A. Michael West Jr., PhD – Johns Hopkins University, Mechanical Engineering
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RESEARCH INTERESTS

My research, rooted in control theory, advances robotic technologies such as rehabilitation robotics, collaborative robots, prosthetics, and dexterous robots by investigating human motor control, learning, and perception. Combining expertise in controls, robotics, biomechanics, and neuroscience, I develop simple, descriptive motor control models that offer immediate and easily interpretable insight. Introducing novel analysis methods for human motor control and leveraging established approaches on new experimental paradigms, my work consistently uncovers fresh insights on human motor control, learning, and perception.

EDUCATION

Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts

Ph.D., Mechanical Engineering, May 2024, GPA: 5.0/5.0

- Dissertation Title: All Models are Wrong, Simple Models Provide Insight: A Study of Human Manipulation
- Advisor: Neville Hogan
- Committee: Haruhiko Harry Asada, Alberto Rodriguez, and Madhusudhan Venkadesan

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

- Dissertation Title: Towards a non-invasive measurement of human motion, force, and impedance during a complex physical-interaction task: wire-harnessing.
- Advisor: Neville Hogan

Yale University, New Haven, Connecticut

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

HONORS & AWARDS

Johns Hopkins University Provost's Postdoctoral Fellowship Program (PPF) **($100,880)** 2024
Office of Graduate Education Service Award, MIT Recognizing Individuals Supporting Equity Awards 2024
Shirley Anne Jackson Award, MIT Ebony Affair 2024

- Presented to the black graduate student who exemplifies the spirit of trailblazing leadership, academic excellence, and commitment to breaking barriers in their field of study.

Inclusive Teaching Certificate, MIT Teaching + Learning Lab 2023
12th Place (out of 300+ Submissions) Best Poster Competition, Rehab Week 2023
Accenture Fellowship **($98,349)**, MIT 2023
MechE Research Exhibition (MERE), Honorable Mention Best Overall Performance **($125)**, MIT 2023
BAMIT Research SLAM, 2nd Place **($500)**, Black Alumni of MIT (BAMIT) 2023
Takeda Fellowship **($94,789)**, MIT 2022
Ben Gold Fellowship **($90,932.76)**, MIT 2021
Ford Foundation Fellowship **($81,000)**, Ford Foundation 2020
Teaching Practice Certificate, MIT Teaching + Learning Lab 2020
Black Graduate Student Association (BGSA) Excellence in Research Award, MIT Ebony Affair 2020
Subject Design Certificate, MIT Teaching + Learning Lab 2020
GEM University Associate Fellowship, MIT 2018 & 2020
Ford Foundation Fellowship Honorable Mention, Ford Foundation 2018
UCEM SLOAN Scholarship **($40,000)**, MIT 2018
Office of Graduate Education (OGE) Diversity Fellowship **($80,872)**, MIT 2018
Student Design Showcase, 3rd Place, Design of Medical Devices Conference 2017

RESEARCH EXPERIENCE

Johns Hopkins University, Haptics and Medical Robotics (HAMR) Laboratory
Advisor: Jeremy Brown
Postdoctoral Research Fellow 2024 – Present

- Conducting cutting-edge research on haptic feedback and its role in robotic manipulation tasks to advance technologies in rehabilitation, prosthetics, and surgical robotics.
- Mentoring and advising PhD and master's students on research methodologies, experimental design, and career development.

Massachusetts Institute of Technology, Newman Laboratory for Biomechanics and Human Rehabilitation
Advisor: Neville Hogan
Graduate Student 2018 – 2024

My research uses analysis of kinematic data recorded during human behavioral studies to unveil latent aspects of human motor control, learning, and perception for applications in rehabilitation and robotics. An emphasis is placed on the development of simple, descriptive models.

- Used kinematic analysis of pianists to predict the prevalence of injury.
- Explored how kinematic analysis of the human hand can be used to estimate the complexity of a dexterous task.
- Collected & analyzed 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. Developed a model of human motor perception.
- Conducted a human subject experiment to analyze how humans control force and motion during human-robot physical interaction.

