CURRICULUM VITAE

# SHANSHAN (SHANE) ZHU

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## EDUCATION

**Mount Holyoke College** Dec 2024
South Hadley, MA
**Bachelor of Arts** in Computer Science & Experimental Psychology
GPA: 3.93/4.0 | Cum Laude

**University of Illinois Urbana-Champaign (UIUC)** May 2027
Urbana–Champaign, IL
**Master of** Computer Science (MCS)

## HONORS AND AWARDS

GenAI Top 15 prize, Harvard University partnered with Manulife, Microsoft, DotsLive. 2024
- *Awarded to the top 15 teams in the AI EarthHack competition in the worldwide.*

Most Creative prize, Amherst College Hackathon 2023
- *Awarded to only one project with the most innovative idea and content.*

Lynk Summer Research Fund, Mount Holyoke College ($3,000) 2023

## PEER-REVIEWED PUBLICATIONS

**Zhu, S.**, & Mohammad, M. (2025). Adaptive Neural Audio Mixing Systems with Human-in-the-Loop Feedback. In preparation for the *2025 AES International Conference on Artificial Intelligence and Machine Learning for Audio (AIMLA)*.

Mohammad, M., **& Zhu, S.** (accepted). Integrating symbolic logic with Deep Neural Networks to build systems capable of both learning from data and reasoning logically in medical treatment planners. To be published in *Springer's Lecture Notes in Networks and Systems (LNNS) Proceedings.*

Mohammad, M., **& Zhu, S.** (2025). AI-powered digital human clones for enhanced business communication: Evaluating engagement, data retention, and ethical implications. Abstract accepted for the *2025 International Business Analytics Conference Proceedings*.

**Zhu, S.**, & Mohammad, M. (accepted). AI-powered models for real-time fraud detection in financial transactions to improve financial security. Abstract accepted for the *2024 International Conference on Machine Learning and Cybernetics (ICMLC).*

Mohammad, M., **Zhu, S.**, & Itauma, I. (2024). An empirical analysis of the functionalities and confidence scoring mechanisms in leading Large Language Models. *International Business Analytics Conference 2024 Proceedings, 1*(1).

## CONFERENCE PRESENTATIONS

Tawa, J., & **Zhu, S**. (2025). *Does participants' random number generation predict racial essentialism?* Conference poster presentation at the UMass Essentialism Conference, Amherst, MA (April 26, 2025).

Mohammad, M., & **Zhu, S.** (2025). *AI-powered digital human clones for enhanced business communication: Evaluating engagement, data retention, and ethical implications.* Conference paper presentation at the 2025 International Business Analytics Conference (May 7, 2025).

Mohammad, M., & **Zhu, S**. (2025). *Integrating symbolic logic with Deep Neural Networks to build systems capable of both learning from data and reasoning logically in medical treatment planners.* Conference paper presentation at the 10th International Congress on Information and Communication Technology (ICICT-2025), London, UK.

Loftman, A., Guzman Amato, A. M., Xu, B., **Zhu, S.**, Ten Kate, C., & Hodges, T. E. (2024). *Adolescent social instability stress affects cognitive bias in male and female rats across the lifespan.* Conference poster presented at the UMass-Amherst Medical Poster Session, Amherst, MA.

Zavalny, A., **Zhu, S.**, Fee, C., & Jung, H. (2024). *Enhancing AI-assisted diagram generation with GenDiagram.* Conference poster presented at the 2024 Brown CS Research Symposium, Providence, RI.

## RESEARCH EXPERIENCE

**Protein Language Model Development Intern | BGI Genomics** Apr 2025–Present
Department of Intelligent Protein Computing, BGI Research
Advisor: *Beibei He, PhD*

- Build transformer protein language models trained on 2TB+ sequences, enabling structure and interaction prediction at scale
- Improve contact map and binding prediction accuracy by 15% through fine-tuning and task-specific heads

- Apply reinforcement and active learning to enhance generalization, reducing benchmark error by 12%
- Conduct model interpretability (attention rollout, SHAP, PCA, t-SNE) to identify biologically meaningful sequence motifs
- Deliver results using pTM, iPTM, PAE metrics with clear visualizations (box/violin plots, heatmaps) for a cross-disciplinary team
- Author 20+ internal reports and contributed to 5+ technical papers

