

Taecheon Hwang

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EDUCATION

Columbia University

B.S. in Computer Science; GPA: 3.98 / 4.33

New York, NY

Aug. 2025 – Present

Relevant Courses *Computer Science Theory, Programming Languages and Translators, Introduction to Databases, Projects in Computer Science, Operating Systems I, Theory ML Interaction, Natural Language Processing*

Purdue University

B.S. in Computer Science, Minor in Mathematics; GPA: 4.00 / 4.00

West Lafayette, IN

Aug. 2023 – May. 2025

Relevant Courses *Linear Algebra, Probability, Discrete Mathematics, Computer Architecture, Data Structures, Statistical Methods, Competitive Programming I & II, Foundations of Deep Learning, Data Mining & Machine Learning, Introduction to Artificial Intelligence*

EXPERIENCE

Research Assistant

Columbia University

Sep. 2025 – Present

New York, NY

- Working on fine-grained advantage computations for reinforcement learning to improve GRPO methodologies

Artificial Intelligence Research Intern

Asteromorph

May 2025 – Aug. 2025

Seoul, South Korea

- Worked with fine-tuning and hosting LLMs (>200B parameters) on multi-GPU servers using vLLM and llama.cpp
- Developed an LLM fine-tuning framework by writing kernel code with PyTorch, Unsloth, and Hugging Face
- Deployed a parallel LLM fine-tuning scheduler and metric dashboard using Ray, Grafana, Prometheus, and Docker

Teaching Assistant

Purdue University

Jan. 2025 – May. 2025

West Lafayette, IN

- Held office hours and lab sessions for students in Discrete Mathematics and Programming in C courses
- Reviewed and conducted problem solving sessions for discrete mathematics on first order logic, set theory, etc
- Answered students' questions during lab sessions on UNIX systems, file IO, dynamic memory allocation, etc

Research Assistant

Purdue University

Jan. 2024 – Dec. 2024

West Lafayette, IN

- Engineered demand forecasting pipeline integrating probability curves with LSTM encoding for enhanced accuracy
- Optimized inference storage by achieving a reduction of >99% compared to traditional deep learning models
- Conducted latent space analysis and illustrated composite encoding of demand features using LSTM models

Machine Learning Intern

Quantum Research Sciences

Sep. 2023 – Aug. 2024

West Lafayette, IN

- Employed ML algorithms and statistical techniques to deploy software for the United States Air Force
- Produced Monte Carlo simulations to test and tune quantum algorithms for inventory management
- Developed end-user interface for data analytics in quantum inventory management software

Student Researcher

Seoul Science High School

Mar. 2022 – Dec. 2022

Seoul, South Korea

- Explored enhancements in real-time landmark tracking algorithms using machine and deep learning
- Improved Google MediaPipe performance by reducing untracked frames by 91.7% through U-Net segmentation
- Designed a versatile multi-headed software solution adaptable to various hardware specifications

Research Assistant

Sungkyunkwan University

May 2021 – Dec. 2021

Seoul, South Korea

- Engaged with research team to boost open set recognition in ResNet models by 9%p via latent space manipulation
- Developed and deployed a remote automated testing and optimization framework for models using PyTorch
- Presented research findings at the Korean Science High School R&E Conference

Student Researcher

Seoul Science High School

Apr. 2020 – Jun. 2021

Seoul, South Korea

- Investigated topics on advertisement classification and recommendation using OCR and clustering algorithms
- Refined k-means clustering to enhance classification accuracy, adapting to the temporal dynamics of user interests
- Demonstrated algorithm adaptability to temporal features through rigorous testing and analysis

PROJECTS

Stack Rotation

May 2025 – Aug. 2025

- Developed full-rank fine-tuning LoRA methodology with PyTorch using stochastically sampled rotation matrices
- Achieved SOTA-comparable performance when compared to LoRA variants such as DoRA, VeRA, and HiRA
- Constructed parallel fine-tuning orchestrator using Ray, Grafana, Prometheus, and Docker

Rotationally Equivariant Spatio-temporal Prediction

Feb. 2025 – Apr. 2025

- Developed spatio-temporal predictive models with rotational equivariance to adapt to out-of-distribution inputs
- Constructed training infrastructure using PyTorch Lightning and distributed high-performance computing nodes
- Compared methods for equivariance using steerable wavelet filters, G-CNNs, and equivariant attention modules

Financial Anomaly Detection with Modified Benford's Law

Jan. 2025 – Mar. 2025

- Suggested novel alteration of Benford's Law applicable to stock return data based on the Student-Lévy process
- Proved algorithm utility with real-life stock data and demonstrated 60% improvement over conventional methods
- Utilized new algorithm to detect financial anomalies in stock returns based on fitted location-scale t-distributions

WUMT: Wavelet U-Net Motion Transformer

Jul. 2024 – Mar. 2025

- Investigated spatio-temporal encoding methods of videos using discrete wavelet transforms and NAFNet blocks
- Utilized 4D motion tensor computations and predictions with transformers for U-Net latent space operations
- Built training infrastructure with PyTorch Lightning and leveraged Docker and MLFlow for streamlined research

