SUHWAN **TCHA**

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Research Interests

My research focuses on developing **human-like and trustworthy Artificial Intelligence** through the integration of computer vision, multimodal modeling, and data-driven problem solving. I am particularly interested in building **robust and interpretable vision-language systems** that can operate reliably in real-world environments, with emphasis on:

(1) **Efficient and reliable visual understanding**, including object detection and lightweight architectures for real-time inference;
(2) **Multimodal fusion** of visual, linguistic, and contextual signals for improved scene interpretation and decision-making;
(3) **Behavioral and environmental analysis** from static and dynamic visual data to support real-world applications such as disaster assessment;
(4) **Trustworthy AI**, ensuring fairness, robustness, and safe deployability of machine learning and large vision-language models.

Education

Sogang University (Transferred 2024) — *Seoul, South Korea*

B.S. in Computer Science — *Expected Aug. 2026*

- GPA: 3.5/4.5 (as of Fall 2025)
- Relevant Coursework: Deep Learning, Machine Learning, Big Data Computing

Hankuk University of Foreign Studies (HUFS) — *Seoul, South Korea*

Information & Communication Engineering — *2020 – 2023*

- Transferred to Sogang University in 2024

Projects

CONVENIENCE STORE CHAIN DATABASE SYSTEM — *2025*

- The Convenience Store Chain Database System is a project implementing a database management solution for store and online purchases, using MySQL database and C++ application. It includes inventory management, sales transactions, loyalty status updates (VIP/VVIP), and support for 7 sample queries covering business needs like stock inquiries, sales analysis, and purchase pattern analysis. The system is designed with an E-R diagram-based logical schema normalized to **BCNF** for data integrity and query performance.
  GitHub: github.com/suhwantcha/Convenience-Store-Chain-Database-System

YOLO-PSYCHO-ANALYSIS (Psychological analysis from house sketches) — *2025*

- The AI House Drawing Psychological Analysis Model is a **YOLOv8**-based project that diagnoses psychological characteristics by detecting and quantifying elements like doors, windows, sun, and chimney in user-drawn sketches. It converts data into psychological scores and provides customized analysis scripts grounded in HTP test theory and art therapy.
  GitHub: github.com/suhwantcha/YOLO-Psycho-Analysis

SEOUL REAL ESTATE PRICE PREDICTION Team Project (4 members) — *2025*

- This project predicts transaction prices for properties in Seoul using official data, involving preprocessing, feature engineering (e.g., building age, floor categories), encoding, and log transformation of the target variable (house_price). It employs multiple ML models including Random Forest, **XGBoost**, CatBoost, and KNeighbors.
  GitHub: github.com/suhwantcha/Seoul-Housing-Price-Prediction

EFFICIENTNET DOG & CAT CLASSIFICATION Team Project (4 members) — *2024*

- This project implements image classification on the Oxford-IIIT Pet Dataset, utilizing transfer learning with **EfficientNet-B0** and systematically optimizing factors like data augmentation and regularization, using CutMix and achieving **88.08% validation accuracy**.
  GitHub: github.com/suhwantcha/efficientnet-Image-classification

CAT-TRANSLATOR — *2025*

- The Cat Meow Translator & Meme Generator analyzes uploaded cat meow audio (WAV, MP3) using the **Gemini API** to translate them into humorous human-like phrases, then generates a corresponding meme image via **Stable Diffusion** on Hugging Face. It features dual versions: a Python-based Streamlit app and a simple React frontend.
  GitHub: github.com/suhwantcha/Cat-translator

YOLO OBJECT DETECTION (YOLOv5, YOLOv7, and YOLOv11) — *2024*

- This project demonstrates training and evaluating YOLO models (**YOLOv5, YOLOv7, and YOLOv11**) for object detection using the PASCAL VOC dataset, including data preprocessing (XML to .txt format), model retraining via transfer learning, and performance evaluation (mAP). Optimized for real-time object detection.
  GitHub: github.com/suhwantcha/yolo-object-detection

SYSTEM PROGRAMMING PROJECTS *2025*

- This repository covers four projects from the System Programming course: MyLib (kernel data structures), MyShell (custom shell with I/O redirection and job control), Concurrent Stock Server (multi-client server using POSIX threads, handling **10K+ clients**), and Mallocator (custom dynamic memory allocator). Technologies include C, system calls, and concurrency libraries.
  GitHub: github.com/suhwantcha/System-Programming

