

Ranjani Narayanan

<https://www.linkedin.com/in/ranjanin2>
Portfolio: ranjanin.com

Email : rnarayanan35@gatech.edu
OrcID: oooo-0003-4351-6501
Mobile : +1 (908)-340-7845

EDUCATION

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| • Doctor of Philosophy (Ph.D.) in Electrical and Computer Engineering
<i>Georgia Institute of Technology, Atlanta</i>
Dissertation: <i>Investigating a human-centered approach towards supporting Shared Mental Models in hierarchical human-agent teams for decision making.</i>
Advisor: Prof. Karen Feigh | Aug 2021 – 2026 (Expected) |
| • Master of Science (MS) in Electrical Engineering
<i>University of Pennsylvania, Philadelphia</i> | Aug 2019 – May 2021
GPA: 3.8/4.0 |
| • Bachelor of Technology (B.Tech) in Electrical Engineering
<i>Sardar Patel College of Engineering, Mumbai</i> | Aug 2015 – May 2019
GPA: 9.3/10.0 |

RESEARCH EXPERIENCE

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| • Graduate Research Assistant- Georgia Institute of Technology
<i>Advised by Prof. Karen M. Feigh, Cognitive Engineering Center</i> | Atlanta, GA
Feb 2022 - Present |
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- Designed and executed IRB-compliant, controlled human-in-the-loop studies to investigate the causal effects of AI-driven interventions on user behavior and performance. Applied human factors and cognitive engineering methods, including heuristic evaluations and cognitive walkthroughs, to iteratively develop and refine research hypotheses.
 - Developed and maintained multi-modal data collection and processing pipelines using process-tracing techniques; conducted statistical modeling and hypothesis testing to evaluate behavioral outcomes and team-level performance across experimental conditions.
 - Created and validated human-centered evaluation metrics to measure human-AI team effectiveness, trust calibration, reliance behaviors, workload, and decision-making performance within AI-supported systems.
 - Utilized statistical inference, mixed-effects modeling, and regression analyses to characterize behavioral, cognitive, and performance impacts of AI system designs.
 - Translated empirical findings into clear, actionable insights that informed the design and improvement of AI-assisted workflows and decision-support systems.
 - Published 8+ peer-reviewed papers in international journals and conferences, contributing interdisciplinary research at the intersection of human behavior, human-AI interaction, and AI-enabled systems.
 - Co-led the development of a successful three-year research grant proposal; communicated project plans and progress through written reports and presentations to stakeholders at the Office of Naval Research on annual and biannual cycles.

INDUSTRY EXPERIENCE

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| • GE Aerospace Research
<i>AI Fellow- Intern</i> | Niskayuna, NY
June - Aug 2025 |
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- Created a multi-domain evaluation dataset (Engineering and Scientific Q&A) to assess text completeness in retrieval-augmented generation (RAG) systems, benchmarking across 2 LLMs, 2 embedding models, and multiple temperature settings.
 - Developed a domain-agnostic proof-of-concept framework to improve LLM trustworthiness by evaluating three dimensions: (1) response completeness and hallucination detection, (2) knowledge sufficiency for answering queries, and (3) query completeness relative to available knowledge.
 - Implemented user-facing diagnostics that highlight contradictions, missing facts, partial answers, and hallucinations directly within model responses and retrieved knowledge, enabling early identification of unreliable outputs.
 - Communicated findings at a GE Research Center-wide poster session (1,000+ attendees) and collaborated with GE Research Bangalore and the VP of Engineering at GE Aerospace HQ to inform downstream model improvement and cross-domain adoption.

• GE Aerospace Research

AI Fellow- Intern

Niskayuna, NY
June - Aug 2024

- Designed a domain-agnostic, automated NER pipeline that uses an LLM (Instruct model) for synthetic dataset creation and BERT-based models for low-latency training and inference. Demonstrated recognition of 11+ different entity types using prompt engineering for constructing a synthetic dataset and heuristic filtering for robust labeling of LLM outputs. Reduced dependency on LLM inference at runtime, enabling scalable, low-latency entity extraction across domains through fine-tuned BERT models.
- Co-authored a conference publication evaluating the robustness of open-source LLMs on 2 newly curated datasets (Arithmetic, Interval Labeling), spanning model scales from 3.8B to 236B parameters. Designed synthetic benchmarks with semantic-preserving perturbations to systematically assess model degradation on math problems.
- Communicated findings at a GE Research Center-wide poster session (1,000+ attendees) and collaborated with GE Research Bangalore and the VP of Engineering at GE Aerospace HQ to inform downstream model improvement and cross-domain adoption.

