

AVA CHEN

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EDUCATION

Columbia University

Ph.D in Mechanical Engineering, expected Spring 2025

M.S. in Mechanical Engineering, conferred Feb. 2021

Advisor: Matei Ciocarlie

2019 – present

New York, NY

Massachusetts Institute of Technology (MIT)

B.S. in Mechanical Engineering

2013 – 2017

Cambridge, MA

HONORS

NIH Ruth L. Kirschstein National Research Service Award (NRSA) F31 – NICHD

2023 – 2025

Robotics: Science & Systems (RSS) Pioneer

2024

Columbia Center for the Integration of Research, Teaching and Learning (CIRTL) Fellow

2023 – 2024

Columbia University Presidential Distinguished Fellowship

2019 – 2023

Rising Star in ME 2022 at Stanford University

2022

Honorable Mention, MIT MechE deFlorez Design Competition

2016

PUBLICATIONS

Peer-Reviewed Journal Articles

[* indicates equal contribution]

- [J.4] L. Winterbottom*, **A. Chen***, R. Mendonca, D.M. Nilsen, M. Ciocarlie, and J. Stein. “Clinician perceptions of a novel wearable robotic hand orthosis for post-stroke hemiparesis.” *Disability and Rehabilitation*, in press. (2024)
- [J.3] J. Palacios*, A. Deli-Ivanov*, **A. Chen***, L. Winterbottom, D. M. Nilsen, J. Stein, and M. Ciocarlie, “Grasp Force Assistance via Throttle-based Wrist Angle Control on a Robotic Hand Orthosis for C6-C7 Spinal Cord Injury.” *IEEE Transactions on Medical Robotics and Bionics*, in press. (2024)
- [J.2] **A. Chen**, L. Winterbottom, S. Park, J. Xu, D. M. Nilsen, J. Stein, and M. Ciocarlie, “Thumb Stabilization and Assistance in a Robotic Hand Orthosis for Post-Stroke Hemiparesis.” *IEEE Robotics and Automation Letters*, 7, 8276-8282. (2022)
 - Presented in *2022 IEEE RAS/EMBS Intl. Conference on Biomedical Robotics and Biomechatronics (BioRob)*. **Finalist, BioRob2022 Best Paper Award**
- [J.1] **A. Chen**, K. Kim, and P.S. Shamble. “Rapid mid-jump production of high-performance silk by jumping spiders.” *Current Biology*, 31, R1422-R1423. (2021)

Peer-Reviewed Conference Papers

- [C.5] P. L. La Rotta*, J. Xu*, **A. Chen**, L. Winterbottom, W. Chen, D. M. Nilsen, J. Stein, and M. Ciocarlie, “Meta-Learning for Fast Adaptation in Intent Inference on a Robotic Hand Orthosis for Stroke.” Accepted to *2024 IEEE/RSJ Intl. Conference on Intelligent Robots and Systems (IROS)*.
- [C.4] **A. Chen***, K. Lee*, L. Winterbottom, J. Xu, C. Lee, G. Munger, A. Deli-Ivanov, D. M. Nilsen, J. Stein, and M. Ciocarlie, “Volitional Control of the Paretic Hand Post-Stroke Increases Finger Stiffness and Resistance to Robot-Assisted Movement.” Accepted to *2024 IEEE RAS/EMBS Intl. Conference on Biomedical Robotics and Biomechatronics (BioRob)*.
- [C.3] **A. Chen**, L. Winterbottom, K. O’Reilly, S. Park, D. M. Nilsen, J. Stein, and M. Ciocarlie. “Design of Spiral-Cable Forearm Exoskeleton to Provide Supination Adjustment for Hemiparetic Stroke Subjects.” In *2022 IEEE Intl. Conference on Rehabilitation Robotics (ICORR)*.
- [C.2] J. Xu, C. Meeker, **A. Chen**, L. Winterbottom, M. Fraser, S. Park, L. M. Weber, M. Miya, D. M. Nilsen, J. Stein, and M. Ciocarlie. “Adaptive Semi-Supervised Intent Inference to Control a Powered Hand Orthosis for Stroke.” In *2022 IEEE Intl. Conference on Robotics and Automation (ICRA)*.
- [C.1] T. Cervantes, W.E. Byun*, **A. Chen***, K. Kim*, K. Nealon*, J. Connor, and A. Slocum. “A Device for Quantitative Analysis of the Thumb Ulnar Collateral Ligament.” ASME. *Frontiers in Biomedical Devices*, 2018 *ASME Design of Medical Devices Conference*.

