaist.ac.kr TEL : 042-350-7421

Lab. : suminlee94@kaist.ac.kr TEL : 042-350-7521

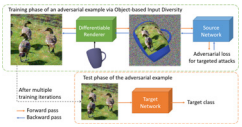
Website : https://cilabs.kaist.ac.kr/

■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : 0 PhD Students: 16 (full-time) / 8 (part-time) Master's Student: 8

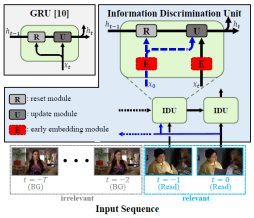
■ **Research Areas**

▶Adversarial Attack & Defense



- Protecting AI systems against malicious users who tries to fool the system.
- Creating adversarial perturbations exploited in real-world physical environments.

▶Action Detection and Anticipation

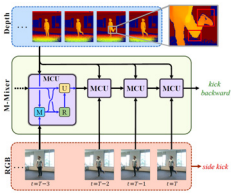


- Discriminating relevant actions for online action detection.
- Forecasting unseen future actions from the pseudo action labels obtained by online action detection.

▶Image segmentation

- Human face parsing & body part segmentation.
- Exploring diverse research topics (e,g, domain adaptive or few-shot segmentation).

▶Video Understanding



- Understanding actions in a video based on multiple modalities.
- Localizing an object of an action.

▶Long-Tail Recognition

- Resolving the data imbalance problem in machine learning
- Important for real world applications such as wild animal classification

▶Short-term Weather Forecast

- Predicting total precipitation image for Korean Peninsula
- Presenting new Total Precipital Water (TPW) benchmark

■ **Recommended courses & Career after graduation**

We recommend taking courses related to **computer vision (CV) and deep learning**. Depending on your area of interest, the courses of **computer graphics and signal processing** can be helpful. Those are not mandatory but it would be better to get used to computer vision and deep learning. About career, based on steady research and various industry-academic cooperation experiences, you can have great research capabilities and industrial adaptability.

■ **Introduction to other activities besides research**

Smooth teamwork must precede innovative research. With this conviction, through outside activities, we build feelings of empathy and compassion for each other, and recharge our energy for research. We celebrate birthdays every month to make good memories of our lab life. Also, on fine days, we go on a picnic together. If you would like to see more pleasant memories of ours, please visit our homepage.

■ **Introduction to the Lab.**

Professor Kim has advised his students at KAIST since 2005 and serves as the head of the Center for Security Technology Research. The mission of the CI Lab. is to analyze computer vision systems and develop the systems for various applications. Our lab collaborates with many industries and institutions to perform innovative research work and has published our research in top-tier conferences and journals.

■ **Recent research achievements ('21~'23)**

- 15 top-conference papers (CVPR, ECCV, ICCV, and etc.)
- 8 international journals (TPAMI, IJCV, and etc.)

<Professor Hoirin Kim's Lab.>

SSSC
Statistical Speech & Sound Computing Lab.

■ **Contact information**

Professor : 2111, LG Innovation Hall (N24) TEL : 7417
Lab. : 2105, LG Innovation Hall (N24) TEL : 7617
Website : https://sites.google.com/site/kaistsssclab/

■ **Current state of the Lab. (in 2023 Fall Semester)**

PhD Students : 4 Master's Student : 4

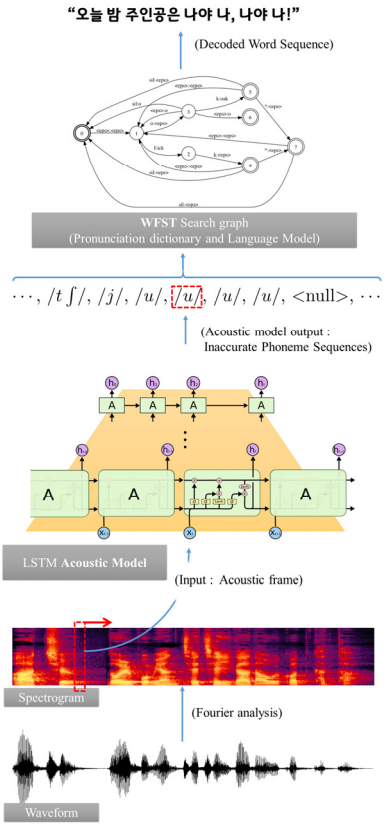
■ **Research Areas**

SSSCLAB has been researching machine learning and deep learning for speech and sound signals. In recent years, with the advance of smart devices & AI, our research fields have attracted much interest day by day.

Speech recognition is a technology that converts human speech into words or sentences. We are also studying **speech synthesis** technology (familiar as **TTS**) that generates a human-like voice from any text. They help humans communicate with computers or machines naturally.

In addition, we have studied natural language processing-based **language modeling** to complement the syntactic consistency of recognized strings and **speaker recognition** to recognize the user's identity. We are also studying **voice conversion** technology that mimics a specific speaker's voice as felt non-artificial.

There are many interesting researches such as **speech enhancement** that restores noisy speech to clean, **wake-up word detection** (ex. Hey Siri, OK Google), **voice activity detection**, **speaker diarization**, **acoustic event detection**, etc.



Current Research Projects
Research on Unified Interactive Learning Schemes of End-to-End Speech Recognition and Synthesis based on Deep Learning of Speech Chain Mechanism
Development of Voicepishing Prevention Technology Based on Speech and Text Deep Learning
Development of Speech Technology for Machine Learning Diagnosis of Cognitive-Affective Disorder Patients

■ **Recommended courses & Career after graduation**

- Recommended : Signals and Systems, Digital Signal Processing, Probability and Random Processes, Linear Algebra, Information Theory, ML or DL related course.
- Alumni have been entering IT companies, research institutes, or universities. (Samsung Electronics, Samsung Research, LG Electronics, etc.)

■ **Introduction to other activities besides research**

Through summer MT, welcome party, year-end party, and homecoming day, we promote friendship among students. In addition, we encourage attendance at domestic/international conferences in related fields, so that students can get various research experiences.

■ **Introduction to the Lab.**

SSSCLAB was founded in 2000 and carries out various projects related to speech and sound signal processing. We accumulates rich practical experience achieving excellent academic research results. Also, we provide stable and strong financial support and a comfortable research environment so that students can continue their studies and research activities. SSSCLAB has produced out 11 Ph.D. and 29 Master graduates for 20 years.

