

# Jiwoon Lee

[LinkedIn](#) | [GitHub](#) | [Google Scholar](#)

Location: Seoul, Republic of Korea  
[jwlee@linux.com](mailto:jwlee@linux.com) | [jiwoonlee@kw.ac.kr](mailto:jiwoonlee@kw.ac.kr)

## EDUCATION

### Kwangwoon University

*Master of Engineering in Computer Engineering Student*

*Advisor: Prof. Cheolsoo Park*

Sep 2024 – Present

*On-site – Seoul, Republic of Korea*

- GPA: 4.21 / 4.5

### Kwangwoon University

*Bachelor of Science in Computer Engineering*

*Advisor: Prof. Cheolsoo Park*

Feb 2019 – Aug 2024

*On-site – Seoul, Republic of Korea*

- Cumulative GPA: 3.67 / 4.5 | Major GPA: 3.73 / 4.5 (77 / 134 credits)

## RESEARCH INTERESTS

Computational neuroscience, signal processing, brain-computer interface, statistical machine learning

## JOURNAL ARTICLES

- Y. Park†, **J. Lee†**, D. Sim, Y. Cho, C. Park. 2025. "Designing Spiking Neural Network-Based Reinforcement Learning for 3D Robotic Arm Applications." *Electronics* (**SCIE, Co-first author, IF = 2.6, JCR Top 45.2%**) [\[LINK\]](#)
- C. Lee†, Y. Park†, S. Yoon†, **J. Lee†**, Y. Cho, C. Park. 2024. "Brain-Inspired Learning Rules for Spiking Neural Network-based Control: A Tutorial." *Biomedical Engineering Letters* (**SCIE, Co-first author, IF = 3.2, JCR Top 45.9%**) [\[LINK\]](#)
- H. Yut†, S. Baek†, **J. Lee†**, I. Sohn, B. Hwang, C. Park. 2024. "Deep Neural Network-based Empirical Mode Decomposition for Motor Imagery EEG Classification." *IEEE Transactions on Neural Systems and Rehabilitation Engineering* (**SCIE, Co-first author: IF = 4.8, JCR Top 2.9%**) [\[LINK\]](#)
- J. Yang, J. Kim, H. Ryu, **J. Lee**, C. Park. 2024. "Predicting Car Rental Prices: A Comparative Analysis of Machine Learning Models." *Electronics* 13, no. 12: 2345 (SCIE, Co-author: IF = 2.6, JCR Top 45.2%) [\[LINK\]](#)
- **J. Lee†**, D. Kim†, Y. Park, J. Park, S. Park, C. Park. "Energy-Efficient Adaptation for Robotic Arm Control on a Neuromorphic Hardware." *Under Review* (**Co-first author**)
- J. Kim, **J. Lee**, C. Park. "Advances in Analog Circuit Design Automation using Reinforcement Learning: A Review." *Under Review* (Co-author)
- J. Lee†, M. Kim†, J. Won, **J. Lee**, H. Lee, Y. Cho, C. Park. "Event-Based Data Generation for Enhancing White Blood Cell Visibility and Counting Accuracy in Nailfold Capillary Videos." *Under Review* (Co-author)

## INTERNATIONAL CONFERENCE PAPERS

- J. Yang, J. Kim, **J. Lee**, H. Ryu, S. Yeo, P. Kim, Y. Kim, J. Lim, H. Yoon, C. Park, "Metaverse: Research Based Prediction Model of the Car Price in view of the Machine-learning Method", In *2023 IEEE International Conference on Metaverse Computing* (IEEE MetaCom 2023), Jun 2023, Kyoto, Japan [\[LINK\]](#)
- **J. Lee**, C. Park, "Restoration of Time-Series Medical Data with Diffusion Model", In *2022 IEEE International Conference on Consumer Electronics-Asia* (ICCE-Asia), Oct 2022, Yeosu, South Korea [\[LINK\]](#)
- S. Baek, S. Han, **J. Lee**, C. Park, "Arrhythmia Classification Using 1D-2D Conversion", In *u-Healthcare 2019*, Dec 2019, Seoul, South Korea
- J. Won, H. Kim, **J. Lee**, J. Lee, C. Park, Velocity-Constrained Representation Learning for sEMG-Based Handwriting Recognition", *Under Review* (Co-author)

