

A. Michael West Jr. – Massachusetts Institute of Technology, Mechanical Engineering, PhD Candidate

Cambridge, Massachusetts • e-mail: amwestjr@mit.edu • website: www.linkedin.com/in/aaron-west-jr/

EDUCATION

Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts

Ph.D., Mechanical Engineering, Class of 2024, GPA: 5.0/5.0

- Dissertation Topic: The Role of Functional Kinematic Hand Synergies in Object Manipulation.
- Advisor: Neville Hogan

M.S., Mechanical Engineering, May 2020, GPA: 4.5/5.0

Yale University, New Haven, Connecticut

B.S., Mechanical Engineering, May 2018, GPA: 3.5/4.0, Major GPA: 3.6/4.0

RESEARCH INTERESTS

My research seeks to better control algorithms for robots involved in rehabilitation, and dexterous manipulation. I investigate human upper-limb motor control and human hand manipulation during tool-use and physical-interaction. By introducing new methods of analyzing human motor control and exploiting old methods on new experimental paradigms, my work leads to new insights on human motor control and perception.

TECHNICAL SKILLS

- Hardware: rapid prototyping using 3D printers, laser cutters, & machine shop tools (mill & lathe).
- Software: CAD (Solidworks, Creo Parametric), Programming (C, C++, Matlab, Python, Arduino, Machine Learning), MuJoCo, Drake, Visual Studio, Microsoft Office.

RESEARCH EXPERIENCE

Graduate Student, MIT, Newman Laboratory for Biomechanics & Human Rehabilitation 2018 – Present

- Exploring how kinematic analysis of the human hand can be used to estimate the complexity of a piano score.
- Collecting & analyzing data on human hand manipulation of complex objects & tools.
- Investigated how humans estimate hidden mechanical properties of another's limbs simply by observing their motions.
- Conducted human subject experiment to analyze how humans control force during motion.

Undergraduate Research Assistant, Yale Biomechanics & Control Lab Fall 2017 – Spring 2018

- Designed & conducted an experiment to produce a geometric theory that models limb movement using joint surface features.

Design Engineering Student, Yale University, Medical Device Design & Innovation Fall 2016 – Fall 2017

- Designed & built a 125-part saw guide to improve sternotomies & decrease complications stemming from sternal non-union.

Undergraduate Research Assistant, Yale University, Social Robotics Laboratory Summer 2016

- Designed & built the interior & exterior components of a social robot's articulating face to improve infant-robot interaction.

WORK EXPERIENCE

Robotic Design Intern, Medtronic, North Haven Summer 2018

- Designed & built the first prototype of an articulating endoscope to interface with a surgical robot, using Creo Parametric 3.0.
- Implemented the endoscopes controller model using Simuscape 2017.

Computer Lab Technician, Yale University, Yale Student Technology Collaborative (STC) 2017 – 2018

- Worked as an STC Operations staff member to repair hardware & software issues of on-campus lab computers.

Design Aide, Yale University, Center for Engineering Innovation & Design (CEID) 2017 – 2018

- Provided theoretical & technical expertise to students seeking help on design projects in the Yale CEID.

COMMUNITY SERVICE & OUTREACH

Graduate Resident Advisor, MIT New Vassar Dormitory Fall 2020 – Present

- Fosters a supportive, safe, & positive living environment for students through events built upon shared community standards.

Treasurer, MIT Black Graduate Student Association (BGSA) Spring 2021 – Spring 2022

- Allocated & managed funds to hold community service & social events for MIT's Black graduate students.

Treasurer, MIT Academy of Courageous Minority Engineers (ACME) Spring 2019 – Spring 2022

- Allocated & managed funds for a group of minority engineers who met weekly to discuss career goals & hold each other accountable in achieving those goals.

Pod Leader, MIT Summer Research Program Summer 2019 & Summer 2021

- Organized meetings & events to foster a positive climate for undergraduate minority students conducting research at MIT.

STEM Outreach Ambassador, Yale Admissions office Spring 2017 – Spring 2018

- Mentored high school students, who had expressed interest in pursuing STEM fields, in making an informed college decision.