Submitted for Publication

- [S.1] J. Xu*, R. Wang*, S. Shang*, **A. Chen**, L. Winterbottom, L. Hsu, W. Chen, K. Ahmed, P. L. La Rotta, X. Zhu, D. M. Nilsen, J. Stein, and M. Ciocarlie, “ChatEMG: Synthetic Data Generation to Control a Robotic Hand Orthosis for Stroke.” (2024, submitted.)

Workshop and Symposium Contributions

- [W.7] L. Winterbottom, **A. Chen**, D. M. Nilsen, R. Mendonca, J. Xu, K. Lee, M. Ciocarlie, and J. Stein. “Motor learning techniques to enhance training with robotic hand orthoses for stroke survivors: challenges and opportunities.” Submitted to *American Occupational Therapy Association (AOTA) INSPIRE 2025*.
- [W.6] **A. Chen**, J. Xu, K. Lee, L. Winterbottom, D. M. Nilsen, J. Stein, and M. Ciocarlie. “Bidirectional Human-Robot Feedback and Physical Effects of Assisted Manipulation with a Robotic Hand Orthosis for Stroke.” In *New England Manipulation Symposium (NEMS) 2024*.
- [W.5] **A. Chen**. “Assisting Impaired Dexterity with User-Driven Robotic Hand Exoskeletons.” In *Robotics: Science and Systems (RSS) workshop: RSS Pioneers 2024*.
- [W.4] L. Winterbottom, D. Nilsen, R. Mendonca, **A. Chen**, S. Lin, K. Carroll, J. Xu, M. Ciocarlie, and J. Stein. “Collaboration between Occupational Therapists, Engineers, and People with Neurological Conditions in the Development of Wearable Robotic Devices.” In *American Occupational Therapy Association (AOTA) INSPIRE 2024*.
- [W.3] J. Palacios*, A. Deli-Ivanov*, **A. Chen**, L. Winterbottom, D. M. Nilsen, J. Stein, and M. Ciocarlie. “Towards Tenodesis-Modulated Control of an Assistive Hand Exoskeleton for SCI.” In *2023 IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS) workshop: Assistive Robotics for Citizens*.
- [W.2] L. Winterbottom, K. Carroll, S. Lin, **A. Chen**, R. Mendonca, D. M. Nilsen, M. Ciocarlie, and J. Stein. “Stroke Survivors’ Perspectives on the Design of a Novel Wearable Robotic Hand Brace.” In *2022 Janet Falk-Kessler Distinguished Lectureship and Day of Scholarship*.
- [W.1] L. Winterbottom, D. Nilsen, R. Mendonca, **A. Chen**, J. Xu, M. Ciocarlie, and J. Stein. “Perspectives of Individuals with C6-C7 Spinal Cord Injury on the Design of a Novel Robotic Hand Brace.” In *2021 Janet Falk-Kessler Distinguished Lectureship and Day of Scholarship*.

Patents

- [P.1] M. Ciocarlie, J. Stein, **A. Chen**, S. Park, D.M. Nilsen. “Robotic Hand Orthosis For Stroke”, Application #: US 63/249,456

Theses

- [T.1] “Effectiveness of Active Cooling on Torque Performance for Prosthetic Applications.” *B.S. Thesis, MIT, 2017*.

GRANT PROPOSAL EXPERIENCE

Impact of biofeedback and task-specific training with a robotic hand orthosis on voluntary muscle modulation for rehabilitation post-stroke. NIH F31 1F31HD111301 NICHD (NCMRR) 8/2023–1/2025 \$72,587 **PI: Chen**

Reciprocal Learning for Intent Inference on an Active Hand Orthosis for Stroke. (Submitted) PI: Ciocarlie/Stein/Nilsen
NSF M3X program. Contributed to conceptualization, methodology, investigation, preliminary data, and writing.

INVITED TALKS

Robotic Hand Exoskeletons to Assist and Rehabilitate Impaired Dexterity Harvard University, Harvard Biorobotics Lab Meeting	June 2024
Robotic Hand Orthoses for Assistance and Rehabilitation After Stroke (Co-Speaker) Global Perspectives on Medicine, Rehabilitation and Robotics Webinar Series	Sept. 2023
MyHand: a Wearable Hand Orthosis for Stroke (Co-Speaker) IROS Workshop, Challenges and Opportunities of Human-Robot Symbiosis: from Wearable Robots to Neurorobotics	Oct. 2021
How Jumping Spiders Use Silk to Orient Themselves in Midair Harvard University, Harvard Bauer Forum	Oct. 2018
How Jumping Spiders Jump Broad Institute, CEE 35th Anniversary Celebration	Oct. 2018

TEACHING EXPERIENCE AND MENTORSHIP

University Courses

Teaching Assistant, Columbia MECE E4602 – Introduction to Robotics	Fall 2020
Lab Assistant, Harvard LS50 – Integrated Science	Spring 2018, Spring 2019

Pedagogical Training

Participant, Columbia Center for Teaching and Learning (CTL) Teaching Development Program	2022 – present
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Talks on Teaching

Columbia CTL “Wowza!” CIRTl Discussion Series – Speaker, “Supporting Teaching as Scholarship”	Mar. 2024
Columbia CTLGrads Journal Club workshop – Speaker, “Effective Teaching Online, Real-Time”	Oct. 2023
Columbia Engineering Your PhD – Invited Panelist, “Insights from Experienced TAs”	Aug. 2023, 2024

Extracurricular

Academic Mentor, Women in Science at Columbia (WISC)	2020, 2021, 2023
Research Mentor, Columbia University Engineering the Next Generation (ENG)	Summer 2022
Research Mentor and Teaching Assistant, Research Science Institute (RSI)	Summer 2014
Teaching Assistant, Bellarmine University Summer Youth Camps	Summer 2012, Summer 2013

RESEARCH STUDENTS SUPERVISED

Shiyao Marcus Lam, Columbia Undergraduate	2024 – present
Akshay Venkatesan, Columbia M.S. Data Science	2023 – present
Matheu Campbell, Columbia Undergraduate	2023 – present
Grace Munger, Columbia Undergraduate [C.4]	2023 – present
Connor Lee, Columbia Undergraduate [C.4]	2023 – present
Alexandra Deli-Ivanov, Columbia Undergraduate [J.3, C.4, W.3] → SpaceX	2022 – 2024
Joaquin Palacios, Columbia Undergraduate and M.S. Robotics [J.3, W.3] → Columbia Ph.D	2021 – 2024
Pedro Leandro La Rotta, Columbia M.S. Robotics [C.5, S.1]	2023
Katherine O'Reilly, Columbia Undergraduate [C.3] → UIUC M.S.	2020 – 2023
Carolyn David, Columbia M.S. Biomedical Engineering → AbbVie	2022 – 2023
Preethika Chivukula, Columbia M.S. Biomedical Engineering → BD Biosciences	2021 – 2022
Ashley Reyes, Columbia ENG Student → WPI UGrad	Summer 2022
Brayan Ramos, Columbia ENG Student → Cooper Union UGrad	Summer 2022
Ciara Little, Columbia Undergraduate → UMass Amherst Ph.D	2020 – 2021
Katelyn G. Mitchell, Columbia Undergraduate → ASML	2020 – 2021
Frederick Horne, Harvard Undergraduate	2019
Rowen VonPlagenhoef, Harvard Undergraduate	2019
Eliot Burnes, Harvard Undergraduate	2018 – 2019
Henry Burnes, Harvard Undergraduate	2018 – 2019
Lincoln Sorscher, Harvard Undergraduate	2018
Cheng Lu, RSI Scholar	Summer 2014

