Harris Nisar
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Education

PhD Candidate in Industrial Engineering, CSL **Jan 2023 - May 2026**
University of Illinois at Urbana-Champaign (UIUC)
Advisor: Dušan M. Stipanović

Master of Science in Industrial Engineering **Jan 2020 - Dec 2022**
University of Illinois at Urbana-Champaign (UIUC)

Bachelor of Science in Bioengineering **Aug 2013 - May 2017**
University of Illinois at Urbana-Champaign (UIUC)

Work Experience

Pre-Doctoral Fellow (PhD Candidate) **Jan 2023 – Present**
Industrial and Enterprise Systems Engineering, University of Illinois at Urbana-Champaign

- Recipient of ISE William A. Chittenden II Graduate Student Fellowship which fully covers my research appointment for one year (AY 2025-26).
- Researching the learning dynamics of recurrent neural networks
- Developing a robotic platform for stroke rehabilitation in collaboration with occupational therapists at OSF St. Francis Hospital in Peoria, IL.
- Using the platform for the collection of patient data and training machine learning models to differentiate between healthy and patient subjects and to forecast patient movement to provide assistance through the robot.
- Taking technical courses in topics including machine learning, computer vision, and control theory.

Part-Time Student Data Scientist **June 2025 – Present**
John Deere, ISG, Machine Intelligence

- Leading the technical feasibility of predicting weed pressure from remote sensing data through deep learning to support John Deere's precision weed sprayers (See & Spray).
- Building PySpark pipelines combining times-series of satellite and equipment data from 100M+ acres, producing clean, leak-free training datasets (<2% duplicates, <5-hour runtime).
- Enabling rapid training of deep learning models on large datasets (>1 billion rows) of remote sensing time-series and machine data using distributed training pipelines, Hydra configuration files and scripts to launch training runs via the Databricks Jobs API.
- Presented model experimentation results to 150+ attendees at JDTechCon, John Deere's premier internal technical conference.
- Uncovered ~10% savings potential by fine-tuning See & Spray machine settings through the analysis of 100M+ acres of equipment data with PySpark and Pandas.
- Determined optimal satellite provider for weed detection through analysis of 100M+ acres of equipment and imagery timeseries data (0.15 -> 0.33 correlation improvement over 40 days).
- Created written and video documentation demonstrating how to use Databricks with VS Code, shared with 50+ data scientists and engineers.

Research Engineer **Sep 2024 – May 2025**
Health Care Engineering Systems Center, University of Illinois at Urbana-Champaign

- Designed a new algorithm to generate realistic timeseries data (eye tracking) conditioned on natural images using diffusion and cross attention, resulting in accepted conference paper to NeurIPS 2025.
- Lead data annotation efforts with a team of 9 workers, using Python-based open-source tools to enhance machine learning models for behavioral data analysis on over 200,000 frames.
- Developed data pipelines using Python (Pandas, NumPy, Matplotlib) to analyze video datasets, detect annotation outliers, and automate visualization pipelines, reducing processing time by 50%.
- Implemented MLOps frameworks to easily launch and track experiments using tools like TensorBoard and Weights & Biases, increasing number of experiments launched from 2 a week to 1 a day.
- Managed GPU computing resources of 2 high performing nodes with 8 GPUs in each for large-scale model training. Utilized these resources for distributed training, increasing experiment speed by 2x.
- Facilitated IRB agreements to receive sensitive video of children performing clinical exams from 3 collaborators. Developing Data Use Agreements and pipelines to efficiently transfer the data (over 5 TB).

Simulation Engineer **Sep 2019 – Sept 2024**
Health Care Engineering Systems Center, University of Illinois at Urbana-Champaign

- Developed 10 virtual and augmented reality simulations for education to enhance training effectiveness.
- Led multi-disciplinary teams of engineers, clinicians, and artists, during full project lifecycle from ideation to deployment.
- Conducted statistical analysis and applied time-series modeling techniques to enhance simulations, creating a data-driven feedback loop that improved user engagement metrics by over 50% during training sessions.
- Managed over $400K in funding, producing 10+ publications and presentations on simulation-based learning.

Simulation Engineer **Sep 2017 – Sep 2019**
OSF St. Francis Hospital, Peoria, IL

- Developed a Unity-based mobile application for patient education, integrating Firebase for backend storage and a React.js-based content management system to enable real-time content updates.
- Designed and built an internal web platform using HTML, CSS, and JavaScript to document simulation development workflows, standardizing system creation and delivery. Presented website to leadership receiving positive feedback.
- Managed and mentored over 30 summer interns, overseeing project logistics, providing technical guidance, and fostering professional development.

Publications

Xu Cao, Frank Yang, Vipin Gunda, Fiona Ryan, **Harris Nisar**, et al. **AI Models Facilitate the Automated Measurement of Social Gaze in During Naturalistic Interactions**, INSAR 2026 (Oral), DOI Coming Soon

Rosalba Hernandez, Killivalavan Solai, Soonhyung Kwon, Prasakthi Venkatesan, Drew Fast, Sandraluz Lara-Cinisomo and **Harris Nisar**, **Translating Behavioral Interventions into Virtual Reality: The Transcend Framework for Immersive Health Design,** Frontiers in Digital Health, section Health Technology Implementation, DOI Coming Soon

O. Kara*, **Harris Nisar***, J. M. Rehg, **DiffEye: Diffusion-Based Continuous Eye-Tracking Data Generation Conditioned on Natural Images**, NeurIPS 2025, https://doi.org/10.48550/arXiv.2509.16767 (* shared first authorship, ordered by last name)