Vice President, National Society of Black Engineers (NSBE) Yale Chapter Spring 2016 – Spring 2017

- Founded a tutoring service at New Haven Academy Elementary School.
- Facilitated chapter meetings & increased comradery through encouraging African-Americans to continue pursuing STEM fields. Assisted in managing organization finances in efforts to sponsor members to attend the national conferences.

Vice President, Yale's Zeta Psi Fraternity Chapter Spring 2016 – Spring 2017

- Served as board member, with the primary role of increasing recruitment, fostering brotherhood, & improving philanthropy.

Defensive End & Linebacker, Yale University Football Fall 2014 – Summer 2016

- Responsibilities included 30+ hours a week of film study, practice, strength & conditioning, & encouraging teammates.

HONORS & AWARDS

Accenture Fellowship, Massachusetts Institute of Technology 2023

Mechanical Engineering Research Exhibition (MERE), Honorable Mention Best Overall Performance, Massachusetts Institute of Technology 2023

BAMIT Research SLAM, 2nd Place, Black Alumni of MIT (BAMIT) 2023

Takeda Fellowship, Massachusetts Institute of Technology 2022

Ben Gold Fellowship, Massachusetts Institute of Technology 2021

Ford Foundation Fellowship, Ford Foundation 2020

GEM University Associate Fellowship, Massachusetts Institute of Technology 2018 & 2020

Ford Foundation Fellowship Honorable Mention, Ford Foundation 2018

UCEM SLOAN Scholar , Massachusetts Institute of Technology	2018
OGE Diversity Fellowship , Massachusetts Institute of Technology	2018
Student Design Showcase, 3rd Place , Design of Medical Devices Conference	2017

JOURNAL PAPERS

1. **West, A. M.** & Hogan, N. (In Progress). Kinematic Hand Synergies differ during Object Manipulation: The Importance of Thumb Rotation. *Journal of Neurophysiology*.
2. **West, A. M.**, Huber, M.E., & Hogan, N. (2022). Role of Path Information in Visual Perception of Joint Stiffness. *PLOS Computational Biology*.
3. **West, A. M.**, Hermus, J., Huber, M., Maurice, P., Sternad, D., & Hogan, N. (2022). Dynamic Primitives Limit Human Force Regulation during Motion. *IEEE Robotics and Automation Letters*.

CONFERENCE PAPERS

1. **West, A. M.**, Tessari, F. & Hogan, N. The Study of Complex Manipulation via Kinematic Hand Synergies: The Effects of Data Pre-Processing. *IEEE International Consortium for Rehabilitation Robotics*.

CONFERENCE ABSTRACTS

1. **West, A. M.**, Tessari, F. & Hogan, N. (September 2023). The Study of Complex Manipulation via Kinematic Hand Synergies: The Effects of Data Pre-Processing. *IEEE International Consortium for Rehabilitation Robotics*, Singapore, Singapore.
2. **West, A. M.**, & Hogan, N. (2023, April). Kinematic Hand Synergies Differ during Tool-Use and Object Manipulation. Poster presented at the 2023 *Society for Neural Control of Movement Conference*, Victoria, BC, Canada.
3. **West, A. M.**, Hermus, J., Huber, M., Maurice, P., Sternad, D., & Hogan, N. (2022, May). Dynamic Primitives Limit Human Force Regulation during Motion. PowerPoint and poster presented at the 2022 *International Conference of Robotics and Automation*, Philadelphia, PA, USA.
4. **West, A. M.**, Hermus, J., Huber, M., Maurice, P., Sternad, D., & Hogan, N. (2022, March). Dynamic Primitives Limit Human Force Regulation during Motion. Poster presented at the 2022 *MIT Sports Summit*, Cambridge, MA, USA.
5. **West, A. M.**, Huber, M.E., Hermus, J., Maurice, P., Sternad, D., & Hogan, N. (2021, April). Humans Do Not Directly Control Force During Physical Interaction. Poster presented at the 2021 *Society for the Neural Control of Movement Conference*, Virtual.
6. **West, A. M.**, Huber, M.E., & Hogan, N. (2020, October). Role of Path Information in Visual Perception of Joint Stiffness. PowerPoint presented at the 2020 *Neuromatch Conference*, Virtual.
7. **West, A. M.**, Huber, M.E., Hermus, J. & Hogan, N. (2020, October). Humans Do Not Directly Control Force During Physical Interaction. PowerPoint presented at the 2020 *Conference of Ford Fellows*, Virtual.
8. **West, A. M.**, & Hogan, N. (2020, May). An Analysis of Kinematic Hand Synergies During Wire-Harness Installation. PowerPoint presented at the 2020 *International Conference of Robotics and Automation*, Virtual.
9. Huber, M.E., **West, A. M.**, Folinus, C., & Hogan, N. (2019, October). Visual Perception of Joint Stiffness from Multi-Joint Limb Motion. Poster presented at the 2019 *Annual Conference of the Society for Neuroscience*, Chicago, IL, USA.
10. **West, A. M.**, Mandl, H., McCann, C., & Gunawardena, N. (2017, April). A Novel Sternotomy Saw Guide Incorporating Integrated Rigid Fixation. Poster presented at the 2017 *Design of Medical Devices Conference*, Minnesota, MN, USA.