**Graduate Researcher | UIUC Verified Intelligence Group** Apr 2025–Aug 2025

- Extended auto-LiRPA and $\alpha$ - $\beta$ -CROWN verification libraries (VNN-COMP winners 2021 – 24), supporting float32/64 and GPU/CPU devices
- Developed robust unit tests, containerized builds, and modular components, reducing CI test flakiness by 10%
- Contributed to branch-and-bound adversarial verification frameworks, improving reliability of safety-critical AI systems

**Research Assistant | Hodges Lab** 2024 – 2025

Department of Neuroscience, Mount Holyoke College

Director: *Travis Hodges, PhD*

- Conducting over 200 neuroscience trials focused on identifying sex-specific neuronal activation patterns related to cognitive biases and depressive behaviors, offering insights into how age and sex differences affect mental health, with potential clinical applications
- Performing estrus cycle analysis and imaging across multiple brain regions, including the ventricular zone, ventral hippocampus, and subventricular zone, and preparing DCX/MAM samples to study neurogenesis
- Assisting with brain slicing and weight measurements, coordinating pair training to ensure precise sample handling, and analyzing cognitive bias and anhedonia videos to detect behavioral patterns in animal models

**Research Assistant | ExploreCSR** 2024

Brown University & Google

Supervisor: *Daniel C. Ritchie, PhD*

- Led the development of DiagramGPT, a tool integrating Keras, TensorFlow, and GPT-4 to streamline data analysis in natural language processing (NLP) tasks, resulting in a 20% increase in dialogue accuracy and a 30% reduction in processing time
- Conducted in-depth literature reviews on dialogue systems and NLP and drafted research proposals outlining novel applications of NLP in educational contexts
- Presented findings in the form of a conference poster at the Brown CS Symposium to an audience of over 100 scholars, boosting community interest in NLP applications and leading to a 15% increase in lab inquiries for collaborative projects

**EcoRankAI | AI EarthHack** 2024
Digital Data Design Institute, Harvard University

- Developed a user-friendly interface in Streamlit, powered by OpenAI's GPT for NLP, to make environmental data analysis accessible to non-technical users
- Integrated automated document analysis and key phrase extraction features, resulting in a 25% improvement in trend prediction accuracy within the ecological data domain
- Employed advanced NLP techniques to support sustainable project evaluation and reporting, allowing users to derive actionable insights from complex data sources; project awarded with the GenAI "Top 15" prize for its potential impact on democratizing data access in environmental science

**Software Engineer | BEARS Lab** 2023 – Present
Psychology Department, Mount Holyoke College
Director: *John Tawa, PhD*

- **RNA Project (Random Number Assessment)**
  - Developed a full-stack Random Number Test Website, utilizing Firebase for the frontend, Google Cloud for the backend, and Google APIs for seamless integration
  - Collected data from over 300 participants and designed R scripts for Recurrence Quantification Analysis (RQA) and Random Number Generation (RNG) analysis, enabling robust data processing and the development of creativity metrics
  - Spearheading the creation of an interactive interface for researchers to test individual creativity, paving the way for publication-ready tools
- **Police Use of Force Study**
  - Collaborated on designing a Virtual Reality (VR) measurement paradigm to study perceptual (eye-gazing), physiological (stress), and cognitive (racial stereotyping) factors in police use of force decisions
  - Leveraged Unity and Varjo AR features to create realistic interactive VR scenarios, improving rendering times by 30% and enhancing user immersion
  - Integrated Python-based eye-tracking technology for behavioral analysis, achieving a 20% improvement in interaction quality by addressing engagement factors
  - Contributing to the development of interventions to mitigate racial bias in decision-making among police officers

## PROFESSIONAL EXPERIENCE

**Co-founder & AI Engineer** 2025
Fojiao.AI

- Engineered a hybrid RAG + local embedding QA system capable of deep semantic retrieval, contextual reasoning, and document-grounded answers—supporting transparent source attribution and scalable multi-subject performance
- Built an automatic mind map generator converting PDFs, slides, and raw content into structured Markdown + XMind formats—bridging unstructured data with cognitive learning workflows
- Developed an AI-powered assessment engine, dynamically generating MCQs, short-answer, and case-based questions from extracted knowledge graphs, with controllable difficulty and topic tagging
- Led frontend-backend orchestration by establishing a cloud-first GitHub CI/CD workflow (AWS EC2 + S3) and deploying a modular system with real-time chatbot, file parsing, and visualization pipelines
- Initiated team growth & tech hiring, recruited across UI/UX and backend, and scoped international expansion through structured roadmap planning and pitch deck creation

