



Daeseok Song

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## Research Objective

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**"Designing next-generation learning algorithms by emulating biological brain mechanisms."**

As an AI engineer with over 3 years of experience solving uncertainty issues in the industry, my goal is to establish a universal learning methodology for Spiking Neural Networks (SNN) that transcends Von Neumann limitations. I am currently implementing Geoffrey Hinton's GLOM and Forward-Forward (FF) algorithms to simulate functional differentiation and integration in the cerebral cortex, aiming to define high-efficiency brain-inspired learning methods.

## 1 Independent Research

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Functional Differentiation and Consensus-based Inference Framework

Oct 2025 – Present

- **Mimicking Functional Differentiation Architecture:** Proposed a structure where individual cortical lobes perform independent functions while organically exchanging information, utilizing the Forward-Forward (FF) algorithm for greedy layer-wise learning followed by global consensus.
- **Scratch Implementation of FF and GLOM:** Developed the FF algorithm to locally optimize 'Goodness' without backpropagation and the GLOM mechanism to achieve hierarchical parsing through 'Islands of Agreement,' all built from scratch without external libraries.
- **Integrated Study of Local Learning and Global Inference:** Conducted mathematical modeling and tuning of the 'cognitive consensus' process, where individual neuron blocks extract independent features yet form a consistent representation via bottom-up, top-down, and lateral interactions.

## 2 Professional Experience

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Connective Co., Ltd.

AI Engineer (Founding Member)

Nov 2022 – Present

- **Foundation Model & MoE Research:** Built a standard PyTorch Lightning pipeline capable of comparing 5 large-scale models (e.g., DINOv3) within 5 days via Linear Probing and LoRA, and designed few-shot learning strategies.
- **Multi-Task Learning (MTL) Framework Lead:** Designed and implemented an end-to-end MTL pipeline to unify 4 separate vision models into a single backbone, achieving a 52% reduction in total model size and saving 6.3GB in weight.
- **Regulatory Affairs (Domestic & Global):** Contributed to the technical documentation and successfully obtained KFDA (Korea), UAE Ministry of Health, and European CE MDR certifications for medical AI products.
- **Consensus-based Ensemble Modeling:** Developed an ensemble system that mathematically models the diagnostic consensus process among medical professionals, improving model accuracy by over 3% (published in SCIE-level journal and patented).
- **MLOps & Data Pipeline:** Established a pipeline for preprocessing over 100,000 medical records into trainable formats and automated the "Labeling-Train-Productization" lifecycle.

Minerva Soft Inc.

Image Processing Intern

Mar 2022 – Jul 2022

- Optimized OpenCV-based ROI detection and preprocessing (Thresholding, Morphology), increasing barcode recognition rates from 70% to over 90%; deployed as a stable C++ DLL after extensive memory leak testing.

### 3 Publications & Patents

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1. **Accurate, automated classification of radiographic knee osteoarthritis severity using a novel method of deep learning: Plug-in modules**, *Knee Surgery & Related Research (SCIE)*, 2024 (2nd Author, Core Algorithm Developer).
2. **Ensemble system and method for improving classification accuracy of knee osteoarthritis**, *International Patent (PCT/KR2025/012689), Korean Patent (10-2024-0124529)* (Inventor).
3. **Image data normalization and augmentation for lesion segmentation in size and ratio polymorphic medical images**, *Korea Computer Congress (KSC 2022)* (1st Author).

### 4 Education & Awards

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**University of Suwon**

*Mar 2017 – Feb 2023*

B.S. in Information Security

- **Valedictorian (Top Graduate)**, GPA: 4.29 / 4.5 (Major GPA: 4.37 / 4.5)
- **1st Place (Grand Prize)**, AI Idea Contest for the Underprivileged (LSTM-based predictive modeling) *Dec 2021*
- **Outstanding Student Award**, Military Open SW Training (Top 50 selected; Developed Android App) *Oct 2019*

### 5 Skills

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**Frameworks** PyTorch, PyTorch Lightning, OpenCV, Scikit-learn, Fast API, Torchserve  
**Languages/Tools** Python, C++; Git, Docker, JIRA/Confluence