Hari Iyer

Mesa, AZ

Biography

Hari Iyer is a Ph.D. candidate and Graduate Research Associate at the Human-in-Mind Engineering Research (HiMER) Lab, at Arizona State University. He worked for Optimal Synthesis Inc. as a Research Engineer on flight navigation and simulation software delivered to NASA Ames Research Center and the Missile Defense Agency (US Department of Defense). Hari was a visiting researcher at the Indian Institute of Technology (Bombay) and an engineering intern for App Orchid Inc.

Contact Profiles

Email: hari.iyer@asu.edu
LinkedIn: https://www.linkedin.com/in/iyerhari1729/
Google Scholar: https://scholar.google.com/citations?user=10Dokm4AAAAJ&hl=en

Professional Experience and Training

December 2022 - Present
Graduate Research Associate: Arizona State University, Mesa, AZ

- Working on Computer Vision, Neural Networks, and Biomechanical sensing for physical task posture estimation as part of National Institute for Occupational Safety and Health (NIOSH) grants.
- Assisting with project grant proposal preparation and running experiments.
- Building technology and hardware for projects at HiMER lab.
- Doctoral advisor and HiMER lab director: Heejin Jeong, Ph.D.

June 2018 - July 2022
Research Engineer: Optimal Synthesis Inc., Los Altos, CA

- Designing, building, and testing systems for US-NAS Air Traffic Management as part of NASA's $10 million ULI grant. Contributed to GNATS software as the deliverable.
- Implemented the first-ever Gate-to-Gate flight simulation for improving safety metrics by 50%. Used for research by the FAA, NASA Ames, AAI, and global aerospace researchers.
- Bridged third-party simulators like X-Plane with GNATS for real-time accident simulation of US Airways 1549 on the Hudson River.
- Optimized 6-DOF Inertial Measurement Unit using real-time embedded signal processing towards Inertial Navigation Systems for the MDA.

December 2019 - February 2020
Visiting Researcher: IIT Bombay, India

- Programmed Air Traffic Controllers' (ATCo) traffic controlling strategies to assess prospective memory and situational awareness (Including real-time at Mumbai ATC for over 60 ATCo).

- Disproved traditional factors (age/experience) for ATCo proficiency, reinforcing cognitive ability as a criterion. This work was part of a research initiative with the Airports Authority of India (AAI).

December 2017 - January 2018
Research Assistant: Arizona State University, Tempe, AZ
- Co-founded and wrote software for PARA-ATM, a flight prognostics and route simulation system. This was delivered to NASA Ames and adopted by SwRI.
- Set up a continuous real-time flight data exchange between FAA System Wide Information Management (SWIM) and ASU, attaining 100% automation for the process.
- PARA-ATM is open-sourced on GitHub for community research purposes and is being used by over 25 aerospace research groups globally.

August 2017 - May 2018
Resident Assistant: Arizona State University, Mesa, AZ
- Responsible for community living and housing safety of over a thousand on-campus student residents including military families.
- Duties include working with campus maintenance and ASU Police to assist with night safety patrolling, organizing community events, safety/community care procedures, room inspection reports, and student move-ins/outs.

Summers: 2016, 2017
Engineering Intern: App Orchid Inc., San Ramon, CA
- Built an accident data/document classifier and search engine over unstructured data for a pool of insurance companies.
- Implemented classifier using an auto-enhancing Naive Bayes model using Spark ML Pipeline that automated 40% of the manual workload.
- Inferred structure from tribal knowledge using Stanford NLP to build a knowledge graph.
- Created a 100K data point training set with Word2Vec out of unstructured text.

Education

2023 – In Progress
Arizona State University
Ph.D., Human Systems Engineering
Research areas: Computer vision, occupational safety, biomechanical sensing, aviation law.

2018
Arizona State University
MS, Software Engineering
Research areas: Statistical machine learning, large language models, US national airspace safety.

2016
University of Mumbai, India
BE, Computer Science and Engineering
Research areas: Aviation meteorology, aircraft trajectory prediction, natural language processing.

Publications

Summary of Publication
Journal articles: 8
Conference proceedings: 12

Journal Articles

Iyer, H., Reynolds, J., Nam, C. S., & Jeong, H. (2025). Exploring Restaurant Worker Mental Models of Injury and Safety Using Pathfinder Networks. *IISE Transactions on Occupational Ergonomics and Human Factors*, 1–9. https://doi.org/10.1080/24725838.2024.2446152

Gyamenah, P., **Iyer, H.**, Jeong, H., & Guo, S. (2025). CLUMM: Contrastive Learning for Unobtrusive Motion Monitoring. *Sensors*, *25*(4), 1048. https://doi.org/10.3390/s25041048

Iyer, H., & Jeong, H. (2024). PE-USGC: Posture Estimation-based Unsupervised Spatial Gaussian Clustering for Supervised Classification of Near-duplicate Human Motion. *IEEE Access*. https://doi.org/10.1109/ACCESS.2024.3491655

Iyer, H., Macwan, N., Guo, S., & Jeong, H. (2024). Computer-Vision-Enabled Worker Video Analysis for Motion Amount Quantification. *arXiv preprint arXiv:2405.13999*.