Yale University, Biomechanics & Control Lab
Advisor: Madhusudhan Venkadesan
Undergraduate Research Assistant Fall 2017 – Spring 2018

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

Yale University, Medical Device Design & Innovation
Advisor: Joseph Zinter
Design Engineering Student Fall 2016 – Fall 2017

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

Yale University, Social Robotics Laboratory
Advisor: Brian Scassellati
Undergraduate Research Assistant Summer 2016

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

PEER-REVIEWED JOURNAL PUBLICATIONS

1. Tessari, F., **West, A. M.** & Hogan, N. (Under Review). On Human Motor Coordination: The Synergy Expansion Hypothesis. *The Proceedings of the National Academy of Sciences (PNAS).*
2. **West, A. M.** & Hogan, N. (Under Review). Reach-and-Grasp Synergies differ from Manipulation Synergies. *Journal of Neurophysiology*.
3. Lachner, J., Tessari, F., **West, A. M.,** Nah, M.C., & Hogan, N. (Under Review). Divide et Impera: Learning impedance families for peg-in-hole assembly. *IEEE Transactions on Robotics (T-RO).*
4. **West, A. M.**, Tessari, F., Wang, M., & Hogan, N. (Accepted) The Study of Dexterous Hand Manipulation: A Synergy-Based Complexity Index. *IEEE Transactions on Medical Robotics and Bionics.*
5. **West, A. M.,** Huber, M.E., & Hogan, N. (2022). Role of Path Information in Visual Perception of Joint Stiffness. *PLOS Computational Biology*. [Video Summary]
6. **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 (RA-L)*. [Video Summary]

PEER-REVIEWED CONFERENCE PUBLICATIONS

1. **West, A. M.**, Tessari, F., & Hogan, N. (2023). The Study of Complex Manipulation via Kinematic Hand Synergies: The Effects of Data Pre-Processing. *IEEE International Conference on Rehabilitation Robotics (ICORR).* [Video Summary]

SHORT PEER-REVIEWED CONFERENCE ARTICLES & ABSTRACTS

1. **West, A. M.,** Tessari, F., Wang, M., & Hogan, N. (2024) The Study of Dexterous Hand Manipulation: A Synergy-Based Complexity Index. *IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob).*
2. **West, A. M.,** Tessari, F. & Hogan, N. (2023, September). The Study of Complex Manipulation via Kinematic Hand Synergies: The Effects of Data Pre-Processing. PowerPoint & poster presented at *Rehab Week*, Singapore. **12th place (out of 300+ submissions) best poster award.**
3. **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 (NCM) Conference*, Victoria, BC, Canada.
4. **West, A. M.,** Hermus, J., Huber, M., Maurice, P., Sternad, D., & Hogan, N. (2022, May). Dynamic Primitives Limit Human Force Regulation during Motion. PowerPoint & poster presented at the 2022 *International Conference of Robotics and Automation (ICRA)*, Philadelphia, PA, USA.
5. **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.
6. **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 (NCM)*, Virtual.
7. **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.
8. **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.
9. **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 (ICRA)*, Virtual.
10. 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 (SfN)*, Chicago, IL, USA.

11. **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*, Minneapolis, MN, USA.

