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Deepa Tilwani

My research focuses on Neurosymbolic AI to develop trustworthy large language models (LLMs) for interdisciplinary and high-stakes applications. I have received accolades for interdisciplinary research in healthcare by developing plausible methods for interpretable and explainable AI. I have accepted papers in top-tier journals and conferences, including AAAI (core A*), IEEE Intelligent Systems (IF: 6.7), and IEEE Journal of Biomedical and Health Informatics (IF: 7.7), where I explore the integration of symbolic reasoning with LLMs. I also developed REASONS, an open-source benchmark dataset for developing attribution and reasoning capabilities in LLMs.

Education

2022–Present	**Ph.D. in Computer Science and Engineering**, *University of South Carolina*, Columbia, SC, USA
2019–2022	**M.Tech in Computer Science and Engineering**, *The LNM Institute of Information Technology*, Jaipur, Rajasthan, India
	Thesis: *Predicting Familial Likelihood of Autism Spectrum Disorder in Infancy Using ECG*
2014–2018	**B.Tech in Computer Science and Engineering**, *Govt. Women Engineering College*, Ajmer, Rajasthan, India

Skills

Programming Languages	Python, PyTorch, Keras, TensorFlow, Scikit-learn, NumPy, Pandas, CUDA, GIT, C
Tools	Seaborn, Matplotlib, Jupyter, Git, Docker, Matlab, GPU
Methodologies	Machine Learning, Deep Learning, Knowledge Graphs, NeuroSymbolic AI, Signal Processing (EEG, fMRI/MRI, ECG), Large Language Models (LLMs), Reterival Augmentation Generation (RAG)
Soft Skills	Team Leadership, Project Management, Communication Skills, Cross-Functional

Work Experience

2022–Present **Graduate Research Assistant**, *Artificial Intelligence Institute, University of South Carolina*, Columbia, SC, USA
- Leading research projects focused on LLMs for search and attribution.
- Led a project on *ECG Recordings as Predictors of Very Early Autism Likelihood: A Machine Learning Approach* that resulted in *Trainee Best Research Presentation Winner in SCAND Symposium*.
- Developed an open source dataset for attribution evaluation *REASONS: A benchmark for REtrieval and Automated citationS Of scieNtific Sentences using Public and Proprietary LLMs.*.
- Collaborated with a multidisciplinary team *to develop machine learning benchmarks for neuroimaging data*.

June 2025–August 2025 **AI Research And Development Intern**, *Neural Nest, LLC*, Remote, USA
- Contributed to the development of ARTHEMIS, an AI-driven Virtual Courtroom platform for U.S. arbitration and mediation.
- Developed multi-agent simulation models to enhance tribunal dynamics and decision-making processes.
- Designed workflows that reduced case resolution times from over 60 days to approximately 15 days, improving efficiency by 75
- Supported the creation of secure digital courtroom spaces, increasing accessibility for users nationwide.

2021–2022 **Visiting Research Scholar**, *Artificial Intelligence Institute, University of South Carolina*, Columbia, SC, USA
- ○ Facilitated research within a multidisciplinary neuroscience team by contributing AI expertise, helping to bridge the gap between computational methods and neurocognitive studies.
- ○ Provided valuable insights to support the development of AI tools for analyzing neuroimaging datasets.
- ○ Gained substantial experience in neuroimaging data (EEG, MRI) processing and analysis, collaborating with neuroscience experts to refine research goals and methodologies.
- ○ Studied emerging trends in AI, machine learning, and deep learning, including their applications in neuroscience, leading to enhanced understanding and expertise in both fields.

2020–2021 **Remote Research Intern**, *Artificial Intelligence Institute, University of South Carolina*, Columbia, SC, USA
- ○ Collaborated on experiments exploring the interaction between ECG and machine learning, assisting in developing new research methodologies.
- ○ Assisted in designing experiments that tested AI models' effectiveness in predicting Autism likelihood from ECG.

Publications

Journal Articles
- ○ **Tilwani, D.**, O'Reilly, C., Riccardi, N., Shalin, V.L., den Ouden, D.B., Fridriksson, J., Shinkareva, S.V., Sheth, A.P. and Desai, R.H., (2025). Benchmarking machine learning models in lesion-symptom mapping for predicting language outcomes in stroke survivors. **Frontiers in Neuroimaging**, 4, p.1573816.
- ○ Dalal, S., **Tilwani, D.**, Gaur, M., Jain, S., Shalin, V., & Sheth, A. (2024). A Cross Attention Approach to Diagnostic Explainability Using Clinical Practice Guidelines for Depression 2024. **IEEE Journal of Biomedical and Health Informatics (IF: 7.7)** [Paper].
- ○ **Tilwani, D.**, Venkataramanan, R., & Sheth, A. P. (2024). Neurosymbolic AI Approach to Attribution in Large Language Models. **IEEE Intelligent Systems 2024 (IF 5.6)** [Paper].
- ○ **Tilwani, D.**, Bradshaw, J., Sheth, A., & O'Reilly, C. (2023). ECG Recordings as Predictors of Very Early Autism Likelihood: A Machine Learning Approach. *Bioengineering*. [Paper]
- ○ O'Reilly, C., Oruganti, S. D. R., **Tilwani, D.**, & Bradshaw, J. (2023). Model-Driven Analysis of ECG Using Reinforcement Learning. *Bioengineering*. [Paper]

Conference Proceedings
- ○ **Tilwani, D.**, O'Reilly, C. (2025). Deep Jansen-Rit Parameter Inference for Model-driven Analysis of Brain Activity. **Proceedings of Advances in Signal Processing and Artificial Intelligence**, 92.
- ○ Mohseni, S., Mohammadi, S, **Tilwani, D.**, Ndawula, G. K., Vema, S., Saxena, Y., Raff, E., Gaur, M. Can LLMs Obfuscate Code? A Systematic Analysis of Large Language Models into Assembly Code Obfuscation. **Proceedings of AAAI 2025**. [Pre-Print]
- ○ Porwal, S., Patel, K. C., **Tilwani, D.**, & Bansal, S. K. (2021). A Comparative Study and Tool to Early Predict Diabetes Using Machine and Deep Learning Techniques. *Emerging Trends in Data-Driven Computing and Communications*. [Paper]

Tutorials
- ○ Gaur, M., **Tilwani, D.**, Raff E., Azimi, I., Chadha, A., Neurosymbolic AI for EGI: Explainable, Grounded, and Instructable Generations, In AAAI 2025

Posters	○ **Tilwani, D.**, O'Reilly, C. Exploring Neural Dynamics: A Long Short-Term Memory for Brain Effective Connectivity Analysis in EEG. Discover USC, 2024. [Poster]

○ **Tilwani, D.**, Goswami, R., O'Reilly, C., Riccardi, N., Yang, X., Shalin, V., Shinkareva, S., Sheth, A., & Desai, H. R. (2023). Predicting Language Outcomes from MRI Post-Stroke: A Machine Learning Approach. *Organization for Human Brain Mapping*, Montreal, Canada. [Poster]

○ **Tilwani, D.**, O'Reilly, C., Bradshaw, J., & Sheth, A. (2023). Interpretable Machine Learning for Predicting the Likelihood of Autism from Infant ECG Recordings. *SCAND Research Symposium*, Columbia, SC. [Poster, Trainee Best Research Presentation Winner]

Under Review
○ **Tilwani, D.**, Saxena, Y., Mohammadi, A., Raff, E., Sheth, A., Parthasarathy, S., & Gaur, M. (2024). REASONS: A benchmark for REtrieval and Automated citationS Of scieNtific Sentences using Public and Proprietary LLMs. **(ACL ARR Metareview score 4, Under Review WWW 2025)**

○ **Tilwani, D.**, O'Reilly, C., Riccardi, N., Shalin, V., Shinkareva, S., Sheth, A., & Desai, H. R. (2024). Predicting Language Ability from MRI in Post-Stroke Patients: An Advanced Machine Learning Approach.

