Himon Thakur

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Research Topics

multi-agent planning and systems, reinforcement learning, multilingual alignment, low-resource and underrepresented languages, on-policy self-distillation, explainability and interpretability, mixture-of-experts, speculative decoding, post-transformer architectures, multimodal and small language models, metacognition and meta-learning, emergent behaviors, continuous learning

Education

• **M.S** in Computer Science | University of Colorado Colorado Springs (UCCS) Jan 2024 - Dec 2026 (Expected)
- **Thesis:** Individual & Ensemble Metacognition with Multi-Agent Reinforcement Learning

• **B.S.** in Electrical, Electronic and Comm. Engineering | Military Institute of Science & Tech (MIST) Jan 2017 - Jun 2021
- **Thesis:** Modeling and Analysis of Linear and Non-Linear Image Enhancement Techniques at Spatial Domain Using FPGA

Publications & Submissions

1. ***Thakur H***, Kamana L, Kalita J; "*Training-Free English-drift Suppression for Low-Resource & Underrepresented Languages through Multilingual Representation Engineering*"; [**Under review at AAAI-27**]
2. ***Thakur H***, Khan R, Paul P, Kalita J; "*Logit Standardization for Calibrated LLM Knowledge Distillation*"; [**Under review at AAAI-27**]
3. Mersha M, Abay T, ***Thakur H***, Acharya A, Katiwada H, Hailu A, Kalita J; "*Multi-Agent Systems: A Survey of Explainability, Failure Analysis, Debugging, Recovery, and Future Directions*"; [**Under review at Knowledge-Based Systems**]
4. ***Thakur H***, Moin A; *"'ENERGY STAR' LLM-Enabled Software Engineering Tools"*; CAIN 2026 - 5th International Conference on AI Engineering - Software Engineering for AI (ICSE);
5. Rivas CJ, ***Thakur H***, Siavash N, Moin A; *A Systematic Literature Review on Quantum Natural Language Processing (QNLP)*; Recent Advances in Natural Language Processing. 2025; 104;
6. Fingleton Z, ***Thakur H***, Siavash N, Moin A; *Large Language Models for Software Verification and Validation*; Recent Advances in Natural Language Processing. 2025; 92;
7. Jibon FA, Miraz MH, Tasbir A, Jin HH, Siddiqui DH Sakib M, Tasbir A, Nishar NH, ***Thakur H***, Khandakar MU; *Graph Attention Network and Radial Basis Function Neural Network-Based Hybrid Framework for Epileptic Seizure Detection from EEG Signal*; Journal of Autonomous Intelligence. 2023; 7(3);
8. Jibon FA, Khandaker MU, Miraz MH, ***Thakur H***, Rabby F, Tamam N, Sulieman A, Itas YS, Osman H; *Cancerous and Non-Cancerous Brain MRI Classification Method Based on Convolutional Neural Network and Log-Polar Transformation*; Healthcare. 2022; 10(9):1801;

Technical Skills

Languages: Python, C, C++, Java, MATLAB, Bash, Arduino, SQL, JavaSript, Ruby
Libraries and Frameworks: LangGraph, LangChain, PettingZoo, TensorFlow, PyTorch, Anaconda, Cirq, Qiskit
Platforms and Tools: UNIX/Linux, AWS, Google Cloud, Anaconda, Vagrant, Ansible, Docker, Git, LaTeX
Hardware: Arduino Microcontroller, Raspberry Pi, NodeMCU Boards, FPGA (Xilinx, Altera)

Professional Experience

• **Student Staff** | *Department of Computer Science, UCCS* May 2024 - Ongoing
- Handle sensitive administrative tasks concerning students and faculties, improving operational efficiency, and ensuring smooth academic operations
- Worked on student admission and enrollment, organized departmental events, developed and maintained student records database, streamlining information access and increasing student engagement, etc.