• Autodesk

Machine Learning Intern

May - Aug 2022

- Extracted and structured user-stored features to enhance AutoCAD's recommendation system, applying NLP methods to parse metadata from 1M+ users and producing a clean unsupervised dataset of 55K high-quality samples.
- Performed feature engineering and generated high-dimensional BERT embeddings for clustering, increasing effective data coverage from 23% to 92% and enabling robust insights from large-scale user behavior.

JOURNAL PUBLICATIONS

- Narayanan, R. & Feigh, K. (accepted, 2025). Designing for Oversight: An Empirical Investigation of the Dual Impact of AI Dependency and Information Abstraction on Human Supervision in Decision-Making Teams. *International Journal on Human Computer Interaction*.
- Walsh, S. E., Narayanan, R., & Feigh, K. (under review, 2025). The Role of Shared Mental Models in AI-advised Decision Support. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*

CONFERENCE PUBLICATIONS

- Narayanan, R., Cohen, M., Feigh, K., & Cooke, N. Two Sides of the Same Coin? Joint Perspectives from Shared Mental Models and Interactive Team Cognition Theories on Human-AI Team Cognition. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 2025. o(o). doi:10.1177/10711813251358788
- Peshave, A., Hossain, K., Kubricht, J., Narayanan, R., Burpee, Z., & Agarwal, A. (accepted, 2025). Evaluating Large Language Models on Arithmetic and Interval Labeling Problems with Syntactic Perturbations. *2025 IEEE International Conference on Data Mining Workshops (ICDMW)*.
- Narayanan, R. & Feigh, K. Human Assessment of AI Errors and its Impact on Hybrid Teaming for Decision Making. *2025 IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA), Duisburg, Germany, 2025*, pp. 103-110. doi:10.1109/CogSIMA64436.2025.11079477 (**Winner of Best Student Paper Award**)
- Narayanan, R. and Feigh, K. M. (2025). Impact of Team Models in Hierarchical Human-Agent Decision-Making Teams. In *Proceedings of the 20th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications - Volume 1: GRAPP, HUCAPP and IVAPP*, ISBN 978-989-758-728-3, ISSN 2184-4321, pages 452-463. doi:10.5220/0013097400003912 (**Nominated for Best Paper & Best Student Paper Awards**)
- Narayanan, R., Walsh, S. E., & Feigh, K. M. (2023). Development of Mental Models in Decision-Making Tasks. *Proceedings of the 67th Human Factors and Ergonomics Society Annual Meeting*. doi:10.1177/21695067231192195

BOOK CHAPTERS

- Narayanan, R. & Feigh, K. (accepted, 2025). How well do we rely on reliance? On the under-utilization of reliance-based metrics towards studying human response to automation assistance. *Advancements in Human Agent Teaming Research Infrastructure: Testbeds, Metrics, and Concepts*. Editors Erin K. Chiou, Douglas S. Lange, Jason H. Wong, Julie Marble. CRC Press, Taylor & Francis.

WORKSHOP PROCEEDINGS

- **Narayanan, R., & Feigh, K. M.** Influence of Human-AI Team Structuring on Shared Mental Models for Collaborative Decision Making. In *Proceedings of Workshop on Theory of Mind in Human-AI Interaction at ACM CHI 2024*.

TECHNICAL SKILLS

- **Programming:** Python, R, MATLAB
- **Tools:** Pytorch, Tensorflow, Keras, Huggingface, OpenCV, Scikit-learn, Pandas, Spacy, SciPy, OpenAI Gym, Git
- **Big Data:** AWS(EC2, S3, Bedrock)
- **Simulation & Other Toolkits:** Simulink (MATLAB), VREP
- **Research Methods:** Statistical modeling & large-scale data analysis, Causal Inference, Human-subjects Experimental Design, Data Visualization, Survey and Interview design, Mixed-methods (quantitative & qualitative analytics)
- **AI/ML:** Machine Learning (supervised and unsupervised learning), Deep Learning, Computer Vision, Generative AI (LLMs, VAEs, GANs), Reinforcement Learning, Natural Language Processing, Transfer Learning, Model fine tuning

