Jasmin E. Palmer, Ph.D.

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EDUCATION

Stanford University Stanford, CA
Doctor of Philosophy in Mechanical Engineering September 2019 – June 2025
Principal Investigator: Dr. Allison M. Okamura
GPA: 3.5/4.0

Stanford University Stanford, CA
Master of Science in Mechanical Engineering September 2019 – January 2021
GPA: 3.4/4.0

Massachusetts Institute of Technology (MIT) Cambridge, MA
Bachelor of Science in Mechanical Engineering June 2015 – June 2019
GPA: 4.8/5.0 (in Major); 4.7/5.0 (Overall)

RESEARCH & WORK EXPERIENCE

Stanford University – Collaborative Haptics and Robotics in Medicine (CHARM) Lab Stanford, CA
Doctoral Researcher September 2019 – June 2025

Summary:

My research focuses on human-computer interaction and haptics—the science of touch—and their applications in enhancing immersiveness in virtual reality (VR) and mixed reality (MR) environments for training and learning. I investigate the relocation of haptic feedback from the fingertips to the wrist for manipulation tasks in VR and augmenting haptic feedback in MR environments. My work addresses the design, perception, and effectiveness of wrist-based feedback. The aim of my thesis is to:

1) *Understand best practices for fingertip to wrist haptic relocation during virtual manipulation tasks.*
2) *Develop an adaptable simulation framework providing realistic haptic feedback and enable users to perform various dexterous manipulation tasks in dynamic VR and MR environments using wrist-worn tactile devices.*

Highlights:

- Developed a virtual environment via the CHAI3D haptics and simulation framework along with a 1-DoF wrist-worn tactile haptic device to enhance manipulation capabilities for training and remote operations
- Conducted a user study and data analysis for a peer-reviewed conference paper investigating how various mappings between fingers and haptic actuators affect task performance
- Designed and executed a second user study for a peer-reviewed conference paper, resulting in two main contributions:
  1) Presented the design and characterization of a novel, soft, 3D-printed pneumatically actuated wrist-worn device.
  2) Demonstrated that relocated haptic feedback while wearing such a device significantly reduces virtual grasping forces up to 17% on the index finger and 15% on the thumb compared to no haptic feedback.
- Performed psychophysical studies to quantify human sensitivity thresholds for stimuli from wrist- and finger-worn devices and compare perception at the wrist, index finger, and thumb in multiple degrees of freedom.

Johns Hopkins University Applied Physics Laboratory Laurel, MD
GEM Engineering Ph.D. Fellowship Intern June 2019 – August 2019

- Updated and rebuilt mobile platform of the Bimanual Dexterous Robotic Platform (AKA RoboSally)
- Developed concept designs for handheld devices to address traumatic intracranial hemorrhages in non-hospital setting

MIT Media Lab – Biomechatronics Group Cambridge, MA
Undergraduate Student Researcher September 2018 – May 2019

- Developed a passive metatarsophalangeal joint for a powered ankle-foot prosthesis to improve the mobility of transtibial amputees

Johns Hopkins University – Photoacoustic and Ultrasonic Systems Engineering Lab Baltimore, MD
Leadership Alliance Scholar and Undergraduate Student Researcher June 2018 – August 2018

- Designed tools for autonomous robotic visual servoing of scissor locations during photoacoustic-guided liver surgery and presented a research poster at the Leadership Alliance National Symposium and Johns Hopkins Summer Research Symposium.

MIT d'Arbeloff Laboratory for Information Systems and Technology Cambridge, MA
Undergraduate Student Researcher September 2017 – February 2018

- Designed custom printed circuit boards with EAGLE software for making mechanical and electronics improvements to a multi-tier platform robotic arm

University of Southern California – Polymorphic Robotics Lab Los Angeles, CA
Undergraduate Student Researcher June 2017 – August 2017

- Developed an algorithm for a forward-motion gait and repaired hardware on reconfigurable robot modules and related machinery.

Northrop Grumman Corporation San Diego, CA
College Intern, Technical *– Virtual Mission Systems Triton Software Test Team* May 2016 – August 2016

- Tested and simulated software for unmanned aircraft using specialized proprietary programs
- Evaluated proprietary and high-level secure integrated systems

FELLOWSHIPS, HONORS, & AWARDS

Stanford:

- Link Foundation Fellowship in Modeling, Simulation, and Training July 2024 – June 2025
  This is a 1-year renewable fellowship of $35,000 for PhD students in areas studying Modeling, Simulation, and Training.
- Black in Robotics Legacy Fellowship April 2024 – June 2025
  This is a scholarship for a student at the undergraduate or graduate level interested in pursuing a career in robotics to promote excellence in studying robotics at secondary institutions.
- National Science Foundation Graduate Research Fellowship September 2020 – June 2023
  This is a competitive national fellowship that provides partial stipend and tuition for three years.
- Enhancing Diversity in Graduate Education (EDGE) Doctoral Fellowship September 2019 – June 2025
  This program provides a small additional stipend for the first two years of graduate school and additional funds for conference travel and research materials.
- GEM Ph.D. Engineering Fellowship June 2019 – September 2020
  Provided summer internship at Johns Hopkins Applied Physics Laboratory and partial funding for the first year of graduate school.

MIT:

- 2016 National Society of Black Engineers (NSBE) Boston Collegiate Ambassador Scholarship:
  This is a scholarship award for collegiate members recognized for their effort towards continuing the mission of NSBE.

PUBLICATIONS

Published Papers:

Winston C., Choi H., Jitosho R., Zhakypov Z., **Palmer J. E.**, Cutkosky M., and Okamura, A. M., "Fourigami: A 4-Degree-of-Freedom, Force-Controlled, Origami, Finger Pad Haptic Device," in IEEE Transactions on Robotics, doi: 10.1109/TRO.2025.3593084.
https://ieeexplore.ieee.org/abstract/document/11097369

J. E. Palmer, B. B. Vuong, Z. Zhakypov, Y. Qin, L. Tilton and A. M. Okamura, "Haptic Relocation of Virtual Finger Forces via Pneumatic Wrist-Worn Haptic Devices," *IEEE Haptics Symposium (HAPTICS)*, Long Beach, CA, USA, 2024, pp. 315-320, doi: 10.1109/HAPTICS59260.2024.10520855.
https://ieeexplore.ieee.org/abstract/document/10520855

J. E. Palmer, M. Sarac, A. A. Garza and A. M. Okamura, "Haptic Feedback Relocation from the Fingertips to the Wrist for Two-Finger Manipulation in Virtual Reality," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Kyoto, Japan, 2022, pp. 628-633, doi: 10.1109/IROS47612.2022.9981392.
https://ieeexplore.ieee.org/abstract/document/9981392

Kempski, K.M., Wiacek, A., Graham, M., González, E., Goodson, B., Allman, D., **Palmer, J.E.**, Hou, H., Beck, S., He, J. and Bell, M.A.L. , "*In vivo* photoacoustic imaging of major blood vessels in the pancreas and liver during surgery," *Journal of Biomedical Optics* 24(12):121905, 2019.
https://doi.org/10.1117/1.JBO.24.12.121905

Kempski, K.M., Wiacek, A., **Palmer, J.**, Graham, M., González, E., