Ashish Jaiswal Ph.D.
Graduate Research Assistant

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With over **four years of extensive research experience** in machine learning and human-computer interaction, I am confident that I can deliver valuable insights through advanced data-driven methods and data analytics. My expertise in signal processing, statistical analysis, supervised and unsupervised machine learning (ML), and deep learning (DL) algorithms has enabled me to conduct classification and regression analysis on various data modalities successfully. My research focuses on applying self-supervised learning to obtain effective representations of high-dimensional data and combining multiple data modalities for better performance, which has been demonstrated through my **10+ publications and 700+ citations**.

🎓 EDUCATION

Present 08/2019	**Ph.D. in Computer Science** | University of Texas at Arlington (UTA), Arlington, TX 　❯ Dissertation : *A Multi-Modal Assessment Framework for Understanding Human Behavior and Cognition* 　❯ GPA : 3.86 | Focus : Multi-modal Analysis to assess Human Cognition
07/2018 10/2014	**Bachelors in Electronics & Comm. Engineering** | Tribhuvan University, Nepal 　❯ Project : *KrishiSathi : Recommendation Tool for Farmers using Machine Learning to Increase Production*

💼 PROFESSIONAL EXPERIENCE

Present Sep 2020	Graduate Research Assistant, UNIVERSITY OF TEXAS AT ARLINGTON, Arlington, TX, USA 　❯ Building 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 **(ATEC)** 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`
Aug 2022 May 2022	Machine Learning Intern, META INC., Menlo Park, CA, USA 　❯ 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`
Aug 2020 Aug 2019	Graduate Teaching Assistant, UNIVERSITY OF TEXAS AT ARLINGTON, Arlington, Texas, USA 　❯ **Courses taught :** Human-Computer Interaction, Advanced Programming, Computer Hardware/Software Systems (Raspberry Pi Labs). `Teaching` `Programming` `Software Engineering` `Hardware Engineering`
Jul 2019 Apr 2019	Scientific Applications Programmer, SOCIALEYES NP, Kathmandu, Nepal 　❯ 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`
May 2019 Dec 2017	Software Engineer, INSIGHT WORKSHOP, Kathmandu, Nepal 　❯ 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`

🏆 Honors & Awards

Conferences and Journals		
	› 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 Proposal

Ashish Jaiswal. *A Multi-Modal Assessment Framework for Understanding Human Behavior and Cognition*. PhD thesis, University of Texas at Arlington, 2023

Journal Papers

J1. M. Zaki Zadeh, A.R. Babu, **A. Jaiswal**, and F. Makedon. Self-supervised human activity representation for embodied cognition assessment. *Technologies*, 10(1), 2022

J2. **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

J3. 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 *Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management. Anthropometry, Human Behavior, and Communication : 14th International Conference, DHM 2023, Held as Part of the 25th HCI International Conference, HCII*, 2023 *(Accepted)*

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 *The 16th PErvasive Technologies Related to Assistive Environments Conference*, 2023 *(Accepted)*

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 *(Accepted)*

C4. 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

C5. 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

C6. 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

C7. 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