■ **Recent research achievements ('22~'23)**

[1] Kangwook Jang, *et al.,* "Recycle-and-Distill: Universal Compression Strategy for Transformer-based Speech SSL Models with Attention Map Reusing and Masking Distillation" Interspeech2023.

[2] Myunghun Jung, *et al.,* "AdaMS: Deep Metric Learning with Adaptive Margin and Adaptive Scale for Acoustic Word Discrimination" Interspeech2023.

[3] Yeunju Choi, *et al.,* "Learning to Maximize Speech Quality Directly Using MOS Prediction for Neural Text-to-Speech" IEEE ACCESS, Vol. 10, pp. 52621-52629, May 2022.

〈Professor Yong Man Ro〉

INTEGRATED VISION LANGUAGE Lab.

IMAGE & VIDEO SYSTEMS Lab. since 1998
Empowered by Deep Learning

Image and Video Systems Laboratory
Integrated Vision and Language Laboratory

■ Contact information

Professor	**Email: ymro@kaist.ac.kr**	**Tel: 042-350-3494**
Lab.	**ITC building (N1) #418**	**Tel: 042-350-8094**
Website	**http://ivylab.kaist.ac.kr**	

■ Current state of the Lab. (in 2023 Fall Semester)

Postdoctoral Fellows : 0 PhD Students: 14 (Full) 2 (Part) Master's Student: 7

■ Research Areas

Generic AI via integrating vision, Language, and speech

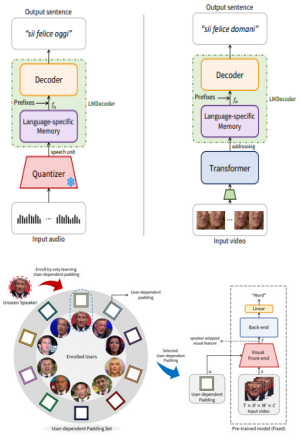
Generic AI via integrating vision, language, and speech vision and language analysis is an emerging research subject in the IVY Lab, where AGI deep learning approach is our current research interest. We investigate various new algorithm and devise novel network structures to analyze vision, language, and speech. Current research works include vision language co-learning, visual prompt learning, visual speech language translation, and low resource deep learning. Some of our research results have been published in international journals (such as IEEE TIP) and international conferences (such as CVPR, ICCV, ECCV, AAAI, ICASSP, etc.).

Multi-modal learning in Deep Learning

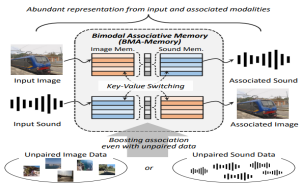
IVY Lab research the principle of multi-modal data analysis (video, audio, language, etc). Recently, we investigate the characteristic of multi-modal data, fusion method and adversarial robustness. Our research interests include adversarial robustness with multi-modal data (RGB, IR, Hyper-spectral, etc), multi-modal data relation/causality, and learning representation of multi-modal data.

Robust and Explainable Deep learning

Current research interest on deep learning-based processing is to design robust networks and further disclose them for explanation, which are strongly demanded in the defense/security applications. Deep learning-based studies for attention network, adversarial learning, generative model, and explainable AI have been done on secure-required image data. Currently, we are conducting deep learning researches for analyzing robustness and interpretability of deep neural networks.



ICCV 2023, ECCV 2022



CVPR 2022

■ Recommended courses & Career after graduation

Recommended courses include probability, digital signal processing, machine learning, introduction to multimedia, image processing/computer vision, various programming courses. Graduates have jobs in various places such as professor, post-doc (EPFL, TUM, GIT, CMU, META), national research institutes (ETRI, ADD, KIST), and companies (Samsung, LG, Naver, Hyundai, SKT, etc.)

■ Introduction to other activities besides research

IVY Lab regularly holds common activities such as mountain tracking, summer/winter MT, etc. Please see various activities in http://ivylab.kaist.ac.kr/base/Gallery/Gallery.php

■ Introduction to the Lab.

IVY laboratory is currently focusing on Vision-Language research. Our lab has achieved outstanding achievements such as this year's Science Prize (Association of Scientific Journalists), Best Paper Awards, and IT Mark. The researchers have strong bonds with each other, and they help/encourage each other while researching and living in an autonomous atmosphere with stable support. We also encourage students to have research experience in an international sense through visiting research with world-class research institutes (e.g., University of Toronto, Technical University of Munich, Ecole Polytechnique Federale de Lausanne, FAIR, CMU, Amazon, etc.) in our interesting research field.

■ Recent research achievements (`21-`23)

- We have published 149 SCI journal papers (SCI-indexed, referee peered), 347 International conference papers (referee peered). In the recent 3 years, 20 AI top tier conferences (CVPR, ICCV, ECCV, NeurIPS, AAAI, etc)) have been published.
Recent AI top tier publication: https://ivylab.kaist.ac.kr/base/Publication/toptier.php

<Professor Hyun Myung's Lab.>

URL URBAN ROBOTICS LAB @KAIST

■ **Contact information**

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Lab. : Urban Robotics Lab TEL : 042-350-7551
Website : https://urobot.kaist.ac.kr/

■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : 1 PhD Students: 31 Master's Student: 14

■ **Research Areas**

- Autonomous robot navigation (SLAM, self-driving car, mobile robot, legged robot, drone, etc.)
- Spatial artificial intelligence & Machine learning
- Intelligent robots
- Monitoring & inspection for smart cities
- Swarm robots

■ **Recommended courses & Career after graduation**

- Recommended courses: EE381, EE581, EE585
- Career after graduation: Robotic researcher for gov. research institutes, industries (Samsung Elec., Hyundai Motor Company, Naver labs, etc.); Professor in academia

■ **Introduction to other activities besides research**

- Summer/winter workshop
- Lab tour
- Strawberry party

■ **Introduction to the Lab.**

Our lab focuses on the research and development of robotics technologies for smart cities. The research fields include autonomous robot navigation, spatial AI, machine learning, monitoring, inspection, control, and rehabilitation for smart cities and civil infrastructures. We also deal with big data informatics supporting sensing, analysis, and design activities needed to construct and operate smart and sustainable built environments.

