

Ashish Jaiswal PH.D.

Graduate Research Assistant

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I am a Research Scientist at Meta, with a Ph.D. in machine learning and computer vision, specializing in enhancing human-computer interaction. With over four years of research experience, I have developed expertise in statistical analysis, supervised and unsupervised machine learning (ML), deep learning (DL) algorithms, and signal processing. My research has been published in **15 publications** and cited over **1200** times.

EDUCATION

- 12/2023 **Ph.D. in Computer Science** | University of Texas at Arlington (UTA), Arlington, TX
08/2019 > Dissertation : *An Intelligent Multi-modal Framework Towards Assessing Human Cognition*
> GPA : 3.86 | Focus : Multi-modal Analysis to assess Human Cognition
- 07/2018 **Bachelors in Electronics & Comm. Engineering** | Tribhuvan University, Nepal
10/2014 > Project : *KrishiSathi : Recommendation Tool for Farmers using Machine Learning to Increase Production*

PROFESSIONAL EXPERIENCE

- 01/2024 **Research Scientist, META, Menlo Park, CA, USA**
Present > Facebook Navigation ML Team
> Enhancing user navigation experience in the Facebook app by incorporating relevant badging and notification signals through machine learning and generative AI.
Machine Learning Generative AI
- 12/2023 **Graduate Research Assistant, UNIVERSITY OF TEXAS AT ARLINGTON, Arlington, TX, USA**
08/2020 > Built a machine learning tool to **detect cognitive fatigue (CF)** in subjects with **spinal cord injuries** while performing day-to-day tasks using multi-modal wearable physiological sensors (ECG, EDA, EEG) and vision sensors (RGB, depth cameras).
> Applied deep learning techniques to **detect cognitive fatigue (CF)** in people with **Traumatic Brain Injuries (TBI)** through **fMRI** scans.
> Developed an automated assessment system (**A TEC**) using computer vision and machine learning to assess embodied cognition (EC) in children through human activity recognition and classification in videos while they performed clinically-approved physical movements/tasks. Applied self-supervised learning techniques to improve the overall performance.
Python PyTorch Computer Vision Deep Learning Wearable Sensors Self-supervised Learning
- 08/2022 **Software Engineering Intern, Machine Learning, META, Menlo Park, CA, USA**
05/2022 > Worked with the Audio-Video Understanding team to build a system that visualizes the current popular trends going on in REELS videos uploaded on Facebook and Instagram.
> Techniques applied : **Unsupervised Clustering** of videos, **NLP** to assign topics to clusters generated, **UI Dashboard**, and **Search Indexing API** for video search based on topics generated.
> My POC was used to pitch in as a service for other clients in the company by my team manager.
Visualization Unsupervised clustering Search Indexing NLP
- 08/2020 **Graduate Teaching Assistant, UNIVERSITY OF TEXAS AT ARLINGTON, Arlington, Texas, USA**
08/2019 > **Courses taught** : Human-Computer Interaction, Advanced Programming, Computer Hardware/Software Systems (Raspberry Pi Labs).
Teaching Programming Software Engineering Hardware Engineering
- 07/2019 **Scientific Applications Programmer, SOCIALEYES NP, Kathmandu, Nepal**
04/2019 > Researched and implemented computer vision techniques with transfer learning to detect diseases from retinal images targeting macular degeneration with **89% classification accuracy**.
> Built a risk analysis matrix dashboard to visualize patient's health information.
Image Processing Deep Learning Amazon AWS Visualization

05/2019 | **Software Engineer, INSIGHT WORKSHOP, Kathmandu, Nepal**
 12/2017

- > Developed the core internal system of a national frozen beverage enterprise in the US inciting a high ground in its space and extending growth rate.
- > Built MVP for a healthcare startup in the US that digitizes real-time health information for patients with IoT and empowers the practitioner-patient relationship

Python Django Amazon AWS JavaScript Angular

TECHNICAL SKILLS

Programming Python, C, C++, JavaScript, MATLAB, AVR/Arduino, Bash/Zsh.
Machine Learning & Analysis PyTorch, TensorFlow (Keras), NumPy, Pandas, Matplotlib, Scikit-learn, SQL, AWS Aurora.
Software Tools Git, Github, Jupyter Notebooks, VS Code, ROS.
OS Systems Linux, Mac, Windows, AWS EC2, RDS, Lambda.
Skills Currently Acquiring Large Language Models (Transformers), Diffusion Models.