## DOMESTIC CONFERENCE PAPERS

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- **J. Lee**, C. Park, "High-Efficiency Spiking Neural Network Image Classifier Mimicking Memory Mechanisms of Cerebral Cortex and Hippocampus", In *2025 Korean Institute of Broadcast and Media Engineers*, Dec 2025, Pyeongchang, South Korea
- **J. Lee**, Y. Park, H. Lee, J. Park, C. Park, "Neuromorphic Spike-based Reinforcement Learning for 2-DoF Robotic Arm Control", In *34th Korean Signal Processing Conference*, Oct 2024, Seoul, South Korea
- Y. Kang, **J. Lee**, C. Park, "Probabilistic Modeling for Multivariate Signal Restoration in PPG and ECG Using Denoising Diffusion", In *The Korean Society of Medical & Biological Engineering Spring Conference 2023*, May 2023, Daegu, South Korea
- **J. Lee**, C. Park, "Denoising Diffusion Probabilistic Model based Time-Series ECG data Interpolation", In *2022 Korean Society of Medical & Biological Engineering Autumn Conference*, Nov 2022, Incheon, South Korea
- S. Baek, H. Yu, **J. Lee**, C. Park, "Design of Explainable AI Model with LIME for Single Channel Electroencephalogram", In *2022 Summer Annual Conference of IEIE*, Jun 2022, Jeju, South Korea [\[LINK\]](#)

## HONORS AND AWARDS

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- Merit-based Scholarship for AI Research, AI Seoul Tech Graduate School Scholarship, Seoul Scholarship Foundation & Seoul Metropolitan Government, 2025
- Excellent Exhibition Center Award, "Human Brain Neuro-computing Platform Research Center", {2024, 2025} World IT Show, Ministry of Science and ICT, {2024, 2025}
- Excellence Award, "SNN-based arm motion imitation robot arm control algorithm using EMG and DVS", The World Embedded Software Contest 2023, Korea Electronics Technology Institute, 2023
- Merit-based Scholarship for Software Competence Excellence, Kwangwoon University, {2019, 2022, 2023}
- **Best Paper Award (Bronze)**, 2022 IEEE ICCE-Asia 2022, IEEE, 2022 [\[LINK\]](#)
- Excellence Award, "SWIM: Study WIth Me, a study stream service", Ministry of National Defense Start-Up Challange, Ministry of National Defense Republic of Korea, 2021
- Scholarship for Academic Excellence, Kwangwoon University, 2019
- Grand Prize, "Text-To-Speech based on Generative Adversarial Network", 2019 Chambit Design Semester Performance Presentation, Kwangwoon University, 2019
- Microsoft Azure Prize, "Mixed Reality Game", The 1st Welcome to the maker world, Microsoft Korea, 2017

## TECHNICAL SKILLS

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### Expert Proficiency

Python, C/C++, CUDA, Deep Learning Frameworks

- **Python: PyTorch** (Custom Autograd/Extensions), TensorFlow, Scikit-learn, Hardware Verification
- **C / C++:** Hardware-software co-design, System-level optimization, Custom CUDA Kernel implementation
- **Key Achievements:** Achieved 700%+ speedup via CUDA; Open-source maintainer (SNN Accelerator)

### Advanced Proficiency

Verilog, FPGA, MATLAB, Assembly

- **FPGA & HDL:** Verilog, **Xilinx** (Zynq, Artix) with Vivado/Vitis, **Intel** (Cyclone V) with Quartus
- **Others:** MATLAB (Signal Processing), Assembly (AArch64/x86/AMD64), Docker, Git, Spice (Circuit Simulation)

