Dae Yon Hwang

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EDUCATION

University of Toronto	Ph.D. in Electrical & Computer Engineering, **GPA**: 4.0/4.0	Nov 2022
Texas A&M University	Master of Science in Electrical Engineering, **GPA**: 4.0/4.0	May 2016
Hanyang University	B.S. in Electronic Engineering, **GPA**: 3.56/4.0 ***(Cum Laude)***	Feb 2014

WORK EXPERIENCE

Layer 6 AI, Trustworthy AI - Senior Research Machine Learning Scientist — May 2025 - Present

- **Build a Customer-Facing Chatbot for a Finance Application**
  - Developed RAG system with query rewriting to enhance customer interactions
  - Integrated a three-layer safeguard framework to mitigate jailbreak attempts and block unsafe content
  - Generated synthetic datasets to stress-test safeguards, achieving high safety performance

Amazon Science, Artificial General Intelligence - Applied Scientist II — Sep 2022 - Apr 2025

Amazon Science, Alexa Artificial Intelligence - Applied Scientist Intern — Sep 2021 - Dec 2021

- **Post-Training of Multimodal Foundation Models for General and Reasoning Applications**
  - Generated synthetic data with multi-step reasoning traces for post-training
  - Applied LLM-as-a-Judge techniques for data filtering and quality assurance
  - Conducted pre-training, instruction fine-tuning, and preference optimization with a focus on domain-specific knowledge and reasoning tasks
  - Utilized chain-of-thought prompting for reliable and explainable model outputs
  - Contributed to the launch of Amazon Nova and improved performance to achieve higher leaderboard ranking
- **Build a Recommendation System with Foundation Models**
  - Customized foundation model with pre-training, instruction fine-tuning, and preference optimization
  - Adapted recommendation system for online environments with continuous updates based on user feedback
  - Integrated RAG to ensure accurate and up-to-date recommendation without retraining
  - Optimized prompts with chain-of-thoughts and proposed novel evaluation metrics for online assessments
  - Successfully deployed a product recommendation system following positive results from online testing
- **Develop an Information Retrieval Model for Alexa Devices**
  - Generated diverse synthetic data using LLM-based methods and fine-tuned models for zero-shot scenario
  - Developed a novel GAN-based augmentation approach to produce high quality synthetic data
  - Customized traditional retrieval systems, such as ElasticSearch, for specific usage scenarios
  - Advanced the representation learning to develop transferrable and generalizable data representation
  - Designed a novel dimensionality reduction to reduce computational costs and improve the generalizability
  - Experienced the end-to-end implementation and deployment of the model in production

University of Toronto, Biometrics Security Lab - Research Assistant — Sep 2018 - Sep 2022

- **Develop User Verification System using Heart Signal with CNN, RNN, GAN and VAE**
  - Applied various signal processing techniques in both time and frequency domain to build input dataset
  - Found time-stable and unique features from heart signals to establish the user verification system
  - Compared conventional machine learning model with deep learning model to find the best suitable one
  - Successfully developed the robust system against the adversarial attacks and security threats
  - Collected the physiological signals from 170 people to build a dataset (largest public dataset)
- **Investigate Human Activity Recognition with Wearable Device**
  - Used inertial and physiological sensors in wearable device to build the robust activity recognition system
  - Built the hierarchical deep learning model with multimodalities to recognize the diverse activities

Hyundai MOBIS, DAS Control Engineering - Research Engineer Jul 2016 - Feb 2018

- **Test Recognition Rate and Design Driver Attention Warning Logic in Multi-Function Camera**
  - Assessed the recognition rate of camera in diverse situations such as downtown, local road, and highway
  - Designed and optimized the flow of logic for improving the quality of function
  - Drove a test car in problematic conditions to resolve the issues of a new vehicles

Texas A&M University, Laboratory for Optical Diagnosis and Imaging - Research Assistant Sep 2014 - May 2016

- **Analyze Biomedical Image Data by Image Processing and Machine Learning Techniques**
  - Implemented deconvolution and various filters to enhance the image quality
  - Experimented feature selection methods to find out useful features in huge datasets
  - Optimized diverse classifiers (mainly, SVM with Gaussian kernel) to obtain lower error rate

RECENT PUBLICATIONS (Full list covered in Google Scholar)