SELECTED PROJETS

COLLABORATIVE RESEARCH : DARE : A PERSONALIZED ASSISTIVE ROBOTIC SYSTEM THAT ASSESSES COGNITIVE FATIGUE IN PERSONS WITH PARALYSIS (NSF GRANT : 2226164) 2022 - 2025

Project Description

The objective of this project is to design and develop an end-to-end personalized assistive robotic system, called iRCSA (Intelligent Robotic Cooperation for Safe Assistance), to recognize, assess, and respond to a human's cognitive fatigue during human-robot cooperation. The focus of the system is on human-robot cooperative tasks where a human with SCI and a robot cooperate during daily tasks (e.g., cooking). Students who have experienced SCI will be involved in every stage of the project, to ensure the acceptability and usability of the proposed system. This project will develop an end-to-end framework for online cognitive fatigue assessment as part of the proposed Human-Robot Cooperation (HRC) system, which constitutes a breakthrough in the ability to effectively integrate the human component in the adaptation (personalization) of assistive robots and address key HRC challenges through these three thrusts : The development of a novel human-technology system for online cognitive fatigue assessment using multimodal data; the development of an adaptive robotic system for personalized interaction based on cognitive fatigue assessment; and an experimental testbed of HRC scenarios to enable HRC, machine/deep learning, and robotic systems computational advances.

assistive robots human-robot cooperation cognitive fatigue cognitive assessment personalization computer vision wearable sensors biomedical signals

CHS : COLLABORATIVE RESEARCH : COMPUTATIONAL SCIENCE FOR IMPROVING ASSESSMENT OF EXECUTIVE FUNCTION IN CHILDREN (NSF GRANT : 1565328) 2016 - 2022

Project Description

Attention deficit hyperactivity disorder (ADHD) is a psychiatric neurodevelopmental disorder that is very hard to diagnose or tell apart from other disorders. In this project, an interdisciplinary team of computer and neurocognitive scientists will develop and implement transformative computational approaches to evaluate the cognitive profiles of young children and to address these issues. The goal of this research is devising new human motion analysis and computer vision algorithms that can automatically assess embodied cognition during structured physical activities, and which will constitute a breakthrough in improving the accuracy and efficiency of cognitive assessments of young children. Intelligent mining techniques will be used to discover new knowledge about the role of physical exercise in cognitive training and to find correlations between individual metrics and degree of improvement over time.

Embodied cognition cognitive assessment physical exercise human motion analysis computer vision (CV) cognitive training neurocognitive executive function cognitive impairment behavioral science human behavior Psychology

PFI:BIC : IWORK, A MODULAR MULTI-SENSING ADAPTIVE ROBOT-BASED SERVICE FOR VOCATIONAL ASSESSMENT, PERSONALIZED WORKER TRAINING AND REHABILITATION (NSF GRANT : 1719031) 2017 - 2022

Project Description

The focus of this project is to develop a smart robot-based vocational assessment and intervention system to assess the physical, cognitive and collaboration skills of an industry worker while he/she performs manufacturing tasks in a simulated industry setting and collaborating with a robot to do the task. The aim is to transform traditional vocational training and rehabilitation practices into an evidence-based and a personalized system that can be used to (re)train, retain, and prepare workers for robotic factories of the future.

personalized vocational training vocational safety training robot collaboration simulation reduce risk of injury simulated industry setting assistive robots cognitive activities monitoring human-robot interaction collaboration skills training intelligent manufacturing environment

CERTIFICATIONS

COLUMBIA UNIVERSITY, EDX **Micro-Masters Program** CSMM.101x : AI CSMM.102x : Machine Learning CSMM.103x : Robotics
 COURSERA **deeplearning.ai** Neural Networks and Deep Learning
 CODEPATH **Advanced Software Engineering** Fall 2021
 LINKEDIN ASSESSMENT **Skills** Python Machine Learning JavaScript MySQL JSON Git jQuery

Conferences and Journals	> HCII 2023, Session Chair (Technologies for Wellness, Health, and Well-being)	07/2023
	> ACM PETRA, Workshop Organizer/Session Chair (Assistive Technologies for Activities of Daily Living) 07/2023	
	> ACM PETRA, Doctoral Consortium Award, Corfu, Greece	07/2023
	> ACM PETRA, Best Poster Award, Corfu, Greece	06/2022
	> ACM PETRA, Doctoral Consortium Award, Corfu, Greece	06/2022
University of Texas at Arlington	> Dissertation Fellowship Award (Office of Graduate Studies)	2023
	> John S. Schuchman Outstanding Doctoral Student	2022
	> Fellowship - Graduate L3/Harris Award for Innovation from L3/Harris	2020
	> STEM Tuition Fellowship	2019 - PRESENT
Others	> Fusemachines AI Scholar, Practical Hands on AI and Deep Learning	2018
	> Best Engineering Award - IOE Robocon (National Robotics Competition)	2018
	> Tech Diversity Scholarship - Code for Nepal	2017
	> Full Tuition Scholarship - Bachelors in Electronics & Comm. Engineering, TU	2014