■ **Recent research achievements ('21~'23)**

- **Published Journal/Conference Papers**

2023 (published paper: 32)

Hyungtae Lim, Beomsoo Kim, Daebeom Kim, and Hyun Myung†, "Quatro++: Robust Global Registration Exploiting Ground Segmentation for Loop Closing in LiDAR SLAM," International Journal of Robotics Research, (accepted. in-press), Aug. 2023.

I Made Aswin Nahrendra, Byeongho Yu, and Hyun Myung†, "DreamWaQ: Learning Robust Quadrupedal Locomotion With Implicit Terrain Imagination via Deep Reinforcement Learning," in Proc. IEEE Int'l Conf. on Robotics and Automation (ICRA), pp. 5078-5084, London, UK, May 2023.

2022 (published paper: 49)

Hyunjun Lim, Jinwoo Jeon, Hyun Myung†, "UV-SLAM: Unconstrained Line-Based SLAM Using Vanishing Points for Structural Mapping," in Proc. IEEE Int'l Conf. on Robotics and Automation (ICRA), pp. 1518-1525, Philadelphia, USA, May 2022.

Wooju Lee, Hyun Myung†, "Adversarial Attack for Asynchronous Event-based Data," in Proc. The 36th AAAI Conference on Artificial Intelligence (AAAI 2022), pp. 1237-1244, Virtual, Jun. 2022.

2021 (published paper: 44)

Hyungyu Lee, Byeongho Yu, Christian Tirtawardhana, Chanyoung Kim, Myeongwoo Jeong, Sumin Hu, and Hyun Myung†, "CAROS-Q: Climbing Aerial RObot System Adopting Rotor Offset With a Quasi-Decoupling Controller," IEEE RA-L (Robotics and Automation Letters), vol.6, no.4, pp.8490-8497, Oct. 2021.

Hyungtae Lim, Minho Oh, and Hyun Myung†, "Patchwork: Concentric Zone-based Region-wise Ground Segmentation with Ground Likelihood Estimation Using a 3D LiDAR Sensor," IEEE RA-L (Robotics and Automation Letters), vol.6, no.4, pp.6458-6465, Oct. 2021.

- **Awards**

First place at Quadruped Robot Challenge (QRC) hosted at the 2023 IEEE Conference on Robotics and Automation (ICRA), London, UK.

First place overall in LiDAR session & first place in academia (second place overall) in the vision-only session at HILTI SLAM Challenge 2023 held at 2023 IEEE International Conference on Robotics and Automation (ICRA), London, UK

The only one to complete the entire course and win a prize in the autonomous flight technology contest hosted by the Defense Acquisition Program Administration and Daejeon City, sponsored by the Agency for Defense Development and Daejeon Techno Park, 2023.

<Professor Gun-Woo Moon's Lab.>

■ **Contact information**

Professor : gwmoon@kaist.ac.kr TEL : 042-350-3475

Lab. : fptmvj@kaist.ac.kr TEL : 042-350-8075

Website : http://power.kaist.ac.kr

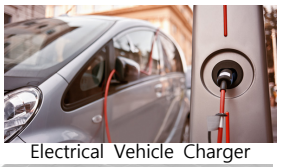
■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : PhD Students: 9 Master's Student: 4

■ **Research Areas**

Electrical Vehicle Charger

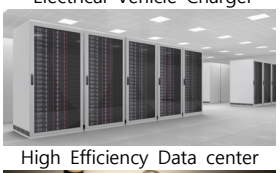
Electrical vehicles essentially have rechargeable batteries that can be fully charged by connecting the vehicle plug to and external electric power source. Therefore, battery charger is one of the key components of EV.



Electrical Vehicle Charger

Power Supply for Data Center

Data center is increasing rapidly due to the extension of internet. Accordingly, power consumptions of data center is rising as a global issue. Therefore, this research proposes new technologies to obtain high efficiency and high power density of data center.



High Efficiency Data center

Battery Management System with Cell Balancing Circuit

As the number of charging and discharging periods increase, the unbalanced cells are faced to the limit with the use of the battery power. Therefore, the cell balancing circuit is required to prevent the unbalance between the cell.

Battery Management System

Wireless Power Transfer System

Wireless Power Charging System for large-capacity battery in electrical vehicles, and dual-band wireless power architecture for multiple load conditions.

Wireless Power Transfer

■ **Recommended courses & Career after graduation**

Recommended courses : Circuit theory, Electronics circuits, Control system, Power electronics systems, Electro-magnetics

Career after graduation: Professors, Research institute (ADD, KARI, KERI, KRRI, KISTI, etc.), Industry (Samsung Electronics, Hyundai Motors, Intel, etc.)

■ **Introduction to other activities besides research**

Exercise Activity : Soccer, Futsal, Basket ball, Foot volleyball,

Workshop : Summer and Winter workshop.

Etc. : Year-end party and Home coming day.

■ **Introduction to the Lab.**

KPEL is leading world-class power electronics researches. Main research area contains power supply for data center, charging system for electrical vehicle, wireless power transfer system, battery management systems. KPEL is contributing domestic company's sales with technical transfer by linking with industry. KPEL published 203 SCI journals, 279 international conferences, and 206 patents.

■ **Recent research achievements ('21~'23)**

International Journal (Total 16)

2023 : 7. (IEEE Trans. Power Electronics [I.F : 6.663 / IEEE Trans. Industrial Electronics [I.F : 9.59])
2022 : 4. (IEEE Trans. Power Electronics [I.F : 6.373 / IEEE Trans. Industrial Electronics [I.F : 7.515])
2021 : 5. (IEEE Trans. Power Electronics [I.F : 7.224 / IEEE Trans. Industrial Electronics [I.F : 8.7])

International Conference (Total 17)

2021-2023 : 17. (ECCE Asia – Japan / ECCE Asia – Singapore / ECCE Asia – Korea)

Award

[1] "Highlighted Paper", IEEE Transactions on Power Electronics
[2] Human Tech Paper Award (Samsung Electronics)
[3] Outstanding Presentation Award, IEEE APEC
[4] Korea Power Electronics Conference : 4 Best Paper

<Professor Heejin Ahn's Lab.>

CONTROL AND INTELLIGENT SYSTEMS LABORATORY

■ **Contact information**

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Lab. : Room 3240, E3-2 TEL : 042-350-7571
Website : cis.kaist.ac.kr

■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : 1 PhD Students: 0 Master's Students: 6

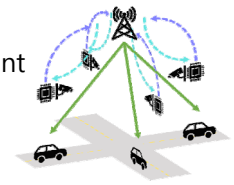
■ **Research Areas**

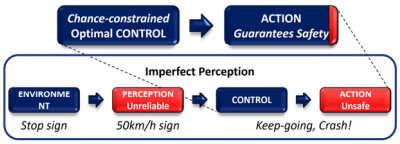
Our lab aims to design control & decision-making algorithms for complex dynamical systems via integration of control theory with computer science. In particular, we use optimization, game theory, and machine learning to develop safe, robust, and efficient control systems.