**Software Engineering Intern** Summer 2023
VeyTel, LLC

- Developed the iOS app Dermaviz using Swift, Xcode, and React Native, enhancing usability and improving user satisfaction by 20%
- Optimized the app's scalability by integrating MongoDB and a cloud-based backend, resulting in a 25% reduction in response times for real-time medical data processing, ensuring faster and more reliable performance
- Contributed to the development of MongoSwiftApi, a scalable API integration to enhance database efficiency and support robust data handling within VeyTel's applications

**Software Engineering Intern** Summer 2023
Dandilyonn

- Led the development of Can-did, a task management mobile app, which improved user efficiency by 35% through real-time updates and effective state management with Redux
- Created an intuitive and engaging user interface, which contributed to the app winning the "Best Solution" prize for delivering a streamlined task management experience

## LEADERSHIP AND VOLUNTEER EXPERIENCE

**MoZone Peer Educator** 2023 – 2024
Mount Holyoke College

- Facilitated social justice training sessions and interactive dialogues on topics such as diversity, equity, and inclusion for students and staff

- Organized and led workshops on foundational social justice principles, race and racism, gender and sexuality, nationality, religion, and allyship, helping foster a supportive campus environment
- Collaborated with the MoZone team to develop educational programs and awareness campaigns, encouraging allyship, open dialogue, and cross-cultural understanding across the campus community

**Cybersecurity Instructor (TA)** 2023 – 2024
TEALS Program, Microsoft

- Co-taught and instructed the Cybersecurity course at Fairfax Senior High School, engaging over 100 high school students in the fundamentals of network security, cryptography, and encryption
- Achieved a 20% improvement in course completion rates by developing interactive lessons and providing individualized support, deepening student understanding of cybersecurity principles

**Video & Audio Media Consultant** 2023 – 2024
Media Teaching Area at the MEWS - LITS, Mount Holyoke College

- Providing technical support in media technologies, web authoring, and stop-motion animation to over 2,500 faculty and students, fostering the effective use of digital tools for academic projects
- Offering instructions and assistance for Adobe Creative Cloud applications, personalized tutorial workshops, and WordPress website development to expand media production capabilities within the college community

## SKILLS AND RELEVANT COURSEWORK

**Programming Languages (Proficient):** Python, Java, C/C++, C#, Swift, JavaScript/TypeScript, Kotlin, R, SQL, Go, MATLAB
**Frameworks (Familiar):** React.js, Next.js, Spring Boot, Node.js, Django, Express.js, TensorFlow, PyTorch
**Databases (Proficient):** PostgreSQL, MySQL, MongoDB, Redis, Firebase, DynamoDB
**Cloud & DevOps (Proficient):** AWS (EC2, Lambda, S3, RDS, DynamoDB), GCP (Firebase, Compute Engine), Docker, Kubernetes, Terraform, CI/CD (Jenkins, GitHub Actions)
**Machine Learning & AI (Proficient):** LLMs, NLP, Generative AI, Model Training, Prompt Engineering, Data Pipelines
**Languages:** Chinese (Native), English (Fluent), Cantonese (Fluent)
**Relevant Coursework:**

- **Core CS:** Data Structures, Discrete Mathematics, Computing Systems, Python Programming, Software Design, Computer Vision, Operating Systems, Image Processing, Data Science, Theory of Computation
- **Advanced Topics:** Machine Learning Applications, Natural Language Processing, Algorithms, Artificial Intelligence, Network Security

**Interdisciplinary Studies:** Neuroscience, Psychology, Mathematics, Statistics, Economics,

## MEMBERSHIP AFFILIATIONS

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|---|---|
| Institute of Electrical and Electronics Engineers (IEEE), *Student Member* | 2024 – Present |
| American Psychological Association (APA), *Student Member* | 2024 – Present |
| Society of Women Engineers (SWE), *Student Member* | 2024 – Present |
| Women in Machine Learning (WiML), *Student Member* | 2024 – Present |
| Girls Who Code, *Student Member, Volunteer, and Mentor* | 2023 – Present |
| Woman In Technology (WIT), *Student Member* | 2023 – Present |

## REFERENCES

Lisa A. Ballesteros, PhD
Jean Sammet Associate Professor of Computer Science
Co-Chair of Computer Science
Department of Computer Science, Mount Holyoke College
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Heather Pon-Barry, PhD
Associate Professor of Computer Science
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