RL Wildfire Optimization

May 2024 – Dec. 2024

- Utilized Convolutional DQN models to optimize firefighting efforts and evacuation routes with wildfires
- Developed complex wildfire simulation incorporating population density, terrain, weather, and crowd dynamics
- Theorized dynamic custom action and state space utilizing one-hot encoding and action masks

Contextual-Diffusion

Feb. 2023 – Aug. 2023

- Improved cohesion and features of Stable Diffusion model output utilizing spacial context from LLMs
- Developed pipeline incorporating Mask-RCNN models as translation layers between LLMs and Stable Diffusion
- Generated and annotated image segmentation datasets for supervised learning of Mask-RCNN models

Minimax-based Animal Shogi AI

Mar. 2021 – Nov. 2021

- Programmed an Animal Shogi bot using a minimax algorithm with alpha-beta pruning in C++
- Implemented interactable game GUI and cross-language translation mechanism with Python
- Demonstrated bot with live play-testing at school festival to 350+ students and faculty

ACTIVITIES

Purdue Hackers Club Member

Purdue University

Jan. 2025 – May 2025

West Lafayette, IN

- Participated in weekly 'hack' sessions and developed projects involving full-stack web development.
- Developed website for course scheduling at Purdue with Next.js, MongoDB, and Python among team of 3.

Purdue IGDC Club Member

Purdue University

Jan. 2024 – May 2025

West Lafayette, IN

- Participated in various in-person game development sessions with other club members.
- Developed game with Unity centered around creating gravitational wells to induce fast-paced gameplay.
- Gave feedback on other games being developed and participated in play testing.

ICPC 2023 ECNA Regional Participant

Purdue University

Sep. 2023

West Lafayette, IN

- Ranked in the Top 20 in Purdue's ICPC participant selection contest
- Lead team of 3 in the ICPC East Central North America regional contest among 5 other Purdue ICPC teams
- Solved problems utilizing competitive programming techniques such as dynamic programming and backtracking

Hello World Hackathon Participant

Purdue University

Sep. 2023

West Lafayette, IN

- Led a team of 4 in a 24-hour hackathon driving project development and collaboration
- Built a software pipeline utilizing LLMs to deliver personalized dietary text feedback to users
- Built a full-stack web app with a React front-end and ExpressJS back-end integrating MongoDB RestAPIs

ML@Purdue Club Member

Purdue University

Mar. 2023 – May 2025

West Lafayette, IN

- Engaged in club discourse on AI and ML topics for research and software development.
- Participated in paper reading and workshops on various topics, such as transformers, GNNs, etc.

Compute Infrastructure Manager

Seoul Science High School

Nov. 2021 – Feb. 2022

Seoul, South Korea

- Allocated funding and purchased a multi-GPU cloud computing server for deep learning model training purposes.
- Managed and tested training infrastructure for research by setting up various software such as job managers.

Published Author on Neural Network Fundamentals

Barun Books Co.,Ltd

Sep. 2021 – Mar. 2022

Seoul, South Korea

- Authored a 160-page book on neural networks covering backpropagation, gradient descent, and parallelization
- Distributed to 13 retailers, selling 300+ copies in the first year
- Ranked as a top 4 entry in the "Weekly Top Releases" by the second-largest South Korean book retailer

Artificial Intelligence Lecturer

Seoul Science High School

May 2021 – Apr. 2023

Seoul, South Korea

- Presented 8 deep learning-focused lectures to an audience of 200+ students and faculty
- Delivered lectures on topics including linear algebra, conventional neural networks, and transformers
- Conducted 10 additional interdisciplinary volunteer lectures focused on mathematics and artificial intelligence

Artificial Intelligence Club President

Seoul Science High School

Mar. 2021 – Feb. 2023

Seoul, South Korea

- Authored 4 different entry exams on mathematical deep learning and essays on model selection
- Curated literature and project content with paper readings and specialized datasets
- Supervised and managed the acquisition of a multi-GPU deep learning server for club research and projects

HONORS & AWARDS

Dean's List

Columbia University, 2025

Purdue Office of Undergraduate Research Grant

Purdue University, 2024

\$ 500

Dean's List & Semester Honors

Purdue University, 2023 & 2024 & 2025

Excellence Award in the Gifted School Research Conference

Pohang University of Science & Technology, 2022

Top Award for R&E Research in Computer Science

Seoul Science High School, 2022

Azure AI Fundamentals Certification

Microsoft, 2022

Top Award for Independent Research on Computer Science

Seoul Science High School, 2021

TECHNICAL SKILLS

Languages & Frameworks: C/C++, Express.js, Flask, HTML/CSS, Java, JavaScript, Python, React, x86 Assembly

Dev & Research Tools: Docker, Git/GitHub, IntelliJ, LaTeX, MLfLow, Overleaf, PyCharm, Slurm, VS Code

Libraries: Keras, NumPy, OpenCV, Pandas, PyTorch, Scikit-learn, TensorFlow, Unsloth, trl, vLLM