KK Thuwajit

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Education

University of Wisconsin Madison — Madison, WI

Bachelor of Science in Computer Science and Mathematics, GPA 4.00 Dean's List — *Aug 2022 – Dec 2025*

- Selected courses: Operating systems, Deep learning in computer vision, Big data system, Stochastic processes

Awards

Hilldale Fellowship — 2025

- Awarded $4000 to 200 juniors/seniors with exceptional research potential

Sophomore Research Fellowship — 2023

- Awarded $2500 to sophomores with novel research topics alongside faculty

Experiences

Machine Learning Engineer Intern (Return Offer) — May – Aug 2024, May – Present

American Family Insurance — *Madison, WI*

- **Built knowledge graph Q&A system** for querying long (several hundred pages) interleaved insurance demands
- **Reduced document splitting errors by 50% and improved processing time** through unified prompting and an automated prompt optimization pipeline
- **Enabled complex relational queries** by augmenting the demand package processing pipeline with a *two-stage graph RAG* using Cypher generation and vectorstore retrieval.
- **Achieved 95% F1 score extracting structured entities from unstructured invoices** using LLM-based post-processing on OCR output

Math Research Fellow — Feb 2025 – Present

Madison Experimental Mathematics Lab — *Madison, WI*

- **Reduced ENKF computational complexity** from cubic to quadratic for high-dimensional data while maintaining accuracy using *PPO reinforcement learning agents*
- **Generalized to unseen systems** via *multi-agent ensemble* trained on different parameterized systems and a *mixture-of-experts-like* adaptor

Brain Imaging Research Assistant — May 2023 – Present

Waisman Center, University of Wisconsin Madison — *Madison, WI*

- **Accelerated MRI scan time from 9 to 2 minutes** using novel *denoising algorithm*
- **Enforced quantitative T1 value consistency** via *dual U-Net regularizer* paradigm
- **Developing diffeomorphic registration** to replace ANTs' slow optimization with *group-constrained deep learning*

Biosignal Research Assistant — May 2020 – May 2023

Information Science and Technology, VISTEC — *Rayong, Thailand*

- **Achieved 95% accuracy seizure detection** from EEG signals using *multi-scale CNN*
- **Enabled real-time respiratory monitoring** via wearable devices using *technique adapted from above*

Machine Learning Engineer Intern — Oct 2021 – Feb 2022

NXPO (Higher Education Science Research Policy Council) — *Bangkok, Thailand*

- **Identified emerging scientific fields** from 1M+ publications for research funding using *word2vec + contrastive learning*
- **Derived generalized logistic regression model** for publication emergence patterns over time

Publications

ApSense: Data-driven algorithm in PPG-based sleep apnea sensing — 2024

- Co-author, IEEE Internet of Things Journal

Accelerated Low-rank MPnRAGE Denoising and qT1 Estimation via Jointly Trained U-Net Regularizers — 2024

- First author, ISMRM Conference

RRWaveNet: A compact end-to-end multiscale residual CNN for robust PPG respiratory rate estimation — 2023

- Co-corresponding author, IEEE Internet of Things Journal

EEGWaveNet: Multiscale CNN-based spatiotemporal feature extraction for EEG seizure detection — 2021

- First author, IEEE Transactions on Industrial Informatics

Projects

Home Server | *Docker, Tailscale, Cloudflared* — 2025

- **Hosted containerized services** such as an LLM assistant (llama.cpp and openwebui), reverse proxy (caddy), and version control (syncthing) on a personal server

Textual Exclusion | *Python, PyTorch, HuggingFace, Diffusers* — 2023

- **Developed textual exclusion**, a personalized text-to-image generation technique via *denoising diffusion models* as final project for CS839 Generative Computer Vision, **outperforming Google's DreamBooth on prompt-adherence**

Unofficial Implementation of UNIT-DDPM | *Python, PyTorch, NumPy, MatPlotLib* — 2022

- **Replicated the paper's results** on unpaired image-to-image translation via *denoising diffusion models*