RAG-based, AI-Powered CRM Manager *Sep 2025 – DEC 2025*

- Architected a **Multimodal RAG** pipeline on GCP, integrating GPT-4o (Vision/Whisper) for unified processing of text and image customer data with ChromaDB vector storage.
- Engineered a **self-evolving loop** using PostgreSQL logs and dynamic prompting, enabling the agent to learn from interactions and align with owner policies.
- Deployed **autonomous agent tools**(e.g., CS replies, BI reports) through a full-stack architecture, featuring a FastAPI backend and an interactive frontend dashboard for admins and agents.
  GitHub: github.com/suhwantcha/CS-Agent

PINTOS OS *Sep 2025 – DEC 2025*

- Implemented a **Pintos OS kernel** in C, completing user program execution, file system support, and **priority-based thread scheduling** (Projects 1–3).
- Designed core **system calls**, per-thread file descriptor management, and **lock-based synchronization** to ensure safe concurrent file access.
- Enhanced the kernel scheduler with **preemption, aging**, and an efficient **alarm clock** using sleep queues.
  GitHub: github.com/suhwantcha/OS-Pintos-Project

Experience

Teaching Assistant, Understanding Artificial Intelligence *Seoul, South Korea*

Sogang University *Sep 2025 – Dec 2025*

- Assisted in an Introduction to Artificial Intelligence course for over 50 students supporting attendance and Q&A.
- Conducted **PyTorch**-based labs on core deep learning architectures, including CNNs and Transformers.
- Guided hands-on implementation of deep learning models and graded assignments.

Teaching Assistant, Computer Architecture *Seoul, South Korea*

Sogang University *Mar 2025 – Jun 2025*

- Assisted in the overall progress of the Computer Architecture course.
- Supported 40+ students in understanding computer systems fundamentals.

Mentor, Parrot Data Science Club *Seoul, South Korea*

Sogang University *Mar 2025 – Jun 2025*

- Guided 5 junior members in data analysis projects and CNN-based computer vision projects.
- Organized internal Kaggle-style ML competitions and technical workshops.

Runner-up, Sogang AI Data Analysis Runnerthon *Seoul, South Korea*

Sogang University *Jan 20 – Feb 14, 2025*

- Built real estate price forecasting model in a team of 4.
- Secured 2nd place among 15 competing teams with XGBoost-based solution.

Teaching Assistant, English & Mathematics *Seoul, South Korea*

Megastudy Russel & Yesum Academy *Feb 2024 – Present*

- Tutored 30+ students in analytical problem-solving and critical thinking.
- Assisted in classroom management and lesson preparation for middle/high school students.

Satellite Operation Squad Leader *Daejeon, South Korea*

Republic of Korea Army *Jan 2022 – Jul 2023*

- Supported stable communication across different military branches by operating the Military Satellite Communication System.
- Demonstrated mission stability and rapid response capabilities in real-world combat readiness operations, ensuring uninterrupted communication services.
- As a Squad Leader, managed and led a team of 7 members, overseeing the maintenance, inspection, and operation of all satellite equipment, enhancing mission readiness.

Activities

Autonomous Taxi Design Project *Seoul, South Korea*

Sogang University *Jul 2025 – Aug 2025*

- Designed autonomous taxi systems, focusing on the integration of AI for navigation and safety protocols.
- Prioritized the development of cost-effective methodologies for sensor fusion and environmental perception in the design.

Member, Parrot Data Science Club *Seoul, South Korea*

Sogang University *Sep 2024 – Present*

- Active member in data science and AI study group.
- Regularly participated in projects involving advanced data analysis and deep learning frameworks.

2023 Military Personnel Software and AI Competency Enhancement Training Program *South Korea*

Republic of Korea Army *Jan 2023 – May 2023*

- Completed intensive training in software development and AI applications.
- Executed a weather forecasting project using real-world data and machine learning models.

English Training Program(R-EIP) *Seoul, South Korea*

Hankuk University of Foreign Studies (HUFS) *Oct 2021 – Dec 2021*

- Participated in university-hosted intensive English language program.
- Improved fluency in academic and technical English communication.

Member, English Conversation Club *Seoul, South Korea*

Shalla, Seoul University Student Union Club *2021*

- Engaged in weekly English conversation practice and cultural exchange.
- Developed confidence in real-time spoken English with peers.

Technical Skills

ML/DL Frameworks, PyTorch, TensorFlow, Hugging Face, LangChain, scikit-learn

Languages, Python, C/C++, SQL, R

Tools, Git, Linux, VS Code, Google Colab, MySQL, Jupyter Notebook, CLion, Notion

Data/Vision, Pandas, Numpy, Seaborn, OpenCV, Pillow, Cutmix

Languages

Korean, Native

English, Fluent — TOEFL iBT 5.0 / 6 (CEFR C1, 100 of 120, Feb 2026)

Japanese, Basic (Studying)