The Amazon Nova Family of Models: Technical Report and Model Card
Amazon Artificial General Intelligence (Contributor: DY Hwang) Dec 2024

Empirical Methods in Natural Language Processing (EMNLP) 2024
Link, Synthesize, Retrieve: Universal Document Linking for Zero-Shot Information Retrieval Nov 2024
DY Hwang, B Taha, H Pande, Y Nechaev

The 4th Workshop on Multilingual Representation Learning 2024 @ EMNLP 2024
Unsupervised Text Representation Learning via Instruction-Tuning for Zero-Shot Dense Retrieval Nov 2024
Q Zeng, Z Qiu, DY Hwang, X He, WM. Campbell

International Conference on Natural Language Generation (INLG) 2023
GAN-LM: Generative Adversarial Network using Language Models for Downstream Applications Sep 2023
DY Hwang, Y Nechaev, CD Lichy, R Zhang

Association for Computational Linguistics (ACL) 2023
EmbedTextNet: Dimension Reduction with Weighted Reconstruction and Correlation Losses for Efficient Text Embedding Jul 2023
DY Hwang, B Taha, Y Nechaev

2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
Eeg Emotion Recognition Via Ensemble Learning Representations Jun 2023
B Taha, DY Hwang, D Hatzinakos

IEEE Journal of Selected Topics in Signal Processing
EyeDrive: A Deep Learning Model for Continuous Driver Authentication Jan 2023
B Taha, SNA Seha, DY Hwang, D Hatzinakos

2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
Hierarchical Deep Learning Model with Inertial and Physiological Sensors Fusion for Wearable-based Human Activity Recognition May 2022
DY Hwang, PC Ng, Y Yu, Y Wang, P Spachos, D Hatzinakos, KN. Plataniotis

Journal of Signal Processing Systems (Invited paper)
A New Score Level Fusion Approach for Stable User Verification System Using the PPG Signal Mar 2022
DY Hwang, B Taha, D Hatzinakos

IEEE Transactions on Information, Forensics and Security
PBGAN: Learning PPG Representations from GAN for Time-Stable and Unique Verification System Oct 2021
DY Hwang, B Taha, D Hatzinakos

2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
Variation-Stable Fusion for PPG-based Biometric System Jun 2021
DY Hwang, B Taha, D Hatzinakos

IEEE Transactions on Information, Forensics and Security

Evaluation of the Time Stability and Uniqueness in PPG based Biometric System Jul 2020
DY Hwang, B Taha, DS Lee, D Hatzinakos

HONORS

SGS Conference Grant - Outstanding student who do conference presentation May 2019
Hanyang International Scholarship - Outstanding student who is studying abroad Sep 2014 - May 2016
Full National Science & Engineering Scholarship - Outstanding engineering student: 5 times Sep 2009 - Sep 2013
Full Grade Scholarship - Top student in major (Rank in 1/215) Mar 2009

PROFESSIONAL SERVICE

Reviewer - EMNLP 2023-2025**,** ACL 2023-2025, ACL Rolling Review, RepL4NLP @ ACL 2024, SyntheticData4ML @ NeurIPS 2023, IEEE Journal of Biomedical and Health Informatics, IEEE Transactions on Information, Forensics and Security

Program Committee - EMNLP 2023 Industry Track

Talks - Career Guidance Seminar @ Incheon National University (Dec 2023), GAN with LM @ ML for Healthcare Roundtable in Amazon (Oct 2023)

SKILLS

Technical Skills - C, C++, Python (including TensorFlow, PyTorch), MATLAB (including Stateflow), AWS
Technical Areas - Signal Processing, Computer Vision, Natural Language Processing, Machine Learning, Deep Learning
Foreign Language - Native in Korean, Fluent in English

REFERRERS

At Amazon - Collaborated closely with **Sr. Applied Scientist Harshit Pande** harshit.pande@mail.mcgill.ca
At Amazon - Collaborated closely with **Sr. Applied Scientist Yaroslav Nechaev** remper@me.com
During Ph.D. degree - Supervised by **Prof. Dimitrios Hatzinakos** dimitris@comm.utoronto.ca
During Master degree - Supervised by **Prof. Javier A. Jo** javierjo@ou.edu