Dayun Choi

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"I am a Master's–PhD integrated student in Electrical Engineering at KAIST, specializing in **deep learning for target sound extraction (TSE)** in complex acoustic scenes. My research focuses on utilizing **spatial queries**, such as direction-of-arrival (DoA), to extract desired multichannel signals, with potential applications in AR/VR. In addition to algorithmic development, I have hands-on experience in the deployment of speakers, sensors, and audio interfaces in **real-world experiments**, which has given me practical insight into audio signal processing. I am also interested in multimodal systems that integrate visual or textual cues, as well as generative methods for spatial audio, which I plan to explore further."

Education

Mar, 2022 – Present
Master's and PhD Integrated Course Student in School of Electrical Engineering at Korea Advanced Institute of Science and Technology (KAIST)
Advisor: Prof. Jung-Woo Choi
Research Assistant at Smart Sound Lab
Focus: Deep Learning-based Target Sound Extraction on Multichannel Mixtures using Directional Queries
GPA: 3.88/4.3 (95.8/100) – via 105 credits.

Mar, 2018 – Feb, 2022
B.S.E. in Electronic Engineering at Sogang University
Advisor: Prof. Yangmo Yoo
Undergraduate Intern at Medical Imaging Computing Systems (MICS) Lab
Research Project: Deep Learning-based Video Classification on Lung Ultrasound Imaging
GPA: 4.12/4.3 (98.6/100) – via 134 credits. (*Summa Cum Laude*)

Publications

Conference Proceedings

1. **D. Choi** and J.-W. Choi, "SoundCompass: Navigating target sound extraction with effective directional clue integration in complex acoustic scenes", in *Proc. International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, IEEE, Barcelona, Spain, 2026, pp. 15 657–15 661. DOI: https://doi.org/10.1109/ICASSP55912.2026.11461583, Demo: https://choishio.github.io/demo-SoundCompass/.
2. **D. Choi** and J.-W. Choi, "Multichannel-to-multichannel target sound extraction using direction and timestamp clues", in *Proc. International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, IEEE, Hyderabad, India, 2025, pp. 1–5. DOI: https://doi.org/10.1109/ICASSP49660.2025.10890145, Demo: https://choishio.github.io/demo_M2M-TSE/.
3. **D. Choi** and J.-W. Choi, "Target sound extraction on multichannel reverberant mixture", in *2024 Autumn Conference of the Acoustical Society of Korea (ASK)*, ASK, Busan, Korea, 2024, pp. 170–171.
4. **D. Choi** and J.-W. Choi, "Target sound extraction on reverberant mixture using sound-class label and timestamp information", in *2024 Spring Conference of the Acoustical Society of Korea (ASK)*, ASK, Jeju, Korea, 2024, pp. 335–336.

5. **D. Choi**, D. Lee, and J.-W. Choi, "Low complexity dnn model for multichannel speech enhancement", in *2023 Spring Conference of the Korean Society of Noise and Vibration Engineering (KSNVE)*, KSNVE, Samcheok, Korea, 2023, pp. 132–132.

6. D. Lee, **D. Choi**, and J.-W. Choi, "DeFT-AN RT: Real-time multichannel speech enhancement using dense frequency-time attentive network and non-overlapping synthesis window", in *Proc. Interspeech*, ISCA, Dublin, Ireland, 2023, pp. 864–868. DOI: https://doi.org/10.21437/Interspeech.2023-2437.

Journal Articles

1. Y. Shul, **D. Choi**, and J.-W. Choi, "CST-former: Multidimensional attention-based transformer for sound event localization and detection in real scenes", *arXiv preprint arXiv:2504.12870*, 2025. DOI: https://doi.org/10.48550/arXiv.2504.12870.

2. **D. Choi** and J.-W. Choi, "Target sound extraction on reverberant mixture", *The Journal of the Acoustical Society of America (JASA)*, vol. 154, no. 4_supplement, A270–A271, 2023. DOI: https://doi.org/10.1121/10.0023494.

Research Projects

KAIST

Jul, 2024 – Present

IoT-based Eavesdropping Attack Detection and Defense Technology funded by National Research Foundation of Korea (NRF) and STEAM research grant with National University of Singapore (NUS)

- Developed DNN models for speech dialogue restoration and enhancement from adjacent indoor spaces
- Generated simulated and real-world datasets using Pyroomacoustics library, loudspeakers, and multiple IoT sensors to evaluate system viability in real-world environments
- Developed software program user interface and hardware products
- Tools: Python (PyTorch), Matlab, NI SignalExpress, LabVIEW | KRK ROKIT 5 (RP5 G3), RME Audio FIREFACE UC, NI 9234, Sensors (352C66, 355B04, HY929)

May, 2024 – Present

General-Purpose AI for Integrated Analysis and Generation of Spatial Audio funded by National Research Foundation of Korea (NRF)