HONORS & AWARDS

- **IEEE CogSIMA 2025 - Best Student Paper Award** For the conference paper on "Human Assessment of AI Errors and its Impact on Hybrid Teaming for Decision Making".
- **VISIGRAPP 2025 - Nominated for Best Paper & Best Student Paper Awards** For the conference paper on "Impact of Team Models in Hierarchical Human-Agent Decision Making Teams".
- **Georgia Tech Student Government Association (2025):** Travel Grant (1000).
- **Career, Research, and Innovation Development Conference (CRIDC) Poster Competition Winner, Georgia Institute of Technology (2024)** For my poster on Shared Mental Models for Human-AI Teaming.
- **INSPIRE Fellowship (2015):** Government of India.

PUBLIC SPEAKING AND ACADEMIC PRESENTATIONS

- **Paper Presentation** "Human Assessment of AI Errors and its Impact on Hybrid Teaming for Decision Making" at the IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA), Duisburg, Germany, 2025.
- **Paper Presentation** "Impact of Team Models in Hierarchical Human-Agent Decision Making Teams" at the International Conference on Human Computer Interaction Theory and Applications (HUCAPP, VISIGRAPP), Porto, Portugal, 2025.
- **Paper Presentation** "Influence of Human-AI Team Structuring on Shared Mental Models for Collaborative Decision Making" at the Workshop on Theory of Mind in Human-AI Interaction at ACM CHI 2024, Honolulu, Hawaii, May 2024.
- **Paper Presentation** "Development of Mental Models in Decision-Making Tasks" at the 67th Human Factors and Ergonomics Society Annual Meeting, Washington D.C., United States, October 2023.

TEACHING EXPERIENCE: GRADUATE TEACHING ASSISTANT

- **Graduate Teaching Assistant - Georgia Institute of Technology, Atlanta** Fall 2021, Spring 2022
 - **Courses:** *Feedback Control Systems (ECE 3550, Undergraduate)*, *Circuit Analysis (ECE 2040, Undergraduate)*
 - Assisted in delivering lectures, labs, or discussion sections to undergraduate students.
 - Held office hours to provide one-on-one academic support and clarify course material.
- **Graduate Teaching Assistant- University of Pennsylvania, Philadelphia** Spring 2021, 2020
 - **Courses:** *Engineering Electromagnetics (ESE 112, Undergraduate)*, *Feedback Control Systems (ESE 505, Graduate)*, *Linear, Non-Linear and Integer Optimization (OIDD 910, Graduate)*
 - Created grading rubrics and evaluated homework, projects, quizzes, and exams fairly and consistently.
 - Provided constructive written and verbal feedback to help students improve performance.
 - Maintained accurate records of student grades and progress.

- **Teaching and Mentorship at Inspirit AI** Remote, Summer 2021
- **Course:** *AI and Computer Vision*
- Guided high-school students in applying theoretical AI/ML concepts to practical problems.
- Contributed to the development of course content, slides, and supplementary resources.
- Conducted workshops and training sessions with students for Python coding on a need-by-need basis.

REVIEWING

- **Book** Advancements in Human Agent Teaming Research Infrastructure: Testbeds, Metrics, & Concepts.
- **Journals** International Journal of Human Computer Interaction
- **Conferences** ACM Conference on Human Factors in Computing Systems (ACM CHI), Human Factors and Ergonomics Society (HFES)

PROFESSIONAL SERVICE

- **Contributor in Social Action Research at Georgia Institute of Technology (Fall 2025):** Successfully completed a social action research program involving deep inquiry, qualitative observation, and real-world evaluation. Collaborated with a research team to identify opportunities to enhance the graduate student experience at Georgia Tech and developed actionable recommendations aimed at creating positive campus-level social impact.
- **Conference Session Chair** for presentation track "Innovations in Research Methods" at the ASPIRE, 69th International Annual Meeting of the Human Factors and Ergonomics Society (HFES), Chicago, USA 2025.
- **Panel Discussion Moderator** ASPIRE, 69th International Annual Meeting of the Human Factors and Ergonomics Society (HFES), Chicago, USA 2025.
- **Alumni Interviewer, University of Pennsylvania:** Interviewer for incoming candidates of undergraduate students for academic years 2021-22 & 2022-23