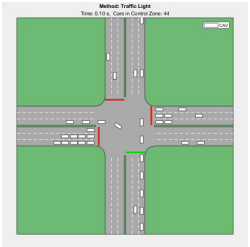
We apply our control & decision-making algorithms to different areas of intelligent transportation systems, ranging from a single autonomous vehicle to multiple autonomous vehicles and to transport network. In addition to theoretical design and analysis of control systems, we put great emphasis on the validation of the theories through computer simulations and hardware tests.

Some current fields of research are:

- Smart City Project
- Smart Intersection Management
- Collaborative Perception
- Uncertainty Quantification







■ **Recommended courses & Career after graduation**

Recommended courses: Linear algebra, differential equations, optimization, signals and systems, feedback control, machine learning

Career after graduation: Academia, industry (e.g., autonomous vehicles), national labs.

■ **Introduction to other activities besides research**

Students are encouraged to participate in other activities, including national/international internships and exchange programs.

■ **Introduction to the Lab.**

We are hiring motivated graduate students! Student who want to study and perform research on control theory and its application are encouraged to apply.

■ **Recent research achievements ('21~'23)**

- "Chance-constrained trajectory planning with multimodal environmental uncertainty", K. Ren, **H. Ahn,** and M. Kamgarpour, *IEEE Control Systems Letters, June 2022*
- "Optimal dynamic transmission scheduling for wireless networked control systems", Y. Ma, J. Guo, Y. Wang, A. Chakrabarty, **H. Ahn,** P. Orlik, and C. Lu, *IEEE Transactions on Control Systems Technology, Nov. 2022*
- "Safe motion planning against multimodal distributions based on a scenario approach", **H. Ahn,** C. Chen, I. M. Mitchell, and M. Kamgarpour, *IEEE Control Systems Letters, June 2021*

<Professor Chang D. Yoo's Lab.>

U-AIM

■ Contact information

Professor : Chang D. Yoo TEL : 042-350-8070

Lab. : U-AIM Lab TEL : 042-350-5470

Website : http://sanctusfactory.com/u-aim/

■ Current state of the Lab. (in 2023 Fall Semester)

Postdoctoral Fellows : 0 PhD Students: 12 Master's Student: 6

■ Research Areas

Machine Learning, Signal Processing, Deep Learning, Computer Vision, 3D Point Cloud, Speech/Audio Processing, Language Model, Vision-language multi-modal processing, Image Generation/Editing, Causality, Fairness, Reinforcement Learning, Robot Manipulation, etc.

■ Recommended courses & Career after graduation

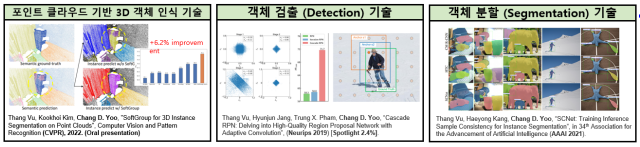
AI Researcher, Professor, etc.

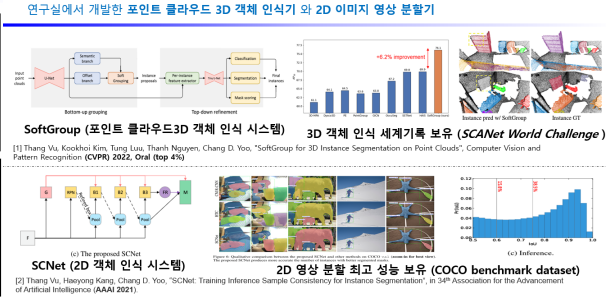
■ Introduction to other activities besides research

MTs every year, Happy Hours every week, International Conference, etc.

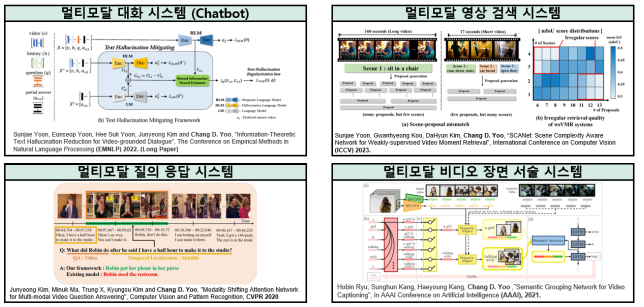
■ Introduction to the Lab.

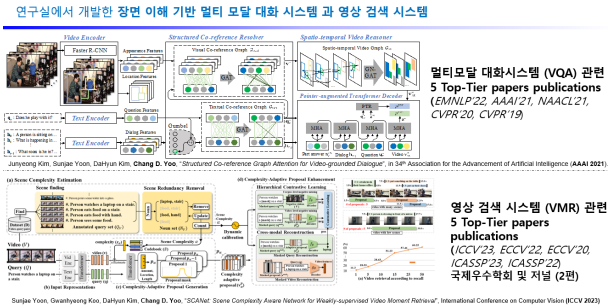
Image and Video Processing



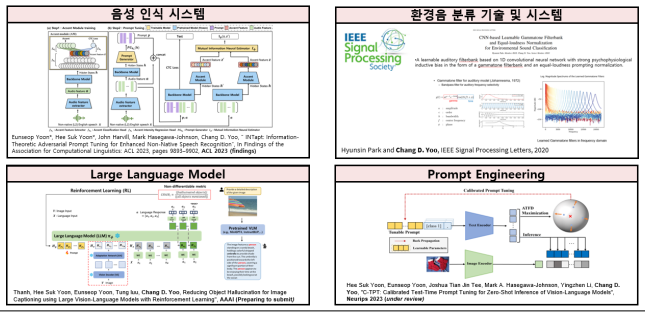


Multimodal Signal Processing

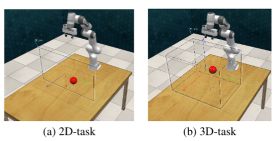




Audio and Natural Langauge Processing



Robot Manipulation (강화 학습)



(a) 2D-task (b) 3D-task

Fig. 1. Reaching to target task in RLBench [23].

