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Dong-Hun Choi AI/ML Researcher & Engineer

Education

Ajou University Suwon, Republic of Korea
M.S. in Artificial Intelligence 2024.03 – 2026.02 (expected)
- GPA: 4.23/4.50
- Research Areas: Biomedical Signal Processing, ECG Denoising, Time-Series Modeling, AI for Healthcare

Ajou University Suwon, Republic of Korea
B.S. in Software Engineering 2018.03 – 2024.02
- GPA: 3.68/4.50

Research Experience

Personalized ECG Imputation and Denoising for Wearable Patch Devices
Ajou University 2024.06 – Present

- Conducted industry–academia research with Gayeong Healthcare to address wearable ECG degradation such as motion artifacts, EMG interference, baseline drift, and electrode instability.
- Developed a hybrid restoration pipeline combining DiTSA for long/short-term missing-value recovery and a Dual-Branch Transformer for ECG denoising that integrates temporal CNN features with frequency-domain FAN encoders.
- Achieved SNR/PRD/SSD improvements surpassing DRNN, FCN-DAE, DeepFilter, and TCDAE, leading to a patent filing.

Domain-Generalized EEG Representation Learning
Ajou University 2023.01 – 2023.09

- Applied domain generalization to EEG signals to improve robustness across demographic and recording-condition shifts.
- Utilized wav2vec2.0 for representation learning, outperforming baseline models and earning the SOFTCON Excellence Award.
- Repository: [code]

Publications

1. **Dual-FreqDAE: Frequency-Aware Dual-Branch Transformer Autoencoder for ECG Denoising**. **Dong-Hun Choi**, Jeong-Hyeon Moon, Kyung-Ah Sohn. *Biomedical Signal Processing and Control (SCI(E), Submitted September 2025)*.
   Dual-branch temporal–frequency architecture achieving state-of-the-art denoising under mixed-noise conditions and enhancing downstream R-peak detection and arrhythmia classification. [link] [code]
2. **LangGraph-based LLM Agent for Copyright Infringement Analysis**. Hyunwoo Jung, Yoonseo Choi, **Dong-Hun Choi**, Kyung-Ah Sohn. *Korean AI Conference 2025*.
   A Multi-Agent legal–technical system integrating Swin Transformer image forensics, SSIM/ResNet similarity analysis, and RAG built from Korean copyright cases. [link] [code]
3. **Dilated Temporal Self-Attention-based ECG Missing Value Restoration**. **Dong-Hun Choi**, Jeong-Hyeon Moon, Kyung-Ah Sohn. *KICS Winter Conference 2025*.
   DiTSA recovers long-range rhythm and short-term waveform morphology, achieving state-of-the-art performance on PTB-XL under 50% continuous missing patterns. [link]
4. **ECG Imputation using Temporal Convolutional Network and Transformer**. Han-Baek Choi, **Dong-Hun Choi**, Kyung-Ah Sohn. *KSC 2024*.
   Hybrid TCN–Transformer model capturing local morphology + global rhythm dependencies, outperforming LSTM/GRU baselines in long-gap imputation. [link]

Projects

Ajou University · Convergence Project Course

Financial Analysis Agent with LangGraph

2025.03 – 2025.06

- Built a natural-language financial agent capable of querying live market data, computing RSI/MACD, and providing chart-based insights.
- Designed a Streamlit dashboard visualizing stock trends, indicator behavior, API call statistics, and reasoning logs.
- Repository: [code]

Multi-Agent LLM System with Automated MLOps Pipeline

2024.09 – 2024.12

- Developed an end-to-end MLOps workflow using GitHub Actions, Docker, MLflow, and vLLM enabling reproducible LLM deployment, evaluation, and model versioning.
- Implemented a Multi-Agent architecture using LangGraph for coordinated tool-use and structured reasoning across GPT, Qwen, and LLaMA personas.
- Repository: [code]

Ajou University · Machine Learning Course Project

Helmet Violation Detection using YOLOv5

2023.03 – 2023.06

- Developed a YOLOv5-based e-scooter helmet violation detector trained on 7,983 annotated images; integrated StrongSORT for tracking and MOTA evaluation.
- Repository: [code]

Ajou SW Convergence Challenge · Competition Project

Bike Station Demand Prediction & Rebalancing Recommendation

2022.12 – 2023.01

- Analyzed Seoul public bike demand using RandomForest and KMeans to identify spatial and temporal usage clusters.
- Implemented a Flask-based API providing demand predictions and rebalancing recommendations.
- Repository: [code]

Skills

Programming: Python, C/C++, Java
Frameworks: PyTorch, TensorFlow, FastAPI, Flask
Tools: Git, Docker, MLflow
Databases: PostgreSQL, MySQL

Certifications

OPIC IH (Intermediate High) — 2025.09
AICE Associate (AI Certification Exam) — 2025.09
ADsP — 2025.08
SQLD (SQL Developer) — 2025.06
Computer Utilization Level 1 — 2019.09

Presentations

- Poster Presentation — **Outstanding Research Presentation**, AI Graduate School Symposium, Seoul 2025.08

Awards

- **KSC 2024 Paper Competition — Honorable Mention** 2024.12
- **AJOU SOFTCON Research Excellence & Merit Award** 2023.06
- **SW Convergence Challenge — Honorable Mention** 2023.01