Wang, Y., Pang, Y., Chen, O., **Iyer, H. N.**, Dutta, P., Menon, P. K., & Liu, Y. (2021). Uncertainty quantification and reduction in aircraft trajectory prediction using Bayesian-Entropy information fusion. *Reliability Engineering & System Safety*, *212*, 107650. https://doi.org/10.1016/j.ress.2021.107650

Gjorcheski, S., **Iyer, H.**, Nikolovski, G., & Trajchev, D. (2018). Autonomous Flight Navigation Mechanism for Air-Route Optimization. *The International Journal of Science & Technoledge*, *6*(3).

Iyer H., Desai H., Bhansali D., Patil A. (2015). Weather Optimized Routing Algorithm for Aircraft. *Intl. Journal of Innovations & Advancement in Computer Science, 4*(10).

Iyer, H., Gandhi, M., & Nair, S. (2015). Sentiment analysis for visuals using natural language processing. *Int. J. Comput. Appl*, *128*(6), 31-35. https://doi.org/10.5120/ijca2015906581

Conference Proceedings

Iyer, H., Eiris, R., & Jeong, H. (accepted, 2025). Real-Time Task Detection and Digital Twin Modeling Using Human Posture Estimation in 360-Degree Videos. In *2024 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*.

Iyer, H., Macwan, N., Guo, S., & Jeong, H. (2024). Analyzing Worker Videos for Quantifying Motion Amounts through Computer Vision. *In Proceedings of the Human Factors and Ergonomics Society ASPIRE Meeting*. SAGE Publications.

Iyer, H., Reynolds, J., Nam, C.S., & Jeong, H. (2024). Pathfinder Networks: Evaluating Injury and Safety Using Restaurant Workers' Mental Models. *In Proceedings of the Human Factors and Ergonomics Society ASPIRE Meeting*. SAGE Publications.

Macwan, N., Hude, A., **Iyer, H.**, Jeong, H., Guo, S. (2024). High-Fidelity Worker Motion Simulation with Generative AI. *In Proceedings of the Human Factors and Ergonomics Society ASPIRE Meeting*. p.p. SAGE Publications.

Avancha, K., Bradley, S., **Iyer, H.**, Becerra, S., Craig, S. (2024, in press). Investigating Knowledge Gain and User Satisfaction in UAS Safety Modules: A Pilot Study. *In*

Proceedings of the Human Factors and Ergonomics Society ASPIRE Meeting. SAGE Publications.

Iyer, H., Isingizwe, J., Eiris, R., Jeong, H. (2024). Ladder Safety Assessment Using Head-mounted 360-degree Camera-based Posture Estimation Overlayed Real-time in Augmented Reality. In *2024 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*. https://doi.org/10.1109/VRW62533.2024.00055

Menon, P. K., & **Iyer, H. N.** (2024). Computational Approaches for Forecasting Operational Risks in the National Airspace System. In AIAA SCITECH 2024 Forum (p. 2818). https://doi.org/10.2514/6.2024-2818

Sharma, K., **Iyer, H.**, & Pant, R. (2022). Cognitive Ability Criterion for Expertise in Air Traffic Control Task. In *AIAA SciTech 2022 Forum* (p. 2449). https://doi.org/10.2514/6.2022-2449

Menon, P. K., Dutta, P., **Iyer, H. N.**, & Chen, O. (2021). An In-Time Aviation Safety Prognostics System. In *AIAA Aviation 2021 Forum* (p. 2365). https://doi.org/10.2514/6.2021-2365

Menon, P. K., Dutta, P., Chen, O., & **Iyer, H. N.** (2020). Metrics for Air Transportation System Safety Analysis. In *AIAA Aviation 2020 Forum* (p. 2910). https://doi.org/10.2514/6.2020-2910

Menon, P. K., Dutta, P., Chen, O., **Iyer, H.**, & Yang, B. J. (2019). A modeling environment for assessing aviation safety. In *AIAA Aviation 2019 Forum* (p. 2937). https://doi.org/10.2514/6.2019-2937

Gao, Y., Liu, Y., Dutta, P., Chen, O., **Iyer, H.**, & Yang, B. J. (2019). Active Learning-based Efficient Separation Risk Assessment in National Airspace System. In *AIAA Aviation 2019 Forum* (p. 2942). https://doi.org/10.2514/6.2019-2942

Memberships and Certifications

- Human Factors and Ergonomics Society (June 2024 - Present).
- American Institute of Aeronautics and Astronautics (May 2024 - Present).
- CITI RCR – Biomedical Responsible Conduct of Research, issued March 2023.
- CITI RCR – Biomedical Responsible Conduct of Research, issued March 2023.
- CITI IRB – Biomedical Research (Group 1), issued August 2022.
- CITI IRB – Social and Behavioral Research (Group 2), issued August 2022.
- AMA – The Recreational UAS Safety Test (TRUST), issued January 2023.

