AVA CHEN

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EDUCATION

Columbia University — **2019 – present**
Ph.D in Mechanical Engineering, expected Spring 2025 — *New York, NY*
M.S. in Mechanical Engineering, conferred Feb. 2021
Advisor: Matei Ciocarlie

Massachusetts Institute of Technology (MIT) — **2013 – 2017**
B.S. in Mechanical Engineering — *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*, 1–10. (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 Inferral on a Robotic Hand Orthosis for Stroke." In *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." In *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.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**. "Assisting Impaired Dexterity with User-Driven Robotic Hand Exoskeletons." In *Robotics: Science and Systems (RSS) workshop: RSS Pioneers 2024.*

[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, 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 Transactions on Robotics (TRO) **2024**
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**
Volunteer / Paper Reviewer, Research Science Institute (RSI) at MIT	**2015, 2018, 2024**
Columbia Engineering Achievers in Graduate Education (EngAGE) – Invited Panelist	**Mar. 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**
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
Studied jumping dynamics and mid-air silk production of jumping spiders [J.1]

Dephy, Inc. **Summer 2017, Fall 2018**
Mechanical Engineering Intern
Designed and built validation equipment for full-system stress testing

MIT Media Lab, Biomechatronics Group **2013 – 2017**
Undergraduate Researcher with Dr. Hugh Herr, Arthur Petron, and Matt Carney
Worked on FitSocket project for soft-tissue characterization and on active motor cooling [T.1]

Apple Inc. **Summer 2016**
Product Design Validation Engineer Intern
Worked on design, usability, and validation for mechanical features in hardware products

Formlabs **Summer 2015**
Mechanical Engineering Intern
Electromechanical design for early versions of Form 2 and Form Cure products

Brain Power, LLC **Winter 2015**
Hardware Intern
Hardware development of Google Glass applications for users with autism

Cardiovascular Innovation Institute & Christine M. Kleinert Institute **2012 – 2013**
Research Intern with Dr. Nolan Boyd and Dr. Christina Kaufman
Worked on tissue self-assembly using adipose stromal vascular fraction

Research Science Institute (RSI) at MIT **Summer 2012**
Summer Scholar with Arthur Petron
Worked on electromechanical designs for a variable spring stiffness emulator

SIDE PROJECTS

Untethered Gait Tracking for Rehabilitation **2018 – 2019**
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.

MIT East Campus Roller Coaster **2015**
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.

More documentation on personal projects at https://www.avamakesthings.com