○ **Tilwani, D.** and O'Reilly, C. Benchmarking Deep Jansen-Rit Parameter Inference: An in Silico Study. arXiv e-prints (2024): arXiv-2406.

Open Source Contributions

Dataset REASONS: REtrieval and Automated citationS Of scieNtific Sentences (https://zenodo.org/records/18264033).

Awards and Achievements

○ 2025 Recipient of the 2025 University Travel Award ($500) for attendance at the International Conference on Advances in Signal Processing and Artificial Intelligence (ASPAI' 2025).
○ 2025 AAAI-25 Student Scholarship Award ($1000)
○ 2024 EMNLP Diversity and Inclusion Award ($1000)
○ 2023 Trainee Best Research Presentation Winner ($100), SCAND Symposium.
○ 2023 Research Symposium Third Place Poster Award ($200), University of South Carolina.
○ 2021 Nirmala and Jashwantlal Clerk Memorial Scholarship ($15000), AIISC.
○ 2020 2nd Prize ($100), LINZ Ars Festival - BR41N.IO Hackathon.
○ 2020 2nd Prize ($300), BR41N.IO: Brain-Computer Interface Designers Hackathon.
○ 2016 1st Place, Poster Presentation on AR and VR Technology, GWECA.
○ 2015 3rd Place, Coding Challenge: Toast to Code - C Language, GWECA.
○ 2012 Silver Prize, National Science Olympiad (NSO).

Advising and Mentoring

○ Yash Saxena, Galgotias University, Sept 2023- Sept 2024. Project: "REASON: Reference and Assertions for Consistent Evaluation of Factual/Non-Factual Sentences".
○ Nethra Gunti, IIIT SriCity, 2022. Project: "Phase Shift Analysis in Autism Spectrum Disorder: A Video-Based Study of Parent and Object Interactions".
○ Sai Durga Rithvik Oruganti, University of South Carolina, 2022. Project: "Phase Shift Analysis in Autism Spectrum Disorder: A Video-Based Study of Parent and Object Interactions".

Selected Media Coverage

○ **USC 2024 Newsletter: Pioneering AI to transform autism diagnosis.** Link

Teaching Experience

- Teaching Assistant, SCINBRE Machine Learning in Python Workshop 2024, University of South Carolina.
- Instructor, Introduction to Machine Learning, AIISC High School Summer Camp, 2024.
- Instructor, Introduction to Python, AIISC High School Summer Camp, 2023.
- Teaching Assistant (2019-2021), The LNM Institute of Information Technology: Computer Networks, Data Structures, DBMS, and Advanced Programming Labs.

Community Service

Conference Reviewer
- ICWSM 2026
- AAAI 20025, 2026
- EMNLP 2025
- KDD 2025
- THE WEB CONFERENCE 2025 (WWW).
- CIKM, KG-STAR Workshop, 2024.
- KDD, KIL Workshop, 2024.

Journal Reviewer
- IEEE Internet Computing
- Neurosymbolic Artificial Intelligence
- ACM Transactions on Computing for Healthcare
- ACM Computing Surveys
- Scientific Reports
- Data Mining and Knowledge Discovery
- Frontiers in Neuroimaging
- MDPI, Advanced NLP and Machine Translation

Program Committee
- KG-STAR, CIKM 2024
- KIL, KDD 2024
- KIL, KDD 2023

Voluntary Work
- Web and Publicity Chair, KG-STAR Workshop CIKM 2024: Organized events, managed communications, and enhanced visibility of the workshop.
- Coordinator, AIISC Retreat, 2023: Organized the institute's retreat, ensuring participation and facilitating collaborations.
- Session Moderator and Publicity Chair, ACM KDD Workshop on Knowledge-infused Learning, 2023: Moderated discussions and Q&A sessions.
- Coordinator, AIISC High School Summer Camp, 2023: Led the planning and execution of the camp, including scheduling and recruitment of instructors.
- Student Member, AAAI (2022-Present).