Md Zahid Hasan

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Objective

To contribute to the field of AI in Transportation Industry and conduct collaborative research to advance AI-driven solutions for public safety, healthcare and agriculture leveraging foundational AI frameworks.

Credential Summary

- Enrolled in the PhD program at Iowa State University and working as a Graduate Research Assistant focusing on Machine Learning and Computer Vision at the Self-aware Complex System Lab (SCS Lab) from Spring 2021
- Graduated with a Master's degree in Electrical Engineering from Iowa State University in August 2024
- Completed and co-authored five manuscripts for USDA-NIFA, NSF, NIH and FHWA-funded research projects
- Co-led the development of the largest biodiversity dataset to advance AI in biodiversity, agriculture and environment which was featured on the USDA-NIFA website for advancing AI in resilient agriculture and food security research
- Published research work in the Top-ranked Transportation journal (*IEEE Transaction on Intelligent Transportation Systems*) and the most leading flagship journal of Alzheimer's research (*Alzheimer's & Dementia*)
- Presented and contributed in well-known AI and Autonomous Vehicle conferences (*NeurIPS 2022, IEEE IAVVC 2024*)
- Served as a reviewer in a high-reputed AI in Engineering journal (*Engineering Applications of Artificial Intelligence*)

Education

Doctor of Philosophy (Ph.D.) — January 2021 - Present
Iowa State University, Major: Electrical Engineering, Minor: Computer Science — Ames, IA
CGPA: 3.79 out of 4.0 (Fall 2024) [Focus in Machine Learning & AI]

Master of Engineering (M.Eng) — January 2023 - August 2024
Iowa State University, Major: Electrical Engineering — Ames, IA
CGPA: 3.79 out of 4.0 [Focus in Machine Learning & AI]

Bachelor of Science — July 2014 - October 2018
Bangladesh University of Engineering and Technology — Dhaka, Bangladesh
Major: Electrical and Electronic Engineering, CGPA: 3.52 out of 4.0

Research Experience & Employment

Machine Learning Graduate Research Assistant — June 2021 – Present
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 and climate change.
- 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 funded project)
- Expanded an AI framework to analyze distracted driving activity from naturalistic driving video while reducing reliance on extensive data and training compute (funded by FHWA Exploratory Advanced Research Program)
- Developed skills in Machine Learning, Convolutional Neural Networks, Transformer, Computer Vision 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
- Served as a journal reviewer for IEEE Transaction on Intelligent Transportation Systems, Computers and Electrical Engineering and Digital Health

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

- Graded homework assignments, final exams and projects in Signal Processing class for 15 undergraduate students
- Conducted Lab on MATLAB Simulink to build models and develop analog and digital communication circuits

Semiconductor Devices Graduate Teaching Assistant — January 2021 – May 2021
Department of Electrical and Computer Engineering, Iowa State University — Ames, IA

- Graded homework, final exams and project reports in Semiconductor Devices class for 40 undergraduate students
- Led weekly recitation sessions on fundamental electronic and optical properties of semiconductors and applications

Research Interest

- Artificial Intelligence (AI) and Machine Learning
- Computer Vision
- Finetuning foundational AI models
- Edge-case generation for foundational AI models
- Robustness of foundational AI models
- Human action understanding in video data

Technical Skills

Programming Languages	Python, C/C++, MATLAB, R, HTML
AI and ML Frameworks	PyTorch, TensorFlow, Transformers, Multimodal foundation models, VLM, LLM
Data Library	Tableau, PostgreSQL, Matplotlib, Numpy, Seaborn, Pandas, AWS S3, LSS, HPC cluster
Software and Tools	OpenCV, Scikit-learn, Amazon AWS, SageMaker, MPI, CUDA, OpenMP, Numpy, OpenCLIP, Timm, PyTorch Lightning, SciPy, Matplotlib, Pandas, Transformer
Platforms	Microsoft Office, Unix/Linux, GitHub, Azure DevOps, LaTeX, VScode, HuggingFace
Others (Learning)	Diffusion Models, 3D vision model, LLM reasoning, Robustness of LLMs, RAG

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) Machine Learning for Autonomous Driving Workshop*, New Orleans, LA, 2022.
- 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) 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)*, Pittsburgh, PA, 2024.
- **Hasan, M. Z.**, Shiam, I. F., Nova, T. T., Reza, M. S. "A modified PLL based on second order generalized integrator for single-phase voltage system,"*IEEE International Conference on Electrical, Computer and Communication Engineering (ECCE)*, pp. 1-6, Cox's Bazar, Bangladesh, 2019.

Review Experience

- Served as a journal reviewer at IEEE Transactions on Intelligent Transportation Systems (Impact factor 7.9)
- Served as a journal reviewer at Engineering Applications of Artificial Intelligence (Impact factor 7.5)
- Served as a journal reviewer at Computers and Electrical Engineering (Impact factor 4.0)
- Served as a journal reviewer at Digital Health (Impact factor 2.9)

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 College of Engineering Tuition award (Spring 2021 – Fall 2024)
- Iowa State College of Engineering Fee award (Spring 2021 – Fall 2024)
- Iowa State College of Engineering Resident Tuition award for Graduate Assistant (Spring 2021 – Fall 2024)
- Iowa State College of Engineering Technology award for Graduate Assistant (Spring 2021 – Fall 2024)
- Bangladesh Notre Dame College perfect attendance award (2013)
- Bangladesh Notre Dame College excellent grade award in Higher secondary level (2013)
- Bangladesh Government Scholarships: Rajshahi Board Scholarship - S.S.C. (2010) and Junior (2008)

Conference Attended

- **Co-authored in the Spotlight paper (Top-3%)** at 38th Conference on Neural Information Processing Systems (NeurIPS 2024) Track on Datasets and Benchmarks, Vancouver, BC, Canada, (2024)
- **Poster Presentation** at 36th Conference on Neural Information Processing Systems (NeurIPS 2022) Machine Learning for Autonomous Driving (ML4AD) Workshop, New Orleans, LA (2022)
- **Poster Presentation** at 2019 International Conference on Electrical, Computer and Communication Engineering (ECCE), Cox's Bazar, Bangladesh (2019)

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
- Served as a liaison between graduate students and the Iowa State ECpE Department
- 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
Institute of Electrical and Electronics Engineers (IEEE), ISU Ames, IA

- Participated in industry sessions, tech events, and exhibits to broaden technical knowledge
- Contributed to educational outreach programs to inspire future engineers

Graduate 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

Student Member January 2021 – Present
Bangladesh Students' Association (BSA), ISU Ames, IA

- Mentored incoming Bangladeshi students at Iowa State with onboarding information and procedures
- Collaborated with student officers to organize on-campus events and programs promoting cultural diversity

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
- Volunteered in the campus clean-up events at Inter-Residence Hall Association (IRHA), ISU
- 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
- Donated blood regularly to support local hospitals and emergency response needs for American Red Cross Iowa Region