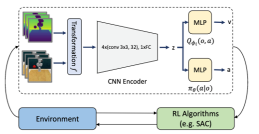


Fig. 4. The overview of our system. The observation including RGB and depth image is fed into the proposed transformation. Then augmented version is plugged into networks.

"Efficient Reinforcement Learning For Robot Manipulation With Augmented Rgb-d Data", Tung M. Luu*, Sanzhar Rakhimkul*, Thanh Nguyen, Chang D. Yoo Submitted for publication.

■ Recent research achievements ('21~'23)

International Conferences(23): CVPR:2, ECCV:2, ICCV:1, ICML:1, AAAI:3, ACL:4, EMNLP:2, Interspeech:1 ICASSP:1, NAACL:1

International Journals(20): Nano Energy:1, Science Advances:1, Advanced Materials:1, IEEE/ACM TASLP:1, Bayesian Analysis:1, IEEE Access:7, MDPI Sensors:6, Speech Communication:1, MDPI MLKE:1

<Professor Young-Gyu Yoon's Lab.>

Neuro-Instrumentation and Computational Analysis Lab

■ **Contact information**

Professor : ygyoon@kaist.ac.kr TEL : 7449

Lab. : nicalab@kaist.ac.kr TEL : 7549

Website : nica.kaist.ac.kr

■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : 0 PhD Students: 4 Master's Student: 5

■ **Research Areas**

< Acquiring Big Data from Brain >

Imaging Brain Activity With genetic engineering, neurons can be modified to change their brightness as a function of the their activity (i.e., neurons "blink" as they fire) which makes the brain activity visible. The main challenge is to record the optical signals at a high spatiotemporal resolution and we develop optical imaging techniques to tackle this.

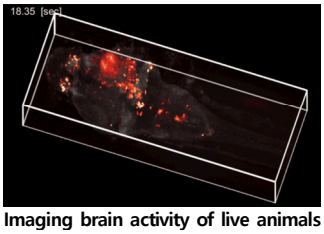
Computational Imaging The performance of imaging systems is impacted by a range of factors, including physics, biology, information theory, and the sampling theorem. To mitigate these limitations, we're utilizing computational imaging methods that leverage machine learning to predict more information from limited data.

Multiplexed Imaging Fluorescence microscopy is limited to imaging only four proteins simultaneously due to the broad emission spectra of fluorescent molecules. To surpass this limitation and visualize a larger number of proteins, we are developing multiplexed imaging technologies that use machine learning algorithms for blind signal separation.

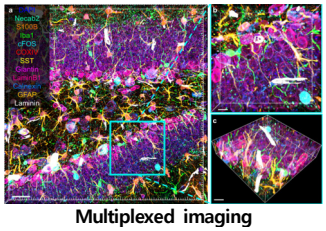
< Analyzing Big Data from Brain >

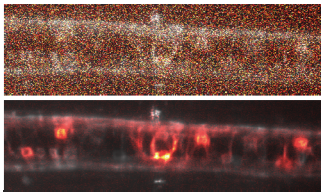
Neuro-image Processing State-of-the-art functional imaging methods generate more than a gigabyte of data per second, necessitating the development of automated analysis algorithms. We develop fast and scalable machine learning algorithms capable of processing such brain images without the need for labeled data.

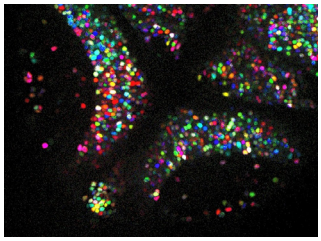
Neuro-data Mining Neural activity underlies many functions in our brain, but our understanding of the fundamental principles of neural signal processing remains limited. To gain greater insight, we apply computational methods to analyze brain activity data and quantify information flow, uncovering the functional connections between neurons. Our aim is to identify repeating patterns, discover local circuits that operate together, and extract synaptic strength information from brain activity, leading to a deeper understanding of the brain.



Imaging brain activity of live animals


Multiplexed imaging


Neuro-image processing


Neuro-data Mining

■ **Recommended courses & Career after graduation**

Recommended courses Signals and Systems (EE), Digital Signal Processing (EE), Machine Learning (CS), Linear Algebra (MA), Optics (PH), Biomedical Optics (ME), Biophotonics (BiS), Brain Science Fundamentals (BiS)

Career All experiences and knowledge acquired during the graduate study can be directly transferred and applied to many data scientist positions and biomedical jobs (both academia and industry).

■ **Other activities besides research**

NICA members communicates with each other through lab dinners and strawberry parties. Lab members maintain good relationships through outside activities on a regular basis.

■ **Introduction to the Lab.**

Our mission is to develop optical and computational technologies for brain and biomedical applications. More specifically, we think of a brain as a circuit that consists of neurons and devise new strategies to reverse engineer this circuit – through imaging/analyzing brain activity/structure. We are looking for the prospective students who are (a) self-motivated and (b) eager to explore new things.

■ **Recent research achievements ('21~'23)**

[1] Statistically unbiased prediction enables accurate denoising of voltage imaging data, ***Nature Methods***, 2023. (featured on the cover of Nature Methods)

[2] Robust and efficient alignment of calcium imaging data through simultaneous low rank and sparse decomposition, ***WACV***, 2023.

[3] Three-dimensional fluorescence microscopy through virtual refocusing using a recursive light propagation network, ***Medical Image Analysis***, 2022.

[4] PICASSO allows ultra-multiplexed fluorescence imaging of spatially overlapping proteins without reference spectra measurements, ***Nature Communications***, 2022. (selected as KAIST Breakthroughs 2022)

[5] 3DM: Deep decomposition and deconvolution microscopy for rapid neural activity imaging, ***Optics Express***, 2021. (featured on Optica main page)

[6] Efficient Neural Network Approximation of Robust PCA for Automated Analysis of Calcium Imaging Data, ***MICCAI***, 2021.

