Abdelrahman Abdelkader

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EDUCATION

University of Rochester **Rochester, NY**

B.S. in Computer Science, Minor in Electrical Engineering *May 2021*

- GPA: 3.6 out of 4.00; Dean's List 5 out of 7 semesters
- Dean's Scholarship Award for Academic Achievement
- Discover Grant for Undergraduate Summer Research
- Advanced Coursework: *Computer Vision, Data Mining, Artificial Intelligence, Computer Networks, Database Systems, Advanced Cryptography, Computer Security, Computer Organization, Logic Design, Circuits I & II, Embedded Systems and Microcontrollers, Advanced Data Analysis, Computer Networks, Robotics, Design and Analysis of Efficient Algorithms.*

Research Interests

Multimodal Learning, Computer Vision , Medical AI, Secure Machine Learning, Co-Learning, and NLP.

Publications

Using AI to measure Parkinson Severity at Home

Nature npj Digital medicine 2023 [Paper] [Demo]

Md. Saiful Islam, Wasifur Rahman, ***Abdelrahman Abdelkader*** *et al.*

A User-Centered Framework to Empower People with Parkinson's Disease

The Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT 2023)

Wasifur Rahman**, Abdelrahman Abdelkader** et al.

Auto-Gait: Automatic Ataxia Risk Assessment with Computer Vision on Gait Task Videos

The Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT 2022) [Paper]

Wasifur Rahman, Masum Hasan, Md Saiful Islam, Titilayo Olubajo, Jeet Thaker, **Abdelrahman Abdelkader** et al.

PARK: Parkinson's Analysis with Remote Kinetics Tasks

Affective Computing and Intelligent Interaction (ACII) 2023 Demo Track

Md Saiful Islam, Sangwu Lee, ***Abelrahman Abdelkader****, Sooyoung Park, Eshan Hoque*

EXPERIENCE

University of Rochester **Rochester, NY**

Medical Machine Learning Researcher *July 2021 – Present*

- Develop early fusion models to diagnose PD through analysis of a speech and facial task and achieved AUC of 0.80.
- Extracted medically relevant features from task-specific videos using Mediapipe and OpenFace.
- Train deep learning and tree-based models to predict audio and facial tremors and achieved MAE of 0.25.
- Automated data collection and standardization for data from 7 study protocols containing 30k+ videos.
- Published 3 research papers in top journals, including npj Digital Medicine and IMWUT.

Secure Aggregation Research Assistant, Cryptography Research Group *May 2020 – March 2021*

- Developed a Rust server-client architecture to implement a Secure Aggregation Machine Learning platform.
- Assisted in implementing a library for FFT in 128-bits large prime fields to compute packed secret sharing efficiently.

Head Teaching Assistant *January 2020 – May 2021*

- Lead weekly TA meetings for organizing study sessions, proctoring exams, and grading projects and assignments.
- Support students' learning of complex topics such as data visualization, data pre-processing, frequent pattern mining, classification methods, cluster analysis, outlier detection, heuristic search, and automated reasoning.
- Taught Artificial Intelligence, Data Mining, Data Structures & Algorithms, and Intro to CS courses.

Cloud AI Solutions **Toronto, Canada (Remote)**

Backend Engineer Intern *January 2022 – February 2022*

- Worked in a cross-border team to create AI based solution.
- Implemented integration with Azure and AWS from extractions services via implementing universal secure REST API that is back-end agnostic.

MACHINE LEARNING PROJECTS

ArXiv Vectors | Python, Pinecone | [demo]

- Deployed an LLM embedding based vector search service for arXiv papers from 2010 to now.
- Indexed over 200K+ arXiv documents for vector embedding search.
- Improved search latency by 300% to achieve < 1 second search latency.

INDEPENDENT PROJECTS

Work-Out Assistant | TensorFlow **Spring 2021**

- Built a machine vision model to detect incorrect posture while working out to limit exercise-related injuries.
- Incorporated state-of-the-art data augmentation methods to overcome small-data bottleneck.

Studying Transposable Elements (TEs) | Python, R **Spring 2020**

- Applied Frequent Pattern Mining to study the association between different Transposable Elements.
- Predicted the insertion sites of TEs based on their target site duplication using Support Vector Machines.

Joystick-Controlled Robot | C **Fall 2020**

- Assembled a 2-wheel robot using a PIC32 microcontroller, Raspberry Pi, gamepad, and gearmotors.
- Implemented SPI and UART communication protocols to direct the robot movements.

CAMPUS LEADERSHIP ACTIVITIES

University of Rochester **Rochester, NY**

President & Publicity Chair, Student Association for the Development of Arab Cultural Awareness August 2018 – Present

- Lead weekly executive board meetings and develop semester-long plans for cultural and social events.
- Organized the largest benefit dinner led by a UofR student organization hosting more than 300 guests.