INVITED TALKS

1. **"All Models are Wrong, Simple Models are Insightful: A Study of Human Manipulation"** Department of Mechanical Engineering, Johns Hopkins University, September 19, 2024
2. **"The Newman Laboratory for Biomechanics, Robotics and Human Rehabilitation: A journey through motor coordination, manipulation and physical interaction"** Munich Institute of Robotics and Machine Intelligence (MIRMI), Technical University of Munich, June 17, 2024
3. **"All Models are Wrong, Simple Models are Insightful: A Study of Human Manipulation"** Department of Mechanical Engineering, Massachusetts Institute of Technology, April 11, 2024
4. **"All Models are Wrong, Simple Models are Insightful: A Study of Human Manipulation"** Department of Robotics, University of Michigan, March 28, 2024
5. **"All Models are Wrong, Simple Models are Insightful: A Study of Human Manipulation"** Department of Electrical Engineering and Computer Sciences, University of California Berkeley, February 27, 2024
6. **"All Models are Wrong, Simple Models are Insightful: A Study of Human Manipulation"** George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, February 14, 2024
7. **"Exploring Human Performance: The Importance of Studying our Limitations"** Collaborative Haptics and Robotics in Medicine Lab (Allison Okamura), Stanford University, May 10, 2023
8. **"Exploring Human Performance: The Importance of Studying our Limitations"** Neuromuscular Biomechanics Lab (Scott Delp), Stanford University, May 10, 2023
9. **"Understanding Human Neuromotor Control: All Models are Wrong, Simple Models are Useful"** Neurobionics Engineering Club, Camplus College, May 4, 2023
10. **"Mechanical Impedance: A Necessity in Both Human Motor Action and Human Motor Perception"** Control Conclave, Indian Institute of Technology Delhi, January 6, 2023
11. **"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

Massachusetts Institute of Technology, Teaching + Learning Lab
Inclusive Teaching Track Fall 2023

- Investigated research on "belonging" in academic settings & developed actionable strategies to cultivate a sense of belonging in teaching contexts.
- Devised discipline specific teaching practices that consistently engage in critical reflection to assess & enhance inclusivity within my classroom.

Massachusetts Institute of Technology, 2.183J/4 Biomechanics & Neural Control of Movement
Teaching Assistant to Professor Neville Hogan Spring 2021

- Assisted students in understanding homework & lecture material via weekly office hours.
- Helped organize the course & develop lessons based on the courses teaching topics.
- Orchestrated a course designed for upper-level undergraduate students and graduate students. It was comprised of 7 undergraduate & 15 graduate students.
- Presented students with a quantitative description of how biomechanical & neural factors interact in human sensory-motor behavior. Topics included a review of relevant neural, muscular & skeletal physiology, neural feedback & "equilibrium-point" theories, co-contraction strategies, impedance control, kinematic redundancy, optimization, intermittency, contact tasks & tool-use.

Massachusetts Institute of Technology, 2.151 Advanced System Dynamics & Control
Teaching Assistant to Professor Neville Hogan Fall 2020

- Independently led students in weekly problem-solving based lectures.
- Helped organize the course & develop lessons based on the courses teaching topics.
- Support a course designed for graduate students. It was comprised of 30 graduate students.
- Educated topics including analytical descriptions of state-determined dynamic physical systems, time & frequency domain representations, system characteristics, & modification of system characteristics using feedback.

Massachusetts Institute of Technology, Teaching + Learning Lab
Teaching Practice Certificate Program Summer 2020

- Discovered several evidence-based teaching strategies that help students stay cognitively active & enable them to practice the material & immediately test their knowledge.
- Practiced giving a lecture that incorporated active learning techniques on a topic involving computer programming.

Massachusetts Institute of Technology, Teaching + Learning Lab
Subject Design Certificate Program Summer 2020

- Practiced defining a lecture's scope, goals, & objectives, & how to effectively assess student progress & give useful feedback.
- Developed an ability to cultivate a classroom that values a diverse set of thoughts, perspectives, & experiences by acknowledging my own experiences & biases.

SUPERVISION OF UNDERGRADUATE MENTEES

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

SUPERVISION OF GRADUATE MENTEES

Margaret Wang, M. Eng., Electrical Engineering & Computer Science, MIT Fall 2022 – Spring 2023

- Wang, M. X. (2023). *Non-invasive vision-based measurement of hand kinematics and interaction* (M. Eng, MIT).
- West, A. M., Tessari, F., **Wang. M,** & Hogan, N. (Accepted) The Study of Dexterous Hand Manipulation: A Synergy-Based Complexity Index. *IEEE Transactions on Medical Robotics and Bionics.*

WORK EXPERIENCE

Medtronic, North Haven
Robotic Design Intern 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.

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

- Repaired hardware & software issues of on-campus lab computers.