## WORK EXPERIENCE

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- Research Assistant** Jan 2022 – Present  
*Bio Computing and Machine Learning (BCML) Lab, Kwangwoon University* On-site – Seoul, Republic of Korea  
Advisor: Prof. Cheolsoo Park
- **Neural Network-Based Circuit Yield Enhancement (Corporate Project):** Conducting a confidential research on circuit yield optimization (NDA).
  - **GPGPU-Based High-Speed Circuit Simulation (Corporate Project):** Optimized sparse matrix solvers using CUDA (cusolver, AMGX), achieving a **718.2% speedup** over CPU-based NGSPICE on ISCAS '85 benchmarks.
  - **Neuromorphic Robot Arm Control:** Classified six arm movements using EMG/DVS; Developing quantized SNN and reward-modulated STDP for neuromorphic processors.
  - **Open-Source SNN Accelerator for FPGA:** Implemented SNN/STDP on FPGA (Verilog/HLS); Integrated with AXI4-Lite/Stream interfaces on PYNQ-Z2; [GitHub \(100+ stars\)](#).
  - **Time-Series Forecasting (Corporate Project):** Developed hybrid models (AR, MA, RNN) for industrial rental price prediction; Addressed data sparsity and non-linearity.
  - **Generative Model for ECG Restoration:** Developed conditional DDPM for ECG interpolation; Achieved up to 70% restoration accuracy; **Best Paper Award** at IEEE ICCE-Asia 2022.
  - **Motor Imagery EEG Classification:** Generalized multivariate EMD using Deep Neural Networks to solve mode mixing problems; Published in *IEEE TNSRE* (IF 4.8, JCR top 2.9%).

- Research Intern** Jul 2022 – Aug 2022  
*Qualcomm Institute, University of California, San Diego* On-site – San Diego, California, United States  
Advisor: Dr. Seokheon Cho

- **Project: Explainable AI (XAI) for Medical Diagnosis** – Reliability Analysis of Breast Tumor Classification [[LINK](#)]
- Investigated model interpretability of high-accuracy diagnostic models using LIME to address the 'Black Box' issue in clinical settings
- Identified key morphological features (concavity, texture) driving the classification, verifying the medical validity of the model's decisions

- Co-Founder & Lead Developer** Jun 2021 – Apr 2022  
*SWIM (Study Stream Service Startup)* Hybrid – Seoul, Republic of Korea
- Designed real-time matchmaking system with Queue and the Nearest Neighbor algorithm
  - Selected for **K-Startup Grand Challenge 2021 Finals**; Secured KRW 70 million (approx. USD 50,000) funding from KISED
  - Received Excellence Award at Ministry of National Defence Start-Up Challenge

- Fire Direction Specialist, Squad Leader, Sergeant** Jun 2020 – Dec 2021  
*Capital Defense Command, Republic of Korea Army* On-site – Seoul, Republic of Korea
- Mathematical computations to determine artillery firing angles
  - Training new recruits in these mathematical calculations; Squad management tasks

## TEACHING EXPERIENCE

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- Teaching Assistant** Mar 2024 – Present  
*Kwangwoon University* On-site – Seoul, Republic of Korea
- Mentoring 47 students in Artificial Intelligence (Fall 2025)
  - Mentored 50 students in Digital Logic Circuits 1 (Spring 2025)
  - Mentored 18 students in Computer Engineering Basic Experiment 1 (Spring 2025)
  - Mentored 73 students in Assembly Language Programming (Fall 2024)
  - Mentored 102 students in Computer Architecture (Spring 2024)

- Student Mentor** Jan 2022 – Present  
*BCML Lab, Kwangwoon University* Hybrid – Seoul, Republic of Korea
- Mentored around 50 undergraduate students in BCML lab, in machine learning [[LINK](#)]

## TEST SCORES

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### TOEFL iBT

Score: 90 (MyBest™ Score: 93)

Jan 2026

- Total: 90/120 (Reading: 27, Listening: 18, Speaking: 22, Writing: 23)

## PROFESSIONAL MEMBERSHIPS AND SERVICES

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Organizer, Google Developer Student Clubs Kwangwoon University	Sep 2023 – Aug 2024
Student member, IEEE, Seoul Section	Sep 2022 – Feb 2024
Member, IEEE Consumer Technology Society	Sep 2022 – Feb 2024