Md Zahid Hasan

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Objective

To leverage expertise in AI and conduct collaborative research to advance AI-driven innovative solutions for transportation, public safety, healthcare and agriculture leveraging foundational AI models & Machine Learning

Credential Summary

- Enrolled in a PhD and working as a Research Assistant, focusing on Machine Learning and Computer Vision at the Self-aware Complex System Lab at Iowa State University since Spring 2021
- Earned Master's degree in Electrical Engineering at Iowa State University in Fall 2024 semester
- Strong interest in Deep Learning, Foundation models & AI with awareness of the recent academic advancements
- 4+ years of deep expertise in implementing ML algorithms in PyTorch, TensorFlow & AWS; extensive experience with VLM finetuning, ViT, transformer-based models, large-scale datasets, geospatial data and Generative AI models
- Published research work in the Top-ranked Transportation journal (*IEEE Transaction on Intelligent Transportation Systems*) and the leading flagship journal of Alzheimer's research (*Alzheimer's & Dementia*)
- Presented and co-authored in Top-tier AI and Autonomous Vehicle conferences (*NeurIPS, IEEE IAVVC, ICCPS*)
- Served as a reviewer in highly reputed AI in Engineering, Machine Learning, Transportation & Digital Health journals

Education

Doctor of Philosophy (Ph.D.) January 2021 - Present
Iowa State University, Major: Electrical Engineering, Minor: Computer Science Ames, IA
GPA: 3.8/4.0, Focus Area: ML & AI, Advisor: Soumik Sarkar & Baskar Ganapathysubramanian

Master of Engineering (M.Eng) January 2023 - August 2024
Iowa State University, Major: Electrical Engineering Ames, IA
GPA: 3.8/4.0, Focus Area: ML & AI, Advisor: Soumik Sarkar & Baskar Ganapathysubramanian

Bachelor of Science (B.S.) July 2014 - October 2018
Bangladesh University of Engineering and Technology Dhaka, Bangladesh
Major: Electrical and Electronic Engineering, GPA: 3.5/4.0

Research Experience & Employment

Machine Learning Intern May 2025 – August 2025
Advanced Learning and Analytics Team, Raytheon Technologies East Hartford, CT

- Developing Multi-Modal LLM reasoning models for scientific discovery & working on LLM Agent-based system
- Gaining experience in industry-standard LLMs and broad areas of AI/ML applications in aerospace & defense

Machine Learning Research Assistant June 2021 – May 2025
Self-aware Complex System Lab, REACTOR Lab, Iowa State University Ames, IA

- Developed the largest biodiversity dataset with 163 million image samples of different species to advance AI research in biodiversity and agriculture, addressing the global challenges of food security (NSF & USDA project)
- Designed and implemented RL-guided frameworks to generate edge cases for vehicle dynamics and control, enhancing robustness in autonomous systems under extreme conditions.(*IEEE IAVVC 2024*, NSF-funded)
- Created a digital biomarker tool to analyze driving patterns in diverse roadways for cognitive health monitoring and dementia risk assessment, paving the way for using vehicles as diagnostic tools (NIH & NIA project)
- Expanded an AI framework to analyze distracted driving activity from naturalistic driving video while reducing reliance on extensive data and training compute (FHWA project at Exploratory Advanced Research Program)
- Developed skills in Computer Vision, AI Foundation models, LLM, VLMs and so on.
- Collaborated with interdepartmental and interdisciplinary teams of students, scientists and faculties from the University of Nebraska Medical Center, Syracuse University, University of Arizona and New York University

Signal Processing Teaching Assistant January 2021 – May 2021
Department of Electrical and Computer Engineering, Iowa State University Ames, IA

- Graded homework assignments, final exams and projects for 40 undergraduate students
- Conducted Lab on MATLAB to build models and develop analog and digital communication circuits
- Led weekly recitation sessions on fundamental electronic and optical properties of semiconductors and applications

Research Interest

- Applied Machine Learning & Generative AI
- Multimodal Learning & Vision Language Models
- GenAI-based multi-agent workflows
- Optimized finetuning of AI Foundation models & Performant models
- Robustness & Edge-case generation for AI Foundational models