Srikar Annamraju*, **Harris Nisar***, Dayu Xia*, Shankar A. Deka, Anne Horowitz, Nadica Miljković, Dušan M. Stipanović, **Robotic Trail Maker Platform for Rehabilitation in Neurological Conditions: Clinical Use Cases**, Under Review at International Journal of Social Robotics, Pre-print: https://doi.org/10.48550/arXiv.2504.19230 (* shared first authorship, ordered by last name)

Harris Nisar, Srikar Annamraju, Shankar A. Deka, Anne Horowitz, Dušan M. Stipanović, **Robotic mirror therapy for stroke rehabilitation through virtual activities of daily living,** Computational and Structural Biotechnology Journal, Dec 1 2024, https://doi.org/10.1016/j.csbj.2024.01.017

Srikar Annamraju, **Harris Nisar**, Anne Christine Horowitz, Dušan M. Stipanović, **Robotic Rehabilitation Through Multilateral Shared Control Architecture**, MDPI Robotics, Apr 16 2025, https://doi.org/10.3390/robotics14040050

Taehyun Kim, **Harris Nisar**, et al. **Beyond the Screen: Gestural Perspective-Taking with a Biochemistry Simulation**, ACM Conference on Human Factors in Computing Systems (CHI): Extended Abstracts, May 11 2024, https://doi.org/10.1145/3613905.3650816

Xiaoyu Tang, Aishwari Talhan, **Harris Nisar**, Robb Lindgren, Matthew Lira, **Good Vibrations: Feeling and Interpreting Haptic Feedback**, International Society of the Learning Sciences (Short Conference Paper), Mar 2025, https://shorturl.at/sI2fg

Taylor Gohman, **Harris Nisar**, et al. **Development and usability of a virtual reality umbilical venous catheter placement simulator**, International Journal of Computer Assisted Radiology and Surgery, Feb 2, 2024, https://doi.org/10.1007/s11548-024-03072-8

Harris Nisar, Nicole Rau, Taylor Gohman, M. Jawad Javed, Avinash Gupta, **Transfer Validity Testing of a Virtual Reality Simulation for Umbilical Venous Catheter Placement**, Journal of Perinatology, Feb 2025, https://doi.org/10.1038/s41372-025-02246-9

Rosalba Hernandez, **Harris Nisar**, et al. **Assessing Safety and Feasibility of Virtual Reality Intervention in Patients with Lung Cancer: A Pilot Study,** Journal of Supportive Cancer Care, Apr 2025, https://doi.org/10.1007/s00520-025-09338-4

Harris Nisar, Arnav Shah, Avinash Gupta, Abraham Kocheril, **A Participatory Design Approach to Develop a VR-Based Electrocardiogram Training Simulator,** HCI International. Copenhagen, Denmark, July 21-30, 2023, https://doi.org/10.1007/978-3-031-35634-6_34

Shrey Pareek, **Harris Nisar**, Thenkurussi Kesavadas, **AR3n: A Reinforcement Learning-based Assist-As-Needed Controller for Robotic Rehabilitation,** IEE Robotics and Automation Magazine, https://doi.org/10.48550/arXiv.2303.00085

Fanxin Wang, **Harris Nisar**, et al. **Low-Cost UVBot Using SLAM to Mitigate the Spread of Noroviruses in Occupational Spaces."** *Sensors* 2022, *22*, 8926. https://doi.org/10.3390/s22228926

Avinash Gupta, **Harris Nisar**, **An Improved Machine Learning Framework to Assess Extended Reality based Simulators for Healthcare Contexts,** IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE). Washington, D.C., USA, November 17-19, 2022

Lydia Lee, **Harris J Nisar**, et al. **Face and Content Validation of Food Safety Training in Virtual Reality (VR),** IEEE SeGAH, Sydney, Australia, August 10-12, 2022, 10.1109/SEGAH54908.2022.9978588

Naveen Sankaran, **Harris J Nisar**, et al. **Efficacy Study on Interactive Mixed Reality (IMR) Software with Sepsis Prevention Medical Education,** IEEE Virtual Reality, Osaka, Japan, March 25-27, 2019. 10.1109/VR.2019.8798089

Funding

Jump ARCHES (Applied Research for Community Health through Engineering and Simulation) program, University of Illinois at Urbana-Champaign, **Phase 1: Virtual reality simulation training for neonatal procedures**, 1/18/2022-1/17/2023, P325, Nicole Rau (PI), Harris Nisar (co-PI), **$38,921.00**

Jump ARCHES, University of Illinois at Urbana-Champaign, **Phase 1: Virtual Reality to Deliver Psychotherapy to Lung Cancer Patients with Depression**, 1/21/2020-12/31/2023, Rosalba Hernandez (PI), Harris Nisar (co-PI), **$75,000**

Jump ARCHES, University of Illinois at Urbana-Champaign, **Phase 1: Virtual Reality Based Visualization and Simulation of Electrocardiogram**, 11/01/2021-10/31/2023, Harris Nisar (PI), Abraham Kocheril (co-PI), **$69,211**

Jump ARCHES, University of Illinois at Urbana-Champaign, **Phase 2: Telerehabilitation of Stroke Patients through an Adaptive Multirobot Architecture**, 1/1/2023-12/31/2024, P386, Dušan M. Stipanović (PI), Harris Nisar (PhD student), **$199,733**

Jump ARCHES, University of Illinois at Urbana-Champaign, **Phase 0: Mixed Reality (MR) Approach to Create Cyber Physical Training Simulation Environments for Neonatal Procedures**, 1/1/2023-6/1/2023, Avinash Gupta (PI), Harris Nisar (Senior Staff), **$25,000**