- Developed Universal Spatial Audio Analysis Network to infer source directions, positions, classes, and room acoustics, and separate signals into object-oriented formats
- Developed Universal Spatial Audio Generation Network to synthesize realistic 3D audio from single-channel or separated sources, supporting multimodal input and 6-DoF spatial rendering
- Tools: Python (PyTorch)

Jan, 2023 – Apr, 2026

Noise Cancellation and Speech Recognition Technology Robust to Battlefield Environments funded by Center for Applied Research in Artificial Intelligence (CARAI)

- Developed DNN models for robust noise cancellation in battlefield scenarios
- Tools: Python (PyTorch)

Research Projects (continued)

Sogang University

Sep, 2021 – Dec, 2021 — **Real-time COVID-19 Detection System from Lung Ultrasound Videos**

- Developed DNN models for video classification of lung ultrasound data
- Explored model compression techniques for real-time deployment
- Developed system user interface
- Tools: Python (TensorFlow, PyQt)

Jul, 2021 — **AI-based Automobile Recognition System** in The 2nd Software Pre-Education Program for Hyundai Mobis - Sogang University (FoSS)

- Pre-trained DNN models for object detection using Open-Images dataset
- Deployed model on Jetson Nano and validated automobile detection performance
- Tools: Python (PyTorch), Jetson Nano

Assistantships

KAIST

Summer, 2025 — [EE495] Individual Study *(Advisor: Prof. Jung-Woo Choi)*

Spring – Winter, 2025 — **Lab Head** of Smart Sound Lab *(Advisor: Prof. Jung-Woo Choi)*

Winter, 2024 — [EE495] Individual Study *(Advisor: Prof. Jung-Woo Choi)*

Autumn, 2024 — [EE202] Signals and Systems *(Lecturer: Prof. Jung-Woo Choi)* **(Head TA)**

Spring, 2024 — [EE488] Introduction to Audio Signal Processing *(Lecturer: Prof. Jung-Woo Choi)* **(Head TA)** & [EE495] Individual Study *(Advisor: Prof. Jung-Woo Choi)*

Winter, 2023 — [EE202] Signals and Systems *(Lecturer: Prof. Jung-Woo Choi)* **(Head TA)**

Autumn, 2023 — [EE202] Signals and Systems *(Lecturer: Prof. Jung-Woo Choi)*

Spring, 2023 — [EE305] Introduction to Electronics Design Lab *(Lecturer: Prof. Jun-Bo Yoon)*

Autumn, 2022 — [EE202] Signals and Systems *(Lecturer: Prof. Jung-Woo Choi)*

Honors & Awards

KAIST

Mar 2nd, 2024 — **The 1st place** at Technical Committee on Architectural Acoustics Student Paper Award for December Sydney meeting

Sogang University

Feb 21st, 2022 — Honors

Mar 30th, 2020 — **Dean's List** for Electronic Engineering

Mar, 2020 – Feb, 2022 — National Scholarship for Science and Engineering

Mar 29th, 2019 — **Dean's List** for Electronic Engineering

Nov 29th, 2018 — **Dean's List** for Electronic Engineering

Nov 16th, 2018 — **The 3rd Prize** at the 7th Proposal Contest of General Elective Subjects

Miscellaneous Experiences

KAIST

- Jun 18th, 2024 — **Representative Presenter (Oral)** of Smart Sound Lab for KAIST-NUS Joint Seminar
- Apr 5th, 2024 — **Representative Presenter (Oral)** of Smart Sound Lab for the 5th SORI Workshop
- Jul 13th, 2023 — **Representative Presenter (Poster)** of Smart Sound Lab for the 4th SORI Workshop

Sogang University

- Jul 19th – 30th, 2021 — The 2nd Software Pre-Education Program for Hyundai Mobis - Sogang University (FoSS)
- Jun 29th – Jul 9th, 2019 — The 24th Overseas Culture Tour to Greece & Türkiye
- Jan, 2019 – Feb, 2020 — **Head of education and culture department** of Hyunwoohoe (Classical Guitar Club)

Skills

- Programming Languages — Python/Matlab (Advanced), C/VHDL/Linux/HTML (Intermediate)
- ML Frameworks — PyTorch/TensorFlow (Advanced), PyTorch Lightning (Intermediate)
- Software — OrCAD/PSpice (Advanced), NI SignalExpress/Audacity (Intermediate), nanoHUB/Unity/LabVIEW (Elementary)
- Hardware — Loudspeaker: KRK ROKIT 5 (RP5 G3)/Audio Interface: RME Audio FIREFACE UC/NI Data Acquisition Tool: NI 9234/Sensor: 352C66, 355B04, HY929, Polytec PDV-100/Microphone Array: ReSpeaker Mic Array v2.0 (Intermediate), Arduino/EasyFPGA-Combo2/Jetson Nano (Elementary)
- Languages — Korean (Native), English (TOEIC: 735 – expired)