• **Graduate Mentor** | *NSF Research Experiences for Undergraduates (REU) Site, UCCS* May 2026 - August 2026
- Mentor and co-supervisor for student research projects on multi-agents systems
- Gave research talks and acted as session chair during student presentations
- Coauthored multiple high-impact research papers and submitted them in reputable venues

• **Graduate Research Assistant (GRA)** | *QAS Lab, UCCS* Apr 2025 - Aug 2025
- Contributed to the **Q-Dev** Project on universal quantum code transpilation.
- Built hybrid quantum versions of various machine learning models for NLP tasks such as Parts-of-Speech (PoS) Tagging, Named-Entity Recognition (NER), etc. to match or outperform classical classification accuracy
- Worked on other projects including Energy-Efficient AI, automated software Verification & Validation (V&V), etc., which led to three submitted journal and conference papers

• **Math Tutor** | *Pre-Collegiate Support and Success Center, UCCS* Aug 2025 - Apr 2026
- Teaching topics include linear algebra, pre-calculus, calculus, geometry, trigonometry, etc.
- Facilitate virtual group study sessions and assist individual students
- Support student learning and assist them in gaining effective study skills and maximizing their potential for academic success

• **Teaching Assistant (TA)** | *Department of Computer Science, UCCS* Aug 2024 - Aug 2025
- TA for courses such as Artificial Intelligence, UNIX Programming, Software Engineering, Python Programming, etc.
- Hold regular office hours for providing support to undergraduate and graduate students
- Lead regular, lab, and review sessions over the semester

Research & Project Experience

• Benchmarking MAMBA-3 as a Joint Embedding Predictive Architecture (JEPA) Predictor Feb 2026 - Jul 2026
- Evaluating the MAMBA and JEPA architectures for subquadratic world models
- Uses a unique two-stage attention mechanism for refined representation learning
- Achieves competitive performance on multiple text classification benchmarks (SST-2, IMDB, AG News, MNLI)

• Hierarchical Multi-Agent Framework for Code Inspection and Debugging Aug 2025 - Dec 2025
- Hierarchical Multi-agent architecture for integrating complex logic and interdependencies in a codebase
- Used LangGraph for the agent structure and a Retrieval-Augmented Generation (RAG) knowledge base to reduce logical errors and hallucination during agentic software debugging and patching
- Uncertainty-aware recursive self-correction achieved a pass@1 rate of **83.60%**, average CodeBleu score increase of **22.1%** and average uncertainty decrease of **56.67%** on the MBPP-Pro dataset

• Transformers for Cognitive Workload Assessment
- Developed transformer models for a multi-class EEG data analysis on the N-Back portion of the COG-BCI dataset
- Achieved **72.4±9.2%** mean accuracy and **71.1±10.5%** mean F1-score with Leave-One-Out Cross-Validation across 29 participants

• Plant Disease Detection and Classification Nov 2022 - Jan 2023
- Curated and annotated a custom dataset of 5000+ images from tea gardens in Sylhet, Bangladesh, ensuring diverse representation of disease types and gravity
- Developed a high-accuracy disease detection system for 5 classes of tea leaf diseases using YOLOv7 architecture
- Achieved **95.4%** classification accuracy with potential for significant economic impact

Accolades

- **Power and Energy Hackathon** by The Ministry of Power, Energy and Mineral Resources | *Champion* 2018
  – Project Title: An IoT-based Prepaid Electric Meter Payment Solution for the Current Electric Grid of Bangladesh.
- **Higher Secondary School Certificate Examination** | *Merit Scholarship* 2016
- **Bangladesh Math Olympiad** | *Runner-Up* 2011

Notable Extra-curricular Involvements

• MIST Robotics Club
- **Vice President (2020 - 2021):** Organized *Tri-Robo Cup*, a one-week virtual robotics competition during the pandemic. Instructor for regular classes on robotics and programming.
- **Executive Director (2019 - 2020):** Organized *Robolution*, the biggest annual robotics competition in Bangladesh. Instructor for regular classes on robotics and programming.

• IEEE MIST Student Branch
- **General Secretary (2020 - 2021):** Organized *An Interactive Session on Satellite Navigation and Radar Engineering*.
- **Executive Director (2019 - 2020):** Organizer and instructor of a 3-week crash course on graphics design.
- **Publication and Design Supervisor (2018 - 2019):** Organizer for the *4th International Conference on Electrical Engineering and Information & Communication Technology (iCEEiCT-2018)*