

# 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.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.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 Inferral 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.3] 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.)
- [S.2] 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 Inferral on a Robotic Hand Orthosis for Stroke.” (2024, under review.)

- [S.1] 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.” (2024, under review.)

## Workshop and Symposium Contributions

- [W.5] **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.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 Inferral 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** **June 2024**  
Harvard University, Harvard Biorobotics Lab Meeting

**Robotic Hand Orthoses for Assistance and Rehabilitation After Stroke (Co-Speaker)** **Sept. 2023**  
Global Perspectives on Medicine, Rehabilitation and Robotics Webinar Series

**MyHand: a Wearable Hand Orthosis for Stroke (Co-Speaker)** **Oct. 2021**  
IROS Workshop, Challenges and Opportunities of Human-Robot Symbiosis: from Wearable Robots to Neurorobotics

**How Jumping Spiders Use Silk to Orient Themselves in Midair** **Oct. 2018**  
Harvard University, Harvard Bauer Forum

**How Jumping Spiders Jump** **Oct. 2018**  
Broad Institute, CEE 35th Anniversary Celebration

## 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**

### 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

### 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

<b>Shiyao Marcus Lam</b> , Columbia Undergraduate	2024 – present
<b>Akshay Venkatesan</b> , Columbia M.S. Data Science	2023 – present
<b>Matheu Campbell</b> , Columbia Undergraduate	2023 – present
<b>Grace Munger</b> , Columbia Undergraduate [C.4]	2023 – present
<b>Connor Lee</b> , Columbia Undergraduate [C.4]	2023 – present
<b>Alexandra Deli-Ivanov</b> , Columbia Undergraduate [J.3, C.4, W.3] → SpaceX	2022 – 2024
<b>Joaquin Palacios</b> , Columbia Undergraduate and M.S. Robotics [J.3, W.3] → Columbia Ph.D	2021 – 2024
<b>Pedro Leandro La Rotta</b> , Columbia M.S. Robotics [S.2, S.3]	2023
<b>Katherine O'Reilly</b> , Columbia Undergraduate [C.3] → UIUC M.S.	2020 – 2023
<b>Carolyn David</b> , Columbia M.S. Biomedical Engineering → AbbVie	2022 – 2023
<b>Preethika Chivukula</b> , Columbia M.S. Biomedical Engineering → BD Biosciences	2021 – 2022
<b>Ashley Reyes</b> , Columbia ENG Student → WPI UGrad	Summer 2022
<b>Brayan Ramos</b> , Columbia ENG Student → Cooper Union UGrad	Summer 2022
<b>Ciara Little</b> , Columbia Undergraduate → UMass Amherst Ph.D	2020 – 2021
<b>Katelyn G. Mitchell</b> , Columbia Undergraduate → ASML	2020 – 2021
<b>Frederick Horne</b> , Harvard Undergraduate	2019
<b>Rowen VonPlagenhoef</b> , Harvard Undergraduate	2019
<b>Eliot Burnes</b> , Harvard Undergraduate	2018 – 2019
<b>Henry Burnes</b> , Harvard Undergraduate	2018 – 2019
<b>Lincoln Sorscher</b> , Harvard Undergraduate	2018
<b>Cheng Lu</b> , RSI Scholar	Summer 2014

### SERVICE

#### University and Conference Service

Workshop Co-Organizer, BioRob 2024	2024
“ <a href="#">Building Responsive Body-Machine Interfaces with Biosignals and Robotic Exoskeletons</a> ”	
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 & Biomechanics (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

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

## SIDE PROJECTS

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