 PUBLICATIONS & PRESENTATIONS

Ph.D. Thesis

Ashish Jaiswal. *An Intelligent Multi-Modal Framework Towards Assessing Human Cognition.* PhD thesis, University of Texas at Arlington, 2023

Journal Papers

- J1. **A. Jaiswal**, A.R. Babu, M. Zaki Zadeh, D. Banerjee, and F. Makedon. A survey on contrastive self-supervised learning. *Technologies*, 9:2, 12 2020
- J2. H.R. Pavel, E. Karim, **A. Jaiswal**, S. Acharya, G. Nale, M. Theofanidis, and F. Makedon. Assessment of cognitive fatigue from gait cycle analysis. *Technologies*, 11(1):18, 2023
- J3. M. Zaki Zadeh, A.R. Babu, **A. Jaiswal**, and F. Makedon. Self-supervised human activity representation for embodied cognition assessment. *Technologies*, 10(1):33, 2022
- J4. S. Doolani, C. Wessels, V. Kanal, C. Sevastopoulos, **A. Jaiswal**, H. Nambiappan, and F. Makedon. A review of extended reality (xr) technologies for manufacturing training. *Technologies*, 8(4):77, 2020

Conference Papers

- C1. **A. Jaiswal**, M. Zaki Zadeh, A. Hebri, A.R. Babu, and F. Makedon. A smart sensor suit (sss) to assess cognitive and physical fatigue with machine learning. In *International Conference on Human-Computer Interaction*, pages 120–134. Springer, 2023
- C2. **A. Jaiswal**, A.R. Babu, M. Zaki Zadeh, G. Wylie, and F. Makedon. Detecting cognitive fatigue in subjects with traumatic brain injury from fmri scans using self-supervised learning. In *Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments*, pages 83–90, 2023
- C3. **A. Jaiswal**, A. Hebri, H.R. Pavel, M. Zaki Zadeh, and F. Makedon. Smartfunction : An immersive vr system to assess attention using embodied cognition. In *The 16th Pervasive Technologies Related to Assistive Environments Conference*, 2023
- C4. E. Karim, H.R. Pavel, **A. Jaiswal**, M. Zaki Zadeh, M. Theofanidis, G. Wylie, and F. Makedon. An eeg-based cognitive fatigue detection system. In *Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments*, pages 131–136, 2023
- C5. M. Zaki Zadeh, **A. Jaiswal**, H.R. Pavel, A. Hebri, R. Kapoor, and F. Makedon. Large-scale self-supervised human activity recognition. In *Proceedings of the 15th International Conference on Pervasive Technologies Related to Assistive Environments*, pages 298–299, 2022
- C6. R. Kapoor, **A. Jaiswal**, and F. Makedon. Light-weight seated posture guidance system with machine learning and computer vision. In *Proceedings of the 15th International Conference on Pervasive Technologies Related to Assistive Environments*, pages 595–600, 2022
- C7. H.R. Pavel, E. Karim, M. Zaki Zadeh, **A. Jaiswal**, R. Kapoor, and F. Makedon. Automated system to measure static balancing in children to assess executive function. In *Proceedings of the 15th International Conference on Pervasive Technologies Related to Assistive Environments*, PETRA '22, page 569–575, New York, NY, USA, 2022. Association for Computing Machinery

- C8. M. Zaki Zadeh, A.R. Babu, **A. Jaiswal**, M. Kyrarini, and F. Makedon. Self-supervised human activity recognition by augmenting generative adversarial networks. In *The 14th PErvasive Technologies Related to Assistive Environments Conference*, PETRA 2021, page 171–176, New York, NY, USA, 2021. Association for Computing Machinery
- C9. M. Zaki Zadeh, A.R. Babu, **A. Jaiswal**, M. Kyrarini, M. Bell, and F. Makedon. Automated system to measure tandem gait to assess executive functions in children. In *The 14th PErvasive Technologies Related to Assistive Environments Conference*, PETRA 2021, page 167–170, New York, NY, USA, 2021. Association for Computing Machinery
- C10. A.R. Babu, M. Zaki Zadeh, **A. Jaiswal**, A. Lueckenhoff, M. Kyrarini, and F. Makedon. A multi-modal system to assess cognition in children from their physical movements. In *Proceedings of the 2020 International Conference on Multimodal Interaction*, pages 6–14, 10 2020
- C11. F. Farahanipad, H.R. Nambiappan, **A. Jaiswal**, M. Kyrarini, and F. Makedon. Hand-reha : dynamic hand gesture recognition for game-based wrist rehabilitation. In *Proceedings of the 13th ACM International Conference on PErvasive Technologies Related to Assistive Environments*, pages 1–9, 2020