Md Halim Mondol

3930 Jackson St, Raleigh, NC 27607 | mmondol@ncsu.edu | +1-919-600-2438

LinkedIn | GitHub | Google Scholar | Website

Research Interests

Large Language Models (LLMs), Generative AI, Deep Learning (DL), Power Electronics

Education

- **North Carolina State University**, Raleigh, NC
  - Ph.D. in Electrical Engineering — August 2022 - June 2027 (Expected)
    Advisor: Edgar Lobaton
  - MS in Electrical Engineering — August 2022 - May 2024

- **Rajshahi University of Engineering and Technology**, Dhaka, Bangladesh
  - B.Sc. in Electronics and Telecommunication Engineering — January 2016 - March 2021

Technical Skills

Programming: Python, C/C++, MATLAB, HTML, Assembly, Bash, Shell
Frameworks/Libraries: PyTorch, FAISS, Scikit-learn, Pandas, Kaggle, LangChain, Hugging Face Transformers
AI/ML Domains: LLMs, Generative AI, Transformer, NLP, PINNs, RAG Systems, Prompt Engineering
Cloud/Tools: GCP, AWS SageMaker, Docker, Git/GitHub, Streamlit, SLURM, Linux, REST APIs

Work Experience

- **Graduate Research Assistant**, ARoS Lab, NC State University — Raleigh, NC [May 2024 – Present]
  - Leading project on *Phosphorus Knowledge Hub Development using Fine-tuned LLMs*: generating synthetic LaTeX-based papers with OpenAI API, building a RAG system with conversation memory in Streamlit, and preparing for fine-tuning on real scientific papers.
  - Designed and trained three models (Pure VAE, Transformer-VAE, LSTM-VAE) on ZINC15 dataset for SMILES $\rightarrow$ Latent $\rightarrow$ Reconstructed SMILES; fine-tuning on VOC-Dye data with FAISS-based latent similarity mapping using GCP A100 GPUs.
  - Built Physics-Informed Neural Network (PINN) to predict SNR coverage of wireless networks; applied CNNs for gait classification (walking, running, stepping up/down).

- **Graduate Teaching Assistant**, NC State University — Raleigh, NC [Jan 2024 – May 2024]
  - Teaching assistant for Deep Learning course: graded neural network homework, managed GitHub Classrooms, and set up/monitored an NSF-supported JupyterHub server.
  - Installed PyTorch Docker images, prepared student environments, and troubleshot server-side errors.

- **Research Intern**, ABB Corporate Research — Raleigh, NC [May 2023 – Aug 2023]
  - Designed energy harvesting circuits using current transformers for onboard measurement systems.
  - Developed real-time motor health monitoring system with DAQ device and PCB design in Altium.

Projects

- **Phosphorus Knowledge Hub:** Streamlit-based RAG system with conversation memory; added guardrails for safe and reliable LLM responses.
- **VOC-Dye Reactivity Prediction:** LSTM-VAE-Transformer model with FAISS-based latent similarity search for molecular reactivity analysis.

Publications

- **Mondol, M.H.**, Wei, Q., Lobaton, E. Hybrid LSTM–Transformer–VAE (LTVAE) for SMILES Reconstruction. *Under Review*, JCIM, 2025.
- Jamalzadegan, S., Penumudy, A., Mativenga, B., **Mondol, M.H.**, et al. AI-Powered Colorimetric Sensing with LLMs. *AIChE Annual Meeting*, 2025.

Certifications & Courseworks

Prompt Engineering (Coursera); Build Your First Robot in Isaac Sim (NVIDIA DLI); Physics-Informed Neural Networks, Deep Learning, Computer Vision, Image Processing, Algorithm Development (NC State); Intro to Git and GitHub (Microsoft); Software Engineering Principles, Efficient Python, Intro/Intermediate Python (DataCamp)