Publications

- **Hasan, M. Z.**, Chen, J., Wang, J., Rahman, M. S., Joshi, A., Velipasalar, S., Hegde, C., Sharma, A., Sarkar, S. "Vision-Language Models Can Identify Distracted Driver Behavior From Naturalistic Videos," *IEEE Transactions on Intelligent Transportation Systems*, vol. 25, no. 9, pp. 11602-11616, Sept. 2024. DOI: 10.1109/TITS.2024.3381175.
- **Hasan, M. Z.**, Basulto-Elias, G., Tan, R. K. L., Chang, J. H., Sarkar, S., Sharma, A., Hallmark, S., Rizzo, M., Merickel, J. "Roadway Weather Challenges Illuminate Real-World Driving Biomarkers of Dementia Risk," *Alzheimer's & Dementia*, 19, e075742. DOI: 10.1002/alz.075742.
- **Hasan, M. Z.**, Joshi, A., Rahman, M., Venkatachalapathy, A., Sharma, A., Hegde, C., Sarkar, S., "DriveCLIP: Zero-shot transfer for distracted driving activity understanding using CLIP," *36th Conference on Neural Information Processing Systems (**NeurIPS 2022**) Machine Learning for Autonomous Driving Workshop*, New Orleans, LA, 2022.
- **Hasan, M. Z.**, Basulto-Elias, G., Hallmark, S., Chang, J., Sharma, A., Dawson, J., Sarkar, S. and Rizzo, M. "Classifying Cognitive Decline in Older Drivers from Behavior on Adverse Roads Detected Using Computer Vision," *Journal of Transportation Technologies*, 15, 135-154, 2025. DOI: 10.4236/jtts.2025.151008.
- Yang, C., Feuer, B., Jubery, Z., Deng, Z. K., Nakkab, A., **Hasan, M. Z.**, Chiranjeevi, S., Marshall, K., Baishnab, N., Singh, A. K., Singh, A., Sarkar, S., Merchant, N., Hegde, C., Ganapathysubramanian, B., "BioTrove: A Large Curated Image Dataset Enabling AI for Biodiversity," *38th Conference on Neural Information Processing Systems (**NeurIPS 2024**) Datasets and Benchmarks Track*, Vancouver, BC, Canada, 2024. (**Top-3% Spotlight paper**)
- Yang, H. J., Beck, J., **Hasan, M. Z.**, Beyazit, E., Chakraborty, S., Wongpiromsarn, T., Sarkar, S., "GENESIS-RL: Generating Natural Edge-Cases with Systematic Integration of Safety Considerations and Reinforcement Learning," *2024 IEEE International Automated Vehicle Validation Conference (**IAVVC 2024**)*, Pittsburgh, PA, 2024.
- Waite, J. R., **Hasan, M. Z.**, Liu, Q., Jiang, Z., Hegde, C., Sarkar, S., "RLS3: RL-Based Synthetic Sample Selection to Enhance Spatial Reasoning in Vision-Language Models for Indoor Autonomous Perception," *16th ACM/IEEE International Conference on Cyber-Physical Systems (**ICCPS 2025**)*, Irvine, CA, May 6-9, 2025.
- Jiang, Z., **Hasan, M. Z.**, Balu, A., Waite, J. R., Huang, G., Sarkar, S."FUSE: First-Order and Second-Order Unified SynthEsis in Stochastic Optimization," *IEEE Conference on Artificial Intelligence*, Santa Clara, CA, May 5-7, 2025.

Grants & Funding Sources

- **U.S. Department of Agriculture (USDA)** - Award No. 2021-67021-35329
- **National Science Foundation (NSF)** - CPS Frontier Grant CNS-1954556, CNS-1845969 and CNS-2141153
- **National Institutes of Health (NIH) & National Institute on Aging (NIA)** - Award No. 5R01AG017177
- **Federal Highway Administration (FHWA)** - EAR Program Award No. 693JJ31950022

Review Experience

- Served as a reviewer at Pattern Recognition (Impact factor 7.5)
- Served as a reviewer at Engineering Applications of Artificial Intelligence (Impact factor 7.5)
- Served as a reviewer at IEEE Transactions on Intelligent Transportation Systems (Impact factor 7.9)
- Served as a reviewer at Transportation Research Part D: Transport and Environment (Impact factor 7.4)
- Served as a reviewer at Computers and Electrical Engineering (Impact factor 4.0)
- Served as a reviewer at Digital Health (Impact factor 2.9)