INVITED TALKS

1. **“Exploring Human Performance: The Importance of Studying our Limitations”** Collaborative Haptics and Robotics in Medicine Lab, Stanford University, May 10, 2023
2. **“Exploring Human Performance: The Importance of Studying our Limitations”** Neuromuscular Biomechanics Lab, Stanford University, May 10, 2023

3. **“Understanding Human Neuromotor Control: All Models are Wrong, Simple Models are Useful”**
Neurobionics Engineering Club, Camplus College, May 4, 2023
4. **“Mechanical Impedance: A Necessity in Both Human Motor Action and Human Motor Perception”**
Control Conclave, Indian Institute of Technology Delhi, January 6, 2023
5. **“Mechanical Impedance: A Key Component in Both Human Motor Action and Motor Perception”**
Future Leaders in Mechanical and Aerospace Engineering: Celebrating Diversity and Innovation, March 10, 2021

TEACHING EXPERIENCE

Teaching Assistant, MIT Graduate Course, Biomechanics and Neural Control of Movement Spring 2021

- Assisted students in understanding homework and lecture material via weekly office hours.
- Worked with Professor Neville Hogan to organize and develop lessons based on his teaching topics.
- Class presented students with a quantitative description of how biomechanical and neural factors interact in human sensory-motor behavior. Topics included a review of relevant neural, muscular and skeletal physiology, neural feedback and "equilibrium-point" theories, co-contraction strategies, impedance control, kinematic redundancy, optimization, intermittency, contact tasks and tool use.

Teaching Assistant, MIT Graduate Course, Advanced System Dynamics and Control Fall 2020

- Independently led students in weekly problem-solving based lectures.
- Worked with Professor Neville Hogan to organize and develop lessons based on his teaching topics.
- Topics included analytical descriptions of state-determined dynamic physical systems, time and frequency domain representations, system characteristics, and modification of system characteristics using feedback.

SUPERVISION OF UNDERGRADUATE MENTEES

Jose Ramos , Mechanical Engineering, MIT	Spring 2021
Shreya Gupta , Mechanical Engineering, MIT	Summer 2020 – Fall 2020
Nicole Attram , Mechanical Engineering, University of Maryland, Baltimore County	Summer 2023

SUPERVISION OF GRADUATE MENTEES

Margaret Wang , M. Eng., Electrical Engineering and Computer Science, MIT	Fall 2022 – Spring 2023
<ul style="list-style-type: none"> • Wang, M. X. (2023). <i>Non-invasive vision-based measurement of hand kinematics and interaction</i> (M. Eng, Massachusetts Institute of Technology). 	

PROFESSIONAL DEVELOPMENT

Postdoctoral Recruitment Initiative in Sciences and Medicine (Participant), Stanford University	May 2023
Focus Fellows Program (Participant), Georgia Institute of Technology	January 2023
NextProf Future Faculty Workshop (Participant), University of California, Berkeley	September 2022