SERVICE

University and Conference Service

Workshop Co-Organizer, BioRob 2024	2024
“ Building Responsive Body-Machine Interfaces with Biosignals and Robotic Exoskeletons ”	
CIRTl Fellow, Columbia University Center for Teaching and Learning	2023 – 2024
Conference Volunteer, Robotics: Science and Systems (RSS)	2022

External Paper Reviewer

IEEE/RSJ Intl. Conference on Intelligent Robots and Systems (IROS)	2024
IEEE RAS/EMBS Intl. Conference on Biomedical Robotics & Biomechatronics (BioRob)	2022, 2024
IEEE Transactions on Medical Robotics and Bionics (T-MRB)	2023
Scientific Reports	2022, 2023
IEEE Intl. Conference on Robot and Human Interactive Communication (RO-MAN)	2022, 2023
IEEE Intl. Conference on Rehabilitation Robotics (ICORR)	2022
IEEE Intl. Conference on Robotics and Automation (ICRA)	2021, 2022
IEEE Robotics and Automation Letters (RA-L)	2021, 2022
IEEE Transactions on Neural Systems and Rehabilitation Engineering (TNSRE)	2020

Science Volunteering and Outreach

Question Reviewer, U.S. Dept. of Energy National Science Bowl (NSB)	2023, 2024
Columbia Engineering Achievers in Graduate Education (EngAGE) – Invited Panelist	Mar. 2024
Exoskeleton and Machine Learning Demonstrations for NYC elementary / middle schoolers	2023, 2024
Columbia WISC STEM Field Exploration Fair – Invited Panelist, “Behind the Lab Scenes”	Apr. 2022
Judge, Kentucky Science and Engineering Fair	2021
Judge, MIT Mechanical Engineering Research Exhibition	2020
Question Writer, USA Biolympiad (USABO)	2019
Volunteer, Adaptive Climbing Group NY	2019
Volunteer, Research Science Institute (RSI) at MIT	2015, 2018
Judge, Sweden Research Academy for Young Scientists (RAYS)	2015

PREVIOUS POSITIONS

Harvard Dept. of Organismic & Evolutionary Biology, Shamble Lab	2017 – 2019
Research Assistant with Dr. Paul Shamble	
<i>Studied jumping dynamics and mid-air silk production of jumping spiders [J.1]</i>	
Dephy, Inc.	Summer 2017, Fall 2018
Mechanical Engineering Intern	
<i>Designed and built validation equipment for full-system stress testing</i>	
MIT Media Lab, Biomechatronics Group	2013 – 2017
Undergraduate Researcher with Dr. Hugh Herr, Arthur Petron, and Matt Carney	
<i>Worked on FitSocket project for soft-tissue characterization and on active motor cooling [T.1]</i>	
Apple Inc.	Summer 2016
Product Design Validation Engineer Intern	
<i>Worked on design, usability, and validation for mechanical features in hardware products</i>	
Formlabs	Summer 2015
Mechanical Engineering Intern	
<i>Electromechanical design for early versions of Form 2 and Form Cure products</i>	
Brain Power, LLC	Winter 2015
Hardware Intern	
<i>Hardware development of Google Glass applications for users with autism</i>	
Cardiovascular Innovation Institute & Christine M. Kleinert Institute	2012 – 2013
Research Intern with Dr. Nolan Boyd and Dr. Christina Kaufman	
<i>Worked on tissue self-assembly using adipose stromal vascular fraction</i>	
Research Science Institute (RSI) at MIT	Summer 2012
Summer Scholar with Arthur Petron	
<i>Worked on electromechanical designs for a variable spring stiffness emulator</i>	

SIDE PROJECTS

Untethered Gait Tracking for Rehabilitation	2018 – 2019
<i>Collaboration with FIGUR8, Inc. to use their wearables platform for monitoring gait trends during self recovery & long-term effects of rehabilitation post knee-reconstruction surgery.</i>	
MIT East Campus Roller Coaster	2015
<i>Formed and led team of students to complete \$15,000 construction project in 8 days.</i>	
<i>Unofficial Guinness World Record holder for Steepest Wooden Roller Coaster.</i>	
More documentation on personal projects at https://www.avamakesthings.com	