Conference Experience

- **Co-authored in Spotlight paper (Top-3%)** 38th Conference on Neural Information Processing Systems (NeurIPS 2024), Vancouver, BC, Canada, (2024)
- **Oral Presentation** 2025 IEEE Conference on Artificial Intelligence (IEEE CAI), Santa Clara, CA
- **Poster Presentation** 2025 NSF Cyber-Physical Systems Principal Investigators Meeting, Nashville, TN
- **Poster Presentation** 2025 Iowa State Translational AI Center Conference (TrAC Day), Ames, IA
- **Poster Presentation** 6th Midwest Machine Learning Symposium (MMLS 2025), Chicago, IL
- **Poster Presentation** 36th Conference on Neural Information Processing Systems (NeurIPS 2022), New Orleans, LA

Invited Talks

- "An overview of Vision-Language models." at Translational AI Center (TrAC), Department of Mechanical Engineering, Iowa State University, Ames, IA (2022).
- "When and why vision-language models behave like bags-of-words, and what to do about it?" at Student Journal Club: Translational AI Center (TrAC), Department of Mechanical Engineering, Iowa State University, Ames, IA (2023)

License & Certificate

- Collaborative Institutional Training Initiative (CITI) Biomedical Research, University of Nebraska Medical Center
- Collaborative Institutional Training Initiative (CITI) RCR Basic Course, Iowa State University
- Fundamentals of Deep Learning for Multi GPUs (2022), NVIDIA
- Machine Learning and AI Foundations: Recommendations (2020), LinkedIn Learning
- Artificial Intelligence Foundations: Neural Networks (2020), LinkedIn Learning

Academic Award

- Iowa State Graduate and Professional Student Senate Leadership Award (Spring 2025)
- IEEE Computational Intelligence Society travel award for the IEEE CAI conference (Spring 2025)
- Iowa State Professional Advancement Grants (PAG) award for conference travel (Spring 2025)
- Iowa State ECpE Professional Development Support (ECpE PDS) Award (Spring 2025)
- Iowa State College of Engineering Tuition award for Graduate Assistant (Spring 2021 – Spring 2025)
- Iowa State College of Engineering Technology Award for Graduate Assistant (Spring 2021 – Spring 2025)

Technical Skills

Programming Languages	Python, C/C++, MATLAB, R
AI and ML Frameworks	PyTorch, TensorFlow, Transformers, Multimodal AI models, VLM, LLM, MLLM
VLM Expertise	CLIP, BLIP, SigLip, LlaVa, GPT-4V, Qwen 2.5 VL, PaliGemma, FastVLM
Data Library	Tableau, PostgreSQL, Matplotlib, Numpy, Pandas, AWS S3, HPC, HuggingFace
Software and Tools	OpenCV, Scikit-learn, Amazon AWS, SageMaker, CUDA, LangChain, Ollama
Platforms	Microsoft Office, macOS, iOS, Unix/Linux, GitHub, Azure, LaTeX, VScode
Others (Learning)	Multi-agent AI system, MCP, A2A communication system, LangGraph, VLA

Leadership & Service Experience

Assistant Secretary January 2024 – Present
Graduate Organization of Electrical and Computer Engineering (GOECpE), ISU Ames, IA
- Fostered social interactions and assisted in developing professional skillsets of the graduate students
- Organized a fundraising initiative for a student engagement event hosted by Iowa State Student Engagement
- Served as one of the program chairs for the IBM Qiskit Fall Fest 2024 event held at Iowa State University

Ambassador August 2024 – Present
Cultural Ambassador Program (CAP), ISU Ames, IA
- Facilitated cross-cultural exchange by pairing with students from diverse backgrounds and interests
- Developed interpersonal and communication skills through multicultural activities and discussions

Senator August 2024 – Present
Graduate and Professional Student Senate (GPSS), ISU Ames, IA
- Represented the graduate and professional student body as a whole on the Student Government
- Developed and disseminated ideas for the improvement of graduate and professional education at Iowa State

Student Member January 2021 – December 2021
IEEE-Eta Kappa Nu Honor Society: Nu Chapter (IEEE-HKN), ISU Ames, IA
- Conducted helproom sessions to support undergraduate students in their academic challenges
- Led weekly discussions to foster a collaborative learning environment

Extra-curricular Involvement

- Organized and volunteered for the IBM Qiskit Fall Fest 2024 event for GOECpE, ISU
- Assisted in organizing the IEEE-HKN Fall 2021 induction program at Iowa State
- Student member at IEEE, IEEE Computational Intelligence Society & IEEE Young Professionals Society
- Engaged in student outreach and mentoring programs at Bangladesh Students Association (BSA), ISU
- Worked as Cultural Ambassador at the social events of the International Students and Scholars Office (ISSO), ISU
- Involved in blood donation to support local hospitals and emergency response needs for American Red Cross Iowa