[7] RLP-Net: A recursive light propagation network for 3-D virtual refocusing, ***MICCAI***, 2021. (received MICCAI Young Scientist Award)

<Professor Donghwan Lee's Lab.>

Machine Decision Intelligence and Learning	■ **Contact information** Professor : donghwan@kaist.ac.kr TEL : 043-350-7462 Lab. : TEL : Website : https://sites.google.com/site/donghwanleehome

■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : 1 PhD Students: 5 Master's Student: 7

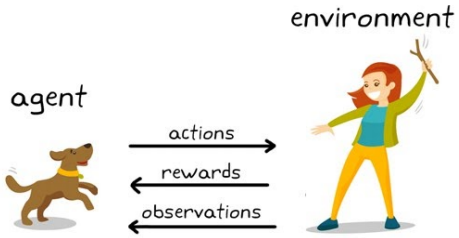
■ **Research Areas**

▶ Reinforcement learning

⇒ What is reinforcement learning? Algorithms to control unknown system by interacting with unknown environments

⇒ Applications: Covers broad area such as robot motion planning, self-driving car, general artificial intelligence, natural language processing, and chatbot

⇒ Our research directions: development of advanced reinforcement learning algorithms, theory and applications, such as robots and self-driving cars



▶ Other research areas:

Control theory and applications, machine learning algorithms, interplay among control, reinforcement learning, and optimization, optimization algorithms and theories.

■ **Recommended courses & Career after graduation**

Recommended courses: control system engineering, linear system, nonlinear system, optimal control, machine learning, reinforcement learning, probability theory, real analysis, measure theory

Career after graduation: national labs, start up, industry, silicon valley, academia

■ **Introduction to other activities besides research**

Conferences

■ **Introduction to the Lab.**

Our research covers theory and application of control, machine learning, reinforcement learning, and interplay among them.

■ **Recent research achievements ('21~'23)**

Donghwan Lee, Han-Dong Lim, Jihoon Park, and Okyong Choi, "New versions of gradient temporal-difference learning," IEEE Transactions on Automatic Control, vol. 68, no. 8, 2023

Han-Dong Lim, Donghwan Lee, "Backstepping temporal-difference learning " ICLR2023, Kigali, Rwanda, May 1-5, 2023

Donghwan Lee, Jianghai Hu, and Niao He, "A discrete-time switching system analysis of Q-learning," SIAM Journal on Control and Optimization, vol. 61, no. 3, 2023

Donghwan Lee, "Convergence of dynamic programming on the semidefininte cone for discrete-time infinite-horizon LQR," IEEE Transactions on Automatic Control, vol. 67, no. 10, pp. 5661-5668, 2022

<Prof. Dong Eui Chang 's Lab>

KAIST EE Ctrl Lab

Control Laboratory

■ **Contact information**

Professor	**Email: dechang@kaist.ac.kr**	**Tel: 042-350-7440**
Lab.	**Room: 1110, N24**	**Tel: 042-350-7540**
Website	**https://control.kaist.ac.kr**	

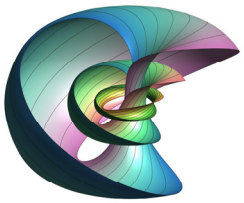
■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : 1 PhD Students: 10 Master's Student: 7

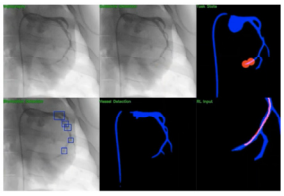
■ **Research Areas**

■ **Control theory and its application with AI**

- We develop novel control theories for efficient and robust control and implement them on real systems.
- We develop automatic control algorithms that combine image processing AI and reinforcement learning.
- We develop numerical integration algorithms to faithfully preserve the values of conserved quantities such as energy during numerical integration.



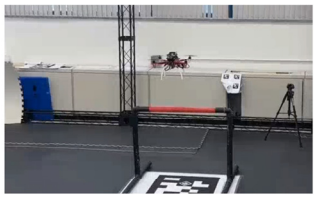
Drone control using S^1 fiber bundle



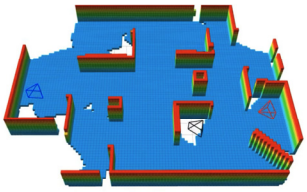
Automatic guidewire control using reinforcement learning

■ **Autonomous flight drone**

- We take a new approach to autonomous flight by applying control theory, deep learning and reinforcement learning.
- We combine AI-based perception and motion planning using reinforcement learning to accomplish missions.
- We implement developed control algorithm on real drone.



Autonomous flight drone for perching

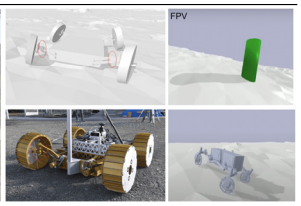


Reinforcement learning-based swarm drone exploration

■ **Robotics with AI**

- We develop artificial intelligence technologies for various robotics fields.
- We develop a simulator for reinforcement learning as well as reinforcement learning algorithms for robust control.

Autonomous driving using imitation learning



Lunar rovor simulator for reinforcement learning

■ **Recommended courses & Career after graduation**

Research on control and robotics requires a strong background in mathematics, physics and computer science as well as electrical engineering. Recommended undergraduate courses are analysis, linear algebra, differential equations, optimization, signals and systems, feedback control, visions, and deep learning.

- Graduates can work in academia, national labs or companies.

■ **Introduction to other activities besides research**

There are no other activities done laboratory-wide other than research.

■ **Introduction to the Lab.**

Prof. Chang is an expert in control, and robotics. He takes students from various fields including electrical engineering, mechanical engineering, aerospace engineering, brain science, computer science, and mathematics, thus creating a synergistic and multi-disciplinary research environment in the laboratory. Prospective students are not expected to have been exposed to all these areas. Only industriousness is required of them.

■ **Recent research achievements (2021-2023)**

[1] A new bundle picture for the drone, IEEE TAC, 2023.

[2] Unscented Kalman filter with stable embedding for simple, accurate, and computationally efficient state estimation of systems on manifolds in Euclidean space, International Journal of Robust and Nonlinear Control, 2023.