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

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

COMMUNITY SERVICE & LEADERSHIP

Massachusetts Institute of Technology, New Vassar Dormitory
Graduate Resident Advisor Fall 2020 – Spring 2024

- Fosters a supportive, safe, & positive living environment for 38 students through events built upon shared community standards.
- Completed numerous training courses on student support, facilitating group dynamics, fostering interpersonal relationships, and mandatory reporting as a responsible employee.

Massachusetts Institute of Technology, Black Graduate Student Association (BGSA)
Treasurer Spring 2021 – Spring 2022

- Allocated & managed funds (~$21,000) to hold community service & social events for MIT's Black graduate students.

Massachusetts Institute of Technology, MIT Summer Research Program (MSRP)
Pod Leader Summer 2019 & Summer 2021

- Organized meetings & events to foster a positive climate for undergraduate minority students conducting research at MIT.
- **16 of the 19 students I mentored have enrolled in top STEM graduate programs including MIT, Stanford, UC Berkeley, Georgia Tech, UCLA, & Purdue.**

Massachusetts Institute of Technology, Academy of Courageous Minority Engineers (ACME)
Treasurer Spring 2019 – Spring 2022

- Allocated & managed funds (~$8,000) for a group of minority engineers who met weekly to discuss career goals & hold each other accountable in achieving those goals.

Massachusetts Institute of Technology, Men's Rugby Football Club
President & Captain Spring 2019 – Spring 2024

- Oversaw team operations, organized competitive events, & fostered a cohesive team environment, resulting in elevated team performance & strengthened camaraderie.
- **Initiated & led comprehensive post-COVID revitalization efforts to reignite team participation & boost morale, resulting in a significant increase in club membership & active participation.**

Yale University Admissions Office
STEM Outreach Ambassador Spring 2017 – Spring 2018

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

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

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

Yale University Zeta Psi Fraternity Chapter
Vice President Spring 2016 – Spring 2017

- Increased recruitment, fostering brotherhood, & improving philanthropy.

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

- Devoted over 30 hours per week to film study, practice sessions, rigorous strength & conditioning, & encouraging teammates to foster team morale.

PROFESSIONAL SERVICE

Journal Reviews

- IEEE Robotics and Automation Letters (RA-L), Qeios

Conference Reviews

- IEEE International Conference on Robotics and Automation (ICRA), IEEE International Consortium for Rehabilitation Robotics (ICORR)

PROFESSIONAL DEVELOPMENT

The Inaugural Raynor Cerebellum Project Postdoc Summit, Scottsdale, AZ	November 2024
The Institute on Teaching and Mentoring, New Orleans, LA	October 2024
BE GREAT retreat (Hosted by Dr. Brooke Coley), Atlanta, GA	March 2024
National Society of Black Engineers (NSBE) Annual Convention, Atlanta, GA	March 2024
The Institute on Teaching and Mentoring, Tampa, FL	October 2023
Trail Blazers in Engineering, Purdue University	July 2023
Postdoctoral Recruitment Initiative in Sciences and Medicine (PRISM), Stanford University	May 2023
Focus Fellows Program, Georgia Institute of Technology	January 2023
The Institute on Teaching and Mentoring, Atlanta, GA	October 2022
NextProf Future Faculty Workshop, University of California, Berkeley	September 2022
The Institute on Teaching and Mentoring, Atlanta, GA	October 2019
National Society of Black Engineers (NSBE) Annual Convention, Pittsburgh, PA	March 2018
National Society of Black Engineers (NSBE) Annual Convention, Kansas City, MO	March 2017
National Society of Black Engineers (NSBE) Annual Convention, Boston, MA	March 2016

IN THE NEWS

A. Michael West: Advancing human-robot interactions in health care, MIT News September 2023
MechE researchers pioneer human motor control theory through global collaboration at TU Munich, MIT MechE July 2024
Johns Hopkins welcomes new cohort of Provost's Postdoctoral Fellows, The Hub at Johns Hopkins September 2024

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.

REFERENCES

Professor Neville Hogan
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