Donghwa Kang

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RESEARCH INTERESTS

Computer vision, Multi-modal learning, Facial analysis, Eye tracking, Event-based vision

EDUCATION

Hongik University, Seoul, South Korea — Mar. 2024 — Present
M.S., Electronic & Electric Engineering

Hongik University, Seoul, South Korea — Mar. 2021 — Feb. 2024
B.S., Electronic & Electrical Engineering

RESEARCH EXPERIENCE

Image Understanding Lab, Hongik University — Mar. 2024 — Present
Graduate Research Assistant — Advisor: Dongwoo Kang

- Developed a cross-modal fusion attention module for facial keypoints alignment using event and RGB data. Analyzed differences between synthetic and real event-based facial data under varying lighting and motion conditions.
- Contributed to an event-based remote eye tracking framework by adapting it to facial data. Investigated asynchronous video processing and generated synthetic facial event data to address dataset limitations.
- Conducted foundational research for an IITP government-funded research initiative on developing high-speed (1000Hz) near-gaze tracking for XR systems, leveraging expertise in remote eye tracking to inform the study of multi-sensor pupil segmentation and tracking algorithms.

Image Understanding Lab, Hongik University — Jun. 2022 — Feb. 2024
Undergraduate Research Assistant — Advisor: Dongwoo Kang

- Investigated pupil detection under large head rotations by utilizing head pose estimation and optimal alignment points to improve robustness in non-frontal views.
- Conducted research on translating Korean Sign Language into Korean in medical service settings, using human pose estimation models with a focus on facial expressions.

PUBLICATIONS

Journal

Kang, Donghwa, Kim, J., & Kang, D. "Event-based Facial Keypoint Alignment via Cross-Modal Fusion Attention and Self-Supervised Multi-Event Representation Learning." IEEE Transactions on Circuits and Systems for Video Technology. (Under review) [Paper]

Kang, Donghwa, & Kang, D. (2025). "An Adaptive Learning Framework for Event-Based Remote Eye Tracking." Expert Systems with Applications, 128038. [Paper]

Kang, Donghwa, & Kang, D. (2024). "Head Pose-Aware Regression for Pupil Localization From a-Pillar Cameras." IEEE Access, 12, 11083-11094. [Paper]

Conference

Kang, Donghwa, & Kang, D. (2024). "Enhanced Eye Center Detection Approach for Large Head Pose." Proceedings of the Korean Society of Broadcast Engineers Conference, 1194-1197. [Paper]

PRESENTATIONS

Kang, Donghwa, & Kang, D. "Head Pose-Aware Pupil Alignment on Driver Monitoring System." Presented at the *IEEE International Conference on Information and Communication Technology Convergence (ICTC)*, Jeju, South Korea, Oct. 2024. (Recent Results, Poster Presentation)

Kang, Donghwa, & Kang, D. "Enhanced Eye Center Detection Approach for Large Head Pose." Presented at the Korean Society of Broadcast Engineers Conference, Jeju, South Korea, Jun. 2024. (Oral Presentation)

Kang, Donghwa, Choi, J., & Kang, D. "Precision Sign Language Translation Research Through Emotion Analysis During Telemedicine Consultations." In *Proceedings of the 2023 Fall Conference of the Korean Society for Internet Information (KSII)*, pp. 85-86, Yeosu, South Korea, Nov. 2023. (Poster Presentation)

PROJECTS

AI Video Masking Service for Privacy Protection Jun. 2023 — Jul. 2023
Naver Boostcamp AI Tech [GitHub]

- Developed a comprehensive AI video masking service utilizing instance segmentation and face recognition for efficient personal information anonymization.
- Focused on masking entire human bodies, beyond just faces, to prevent portrait rights infringement and enhance privacy protection in diverse video content.
- Contributed to data cleansing, human segmentation model fine-tuning, and implemented video editing for the service.

Semantic Segmentation of Hand Bones from X-ray Images Jun. 2023
Naver Boostcamp AI Tech [GitHub]

- Researched and implemented a range of semantic segmentation models, including FCN, DeepLabV3+, and UNet++, to explore various architectural approaches for the task.
- Designed an experimental pipeline involving data cleansing, various data augmentation techniques, and automated experiments with RabbitMQ to systematically improve the mean Dice score.

Object Detection for Recyclable Waste Classification May 2023
Naver Boostcamp AI Tech [GitHub]

- Implemented and fine-tuned various object detection models, including the team's best-performing Cascade R-CNN (Swin-S) which achieved a mAP of 0.607.
- Conducted in-depth research on various model backbones and neck architectures to optimize detector performance on the dataset.

Multi-label Image Classification for Mask Status, Gender, and Age Apr. 2023
Naver Boostcamp AI Tech [GitHub]

- Researched and implemented various classification architectures, including VGG, Vision Transformer (ViT), and MobileNet, to predict 18 classes related to facial attributes.
- Designed a data augmentation strategy and applied model ensembling techniques, which boosted the final classification accuracy from 62% to over 71%, an improvement of nearly 10%.

TEACHING EXPERIENCE

Multimedia Signal Processing, Hongik University Sep. 2025 — Present
Teaching Assistant

- Delivered a guest lecture and led a hands-on Python session on event camera representations.

Digital Logic Lab & Design, Hongik University Spring 2025
Teaching Assistant

- Facilitated weekly lab sessions by providing technical guidance on digital logic circuit experiments.

AWARDS & SCHOLARSHIPS

Scholarship for Excellence in Science and Engineering Spring 2024 — Present
Hongik University
Hongik Research Frontier Spring 2025
Hongik University
Scholarship for Research Assistant Fall 2023
Hongik University
Excellence Award, Digital Bio-Health Capstone Design Competition Dec. 2022
Hongik University

Academic Progress Scholarship Fall 2021
Hongik University

PROFESSIONAL & COMMUNITY ENGAGEMENT

Volunteer Translator, Compassion Mate 2021, 2022, Present
Compassion Korea

- Translated letters between sponsored children and their sponsors (Korean-English).

International Student Mentor, HI-TOUCH Program Fall 2021, Fall 2022, Present
Hongik University

- Facilitated the academic and personal transition of international students by providing comprehensive one-on-one guidance on study strategies, course inquiries, and campus resources.

Mentee, Global Cross Mentoring Program 2024 — Present
Korea Foundation for Women in Science, Engineering, and Technology (WISET)

- Selected for a competitive mentorship program connecting early-career female scientists in Korea with senior researchers in the U.S. and Europe for career development and global networking.

Academic Mentor, Seoul Learn Mentoring Program Mar. 2022 — Apr. 2023
Seoul Metropolitan Government

- Tutored local middle and high school students in Math and English, providing both academic planning and career guidance.

SKILLS

Programming Languages: Python, C, Matlab
Tools: PyTorch, TensorFlow, Keras, NumPy, Pandas, OpenCV, CUDA, Linux
Domain Skills: Deep Learning, Computer Vision, Sensor Fusion, Artificial Intelligence