[3] Feedback gradient descent: efficient and stable optimization with orthogonality for DNNs, AAAI, 2022.

[4] Model-free unsupervised anomaly detection of a general robotic system using a stacked LSTM and its application to a fixed-wing unmanned aerial vehicle, IROS, 2022

[5] Sim-to-Real transfer of image-based autonomous guidewire navigation trained by deep deterministic policy gradient with behavior cloning for fast learning, IROS, 2022

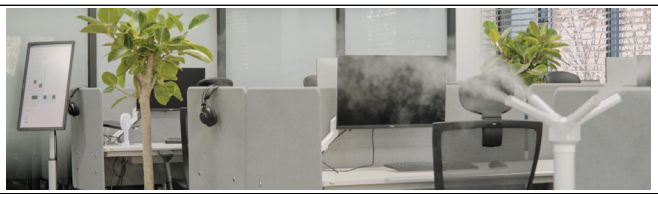
[6] Globally exponentially convergent observer for the rigid body system on SE(3), CDC, 2022

[7] Robust navigation for racing drones based on imitation learning and modularization, ICRA, 2021.

[8] Transversely stable extended Kalman filters for systems on manifolds in Euclidean spaces, Journal of Dynamic Systems, Measurement, and Control, 2021.

[9] Globally exponentially convergent continuous observers for velocity bias and state for invariant kinematic systems on matrix Lie groups, IEEE TAC, 2021.

<Professor Joon Son Chung's Lab.>



■ Contact information

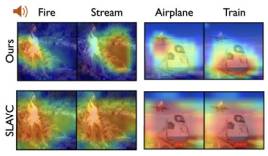
Professor : Joon Son Chung TEL : 042-350-2114
Lab. : Multimodal AI Lab (N24 #3102)
Website : https://mmai.io

■ Current state of the Lab. (in 2023 Fall Semester)

Postdoctoral Fellows : 2 PhD Students: 5 + 5 (integrated) Master's Student: 10

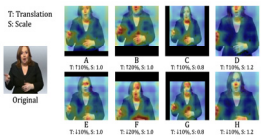
■ Research Areas

- **Sound Source Localization**



As humans have intuitive understanding of the direction of sound when perceiving visual scene. By focusing on cross-modal alignment of visual and auditory information and leveraging learning-based approach, we achieve high localization performance.

- **Sign Language and Gesture Recognition**

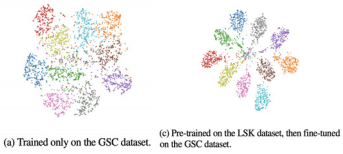


Sign language includes complex features to sufficiently understand the meaning. Therefore, we attempt to extract multiple features without the need for additional annotations. Our self-sufficient learning framework and thereby achieves the state-of-the-art performance.

- **Talking Face Generation**

Generating a talking face video plays a crucial role in human-computer interactions and can be applied to diverse fields. We construct a method that generates a natural-looking talking faces with fully controllable facial attributes and accurate lip synchronization

- **Keyword Spotting**



(a) Trained only on the GSC dataset. (c) Pre-trained on the LSK dataset, then fine-tuned on the GSC dataset.

We explore a task of discovering keywords spoken by humans. By leveraging user-defined keyword spotting and metric learning, we produce the state-of-the-art performance in the domain. We also propose a novel dataset corresponding to the task.

■ Recommended courses & Career after graduation

Recommended Courses

- Signals and Systems (EE202)
- Programming Structure for Electrical Engineering (EE209)
- Digital Signal Processing (EE432)
- Special Topics in Electronic Engineering: Deep Learning for Computer Vision (EE488)

■ Introduction to other activities besides research

Our Lab highly encourages social events including strawberry party, internal workshops, and sports. All lab members including foreign students and interns are open to active participation.

■ Introduction to the Lab.

Mutimodal AI (MMAI) Lab develops numerous ideas based on multi-modal data. With the help of Artificial Intelligence, we aim to solve various tasks by fundamental understanding of multi-modality, an extension of single modal approach such as vision only, and audio only. We focus on augmenting the performance of existing tasks by the multi-modal approach and exploring more in-depth researches based upon the combination of various information. Any motivated students in machine learning, visual, and auditory information are welcomed.

■ Recent research achievements ('22~'23)

1 paper at ACM International Conference on Multimedia 2023 (ACM MM)
1 paper at International Conference on Computer Vision 2023 (ICCV)
2 papers at Interspeech 2023
4 papers at International Conference on Acoustics, Speech, and Signal Processing 2023 (ICASSP)
1 paper at British Machine Vision Conference 2022 (BMVC)

<Professor Jung-Woo Choi's Lab.>

Smart Sound Systems Lab

■ **Contact information**

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■ **Current state of the Lab. (in 2023 Fall Semester)**

Postdoctoral Fellows : 0 PhD Students: 6 Master's Student: 3

■ **Research Areas**

Smart Sound System Laboratory pursues **better understanding** and **rendering of spatial audio** through **AI-based technologies** and **audio signal processing**. We study audio signal processing, AI-based audio scene analysis, diagnosis, and audio generation models to realize truly immersive audio experience. Our research topics cover Metaverse Audio (virtual reality, augmented reality, extended reality audio), and Auditory Information Analysis such as Speech Enhancement and Separation, Direction-of-Arrival estimation, Room Impulse Response estimation, Room Geometry Inference. Sound-based Anomaly Detection and Fault Diagnosis is another major research topic in our Lab.