Industry and Research Projects

- GRA on "Vision-based Assessment of Physical Workers' Repetitive Actions" (Arizona State University, 2023 - Ongoing).
- Developed Posture Estimation-based Multi-Distance Spatial Clustering Algorithm as an optimization over pixel-based image classification for tasks (Arizona State University, 2023-Ongoing).
- Led Research and development of a cross-platform monitor for Aircraft Communications Addressing and Reporting System (ACARS), Automatic Dependent Surveillance–Broadcast (ADS–B), and integrated Speech-Enabled Simulation Interface Agent (SESIA) protocol for ATC command modelling.

- Worked as a Research Engineer on the "Novel Signal Processing Software for Improving Inertial Measurement Unit Performance" for the US DoD's Missile Defense Agency (Optimal Synthesis Inc., 2021).
- Worked as a Research Engineer on the Generalized National Airspace Trajectory System (GNATS) for the NASA ULI project (Optimal Synthesis Inc., 2021).
- Co-founded Prognostic Analysis and Reliability Assessment Air Traffic Management (PARA-ATM) and served as lead engineer (Arizona State University, 2018).
- Worked as Data Engineer: "Using Convolutional Neural Networks to Classify Commercial Aircraft." (Arizona State University, 2018).
- Designed Pareto Optimization for a non-linear data store: "Brew Day, the homebrewing tool" (Arizona State University, 2018).
- Knowledge graph for airline data: "AirCheck: An Aviation Data Analysis Platform" (Arizona State University, 2018).
- Built microprocessor register datapath communication module: "Progressive Learning Platform (PLP)" (Arizona State University, 2016).
- Co-founded and served as a lead engineer: "Flight Router, a weather-optimized aircraft routing algorithm" (University of Mumbai, 2016).

Invited Talks and Presentations

- **Iyer, H.**. "Artificial Intelligence for Aviation Safety in National Airspace System" at AIAA Engage, Phoenix, February 2025.
- Ganatra, S., Jung, H., **Iyer, H.**, Jeong, H. "Enhancing Humanoid Robot Teleoperation with Artificial Intelligence and Augmented Reality" at the Proceedings of the Human Factors and Ergonomics Society ASPIRE 2024 Meeting.
- "Posture Estimation-based Spatial Modeling for Classifying Obscured Human Motion" invited for poster presentation at the 22nd Triennial Congress of the International Ergonomics Association (IEA), Jeju, South Korea.
- Presenting speaker, IISE AEC, 2024.
- Presenting speaker, "Computer-Vision-Enabled Worker Video Analysis for Motion Amount Quantification," INFORMS Annual Meeting 2023.
- Guest speaker, "Aviation Safety and Air Traffic Management Systems," Cogitations, 2023.
- Guest speaker, "The next generation of engineers in the US ATM industry," Radar Contact, FoxATM, 2022.

Honors and Awards

- Awarded ASU TPS Student Travel Grant, 2024.
- Awarded 2024-2025 Harold & Lucille Dunn Memorial Engineering Fellowship.
- Best presentation award, Three-Minute Thesis (3MT) competition, ASU.
- Student of the Year, Institute of Industrial and Systems Engineer's (IISE) Applied Ergonomic Conference (AEC), 2024.
- Menon and Iyer (2024) selected by the American Institute of Aeronautics and Astronautics (AIAA) to appear on the Kudos platform.
- Awarded ASU Graduate Research Support Program grant, 2024.

- Awarded ASU TPS Student Travel Grant, 2023.
- Instructor, "AI for Air Traffic Safety Enhancement," 2023, AIAA.

Mentions

- Featured on ASU's achievements for [accomplishments](#) during the Ph.D. program.
- NASA ULI project outcomes featured on Arizona's Family (CBS 5 News).
- PARA-ATM featured on ASU Full Circle News, 2023.
- Carnegie Mellon University has listed PARA-ATM, along with its GitHub link, under its "Data and Tools" repository for community research and development.
- The National Academies of Sciences, Engineering, and Medicine lists GNATS and PARA-ATM as part of NASA ULI outcomes.
- PARA-ATM was featured on the NASA ULI tech talk, 2023.
- Air Traffic Technology Journal news featured PARA-ATM simulation software, 2023.
- Science X Network mentioned GNATS and PARA-ATM as revolutionary technologies for Next-gen air safety systems incorporating risk models and data analysis, 2023.
- Vanderbilt University highlighted the impacts of GNATS and PARA-ATM, 2023.

Peer review

- IEA conference, 2024.
- IISE Transactions on Occupational Ergonomics and Human Factors (Taylor & Francis) journal, 2024.
- Ergonomics (Taylor & Francis) journal, 2023.
- Human Factors and Ergonomics Society conference, 2023.