Rachel A. G. Adenekan

medical technologies • haptics • biomechanics • mechatronics • data science
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EDUCATION

Stanford University
Master of Science in Mechanical Engineering (2019), PhD in Mechanical Engineering (Fall 2023)
Relevant courses: Mechatronics, Algorithms, Applied Machine Learning, Statistical Learning, Deep Learning, AI for Health, AI for Disease Diagnosis and Info. Rec., Biomechanics of Movement, Modeling and Simulation of Human Movement, Orthopaedic Bioeng., Engineering Design Optimization, Controls, Probability and Statistics, Linear Dynamical Systems

Massachusetts Institute of Technology (MIT)
Bachelor of Science in Mechanical Engineering, Minor: Music (2017) GPA: 4.6/5.0

HONORS AND AWARDS

National Science Foundation Graduate Research Fellow 2019-2022
Stanford Enhancing Diversity in Graduate Education Fellow 2019-2022
Stanford Graduate Fellow (Medtronic Foundation Fellow) 2017-2022
MIT Lincoln Labs Undergraduate Research and Innovations Scholar 2015

SKILLS

Software: C++, Embedded C, Python, Tensorflow, MATLAB & Simulink, Arduino
Biomechanics: Motion Capture, Electromyography, Respirometry, Exoskeleton Control and Assistance, OpenSim
Misc: Haptics, Mechatronics

RESEARCH EXPERIENCE

Collaborative Haptics and Robotics in Medicine Laboratory
PhD Candidate with Prof. Allison Okamura, Co-advisor: Prof. Scott Delp Fall 2021-Present
Developing and deploying a mobile phone-based instrument for measuring vibrotactile sensory acuity

- Characterized mobile phone vibrations in comparison to clinical tuning fork vibrations
- Planned a study to use the mobile phone as a diagnostic tool for measuring sensory neuropathy
- Planned a set of studies to use the mobile phone to study vibration sensitivity in a wide population of users and determine optimal training methods to enhance sensorimotor performance

Stanford Biomechatronics Laboratory
PhD Candidate with Prof. Steve Collins, Co-advisor: Prof. Scott Delp Jan 2018-Summer 2021
Studied human response to wearable robotic devices called exoskeletons. Our goal was to develop methods of controlling these devices so that they could be used to enhance balance ability in older adults.

Stanford Mechatronics Design Sequence Fall 2017-Spring 2018
Project Member
Designed and developed an autonomous robot capable of using SPI communication protocols and multiple sensing modes including color gradients, IR emitter and receiver pairs, and tape sensors to navigate a field and perform game tasks. Utilized hierarchical event driven programming and state diagrams to determine system behavior. Devised multiple user interactions using IR sensing and audio input to control system behaviors. Integrated visual, audio, and haptic feedback based on user input and system state.

Politecnico Di Milano's Movement Biomechanics and Motor Control Lab
MIT MISTI Research Intern Scholar Summer 2017
Assisted graduate students in using motion capture to analyze the kinematics and kinetics of amputees and assess the efficacy of their prostheses.

MIT's Soft Active Materials Lab and MIT's Lincoln Lab
Lincoln Labs Undergraduate Research & Innovation Scholar Fall 2015-Dec 2016
Collaborated with an interdisciplinary team to design conductive, tough, stretchable, and biocompatible hydrogels that could create a seamless interface between electronics and biological tissues. Awarded for Advanced Research in Mechanical Engineering. Presented at EECScon, MIT's premier undergraduate research conference, in 2016.

MIT's Laboratory for Energy and Microsystems Innovation
Undergraduate Research Assistant Summer 2015
Fabricated a flexible nanoparticle separation prototype that uses microfluidics and electrokinetics to separate catalytic nanoparticles in oil refining processes. Sponsored by the oil company Saudi Aramco. Also helped develop and publish a paper on a novel method of designing conductive hydrogel films.

TEACHING EXPERIENCE

Teaching Assistant, Biomechanics of Movement ME281, Stanford, CA Winter 2021
MIT Global Teaching Labs Instructor, Various High School STEM Classes, Badalona, Spain Jan. 2017

PUBLICATIONS AND PRESENTATIONS

R. Adenekan, B. Huerta, K. Yoshida, C. Nunez, and A. M. Okamura, "Comparison of Sensory Diagnostic Tuning Fork Vibrations and Smartphone Vibrations," *in preparation for submission to Eurohaptics 2022*.

R. Adenekan, S. H. Collins, "Balance enhancing controller for an ankle exoskeleton," Dynamic Walking, Canmore, Canada, June 3-6, 2019.

Y. S. Joung, R. B. Ramirez, E. Bailey, **R. Adenekan**, & C. R. Buie, Conductive hydrogel films produced by freestanding electrophoretic deposition and polymerization at the interface of immiscible liquids. *Composites Science and Technology*, (2017)153, 128-135

R. Adenekan, H. Yuk, X. Zhao, "Hydrogel Neural Probe," *EECSCon*, Cambridge, Massachusetts, 2016

LEADERSHIP / ACTIVITIES

Neuromuscular Biomechanics Lab Outreach Committee Member Summer 2020-Present
Organized a recruitment event for new graduate students at Stanford. Helped with a video to showcase the lab's work for Stanford SERGE, a program to recruit rising junior and senior undergraduate students.
Stanford Enhancing Diversity in Graduate Education Mentor Fall 2021-Present
Mentoring early-stage doctoral students in Mechanical Engineering
Stanford School of Engineering Graduate Student Recruiter Fall 2019-Spring 2020
Selected by Stanford School of Engineering's diversity office to travel to undergraduate institutions and recruit under-represented minority students.
BrainOn, Science Podcast for Kids, Guest Speaker Summer 2020
Featured on the Oct 6, 2020 episode at time 40:25 to explain why humans swing their arms when they walk.
Stanford STEM Fellows Mentor Fall 2019 - Fall 2020
Mentoring undergraduate students who are interested in pursuing graduate education in engineering
Bay Area Graduate Pathways to STEM Committee Member and Advisor 2018- 2019
Organized informative workshops that prepare undergraduate students for the graduate school application process. Encouraged my graduate student peers to serve as mentors.
Center for Sensorimotor Neural Engineering Hackathon Winner Spring 2017
Developed an interactive rehabilitation system for patients with foot drop. Our system used muscle activity measurements to drive audio and visual feedback which allowed users to better understand their improvement in assigned exercises in a clear and motivating manner.
MIT's Design For America, Service and Outreach Team Co-Founder Fall 2015 -Fall 2016
Partnered with a local high school to offer disadvantaged students interactive workshops on skills ranging from 3D modeling and printing to basic electronics and Arduino software.