[Highlights]

- SOTA in DNN-based Multichannel Speech Enhancement [DeFTAN-II]
- 7th place, in 2023 DCASE Sound Event Detection & Localization
- Inventor of Personal Audio Technology for Automotive Vehicles

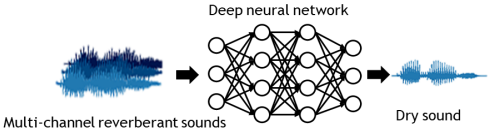
[Theories]

- Audio signal processing, Multichannel signal processing
- Sound propagation, Spatial perception of sound
- Anomaly detection, out-of-distribution detection

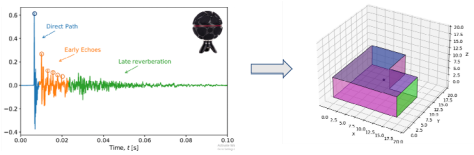
[Applications]

- Audio Metaverse, Audio AR/VR/XR
- Speech Enhancement and Separation, DoA Estimation using DNN
- Sound-based Environmental Parameter Generation and Estimation
- Beamforming, Sound Source Localization
- Intelligent Audio System with Environmental Awareness
- Machine Anomaly Detection and Fault Diagnosis with AI

<Metaverse Audio Recording>



<Audio & Speech Signal Processing using AI>



<Room shape inference from sound>

■ **Recommended courses & Career after graduation**

We recommend signal processing based courses (Signals and systems / DSP), Deep learning-related courses. After graduation, you can further develop your career in IT companies & research centers, as well as sound & vibration control industries (such as Samsung Research, ETRI, Naver, Gaudio). You can also work in a wide range of fields, including Electric / Defense science, etc.

■ **Introduction to other activities besides research**

Lab members frequently engage in yoga, ping-pong matches, and learning musical instruments. Through the organization of yearly membership training workshops and field trips, we actively facilitate the cultivation of camaraderie among members. Our laboratory fosters a regulation-free environment, striving to empower our members' creativity and self-motivation.

■ **Introduction to the Lab.**

The field of intelligent audio signal processing is a multidisciplinary field that enables the blending of signal processing technologies with machine-learning approaches, sound propagation theories, and insights into human sound perception. The driving force of the lab is the spirit of embracing challenges to explore new ideas guided by a profound intuition for signal processing. Collaborative research on top-notch immersive audio technology is underway, with the support of consistent funding, in partnership with KISTI, ETRI, and Samsung Electronics.

■ **Recent research achievements ('21~'23) (visit sound.kaist.ac.kr for full list of publications)**

- J-W. Choi, and F. Zotter, "Six degrees-of-freedom room impulse response dataset measured over a dense loudspeaker grid (6DRIR-DL)," AES International Conference on Spatial and Immersive Audio, Huddersfield, Aug. 2023.
- D. Lee, and J-W. Choi, "DeFT-AN: Dense Frequency-Time Attentive Network for Multichannel Speech Enhancement," IEEE Signal Processing Letters, vol.30, pp.155 - 159, Feb. 2023.
- Y. Shul, W. Yi, J. Choi, D-S. Kang, and J-W. Choi, "Noise-based self-supervised anomaly detection in washing machines using a deep neural network with operational information," Mechanical Systems and Signal Processing, vol.189, Apr. 2023.

<Professor SooJean Han's Lab.>

Autonomous Control of Stochastic Systems (ACSS)

■ **Contact information**

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■ **Current state of the Lab. (in 2023 Fall Semester)**

***New faculty member as of August 2023.**

■ **Research Areas**

control systems, stochastic processes, machine learning

■ **Recommended courses & Career after graduation**

*coding background: Python, MATLAB.

*course background: calculus, ODEs, linear algebra, introductory machine learning, basic probability.

*[Bonus] coding background: C++, ROS, working on GPUs.

*[Bonus] course background: any control theory / control engineering course.

*[Bonus] hardware background: robots/drones, motion capture system.

Bonus backgrounds are not strictly required. Self-motivation and a determination to learn new skills is more important.

■ **Introduction to other activities besides research**

My biggest motivation for being an engineer comes from movies! When I was a kid, I was inspired by the robots in Wall-E, especially EVE.

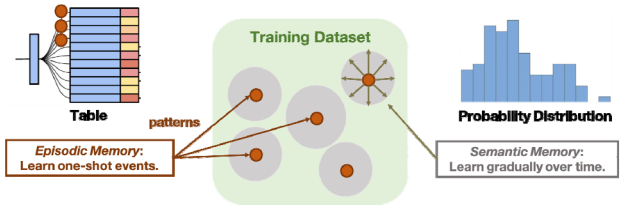
If you want to help me build real-life autonomous systems like EVE, consider joining my lab :)

■ **Introduction to the Lab.**

We develop intelligent and efficient methods for control, estimation, and decision-making of stochastic systems. Our main applications include networked systems: traffic management of unmanned (aerial) vehicles, multi-agent robotics, and distributed sensor networks.

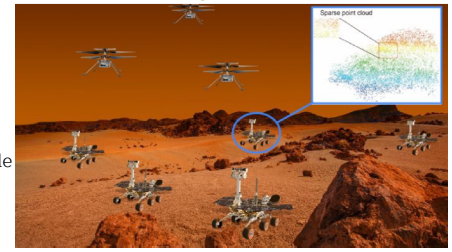
Heterogeneous Memory for Decision-Making.

We study the patterns of a system and design rules to determine what to store in memory and how to store them. By taking inspiration from the human brain, heterogeneous memory structures encode information in a diversity of ways (e.g., semantic versus episodic memory). Applications include autonomous robotic systems, reinforcement learning.



Topology of Multi-Agent Systems.

We design ways to abstract the topology of a complex real-world network into spatial patterns (e.g., tessellations) to achieve faster communication and more optimal resource allocation. Applications include large-scale flow networks: vehicle congestion control, air traffic management and UAV formation-flight.



Distributed Data-Gathering with Feedback.

We take inspiration from the human nervous system to improve distributed data-gathering algorithms: feedback channels are established from the processor to the individual sensors, enabling prediction and redundancy-reduction. Applications include problems where large-scale wireless communication is important: collaborative mapping of an unknown environment, multiagent target-tracking, distributed sensing and decision-making.

■ **Recent research achievements ('21~'23)**

*Han, Chung, Doyle, "Predictive Control of Linear Discrete-Time Markovian Jump Systems by Learning Recurrent Patterns." Automatica, May 2023.

*Han, Chung, Gustafson, "Congestion Control of Vehicle Traffic Networks by Learning Structural and Temporal Patterns." Learning for Dynamics and Control Conference (L4DC), Jun 2023.

*Han, "Optimizing Accuracy and Efficiency in Distributed Data Gathering Architectures with Feedback." Sep 2022.

*Han, Chung, "Incremental Nonlinear Stability Analysis for Stochastic Systems Perturbed by Lévy Noise." International Journal of Robust and Nonlinear Control (IJRNC), Aug 2022.

<For more, please visit personal homepage at soojean.github.io>.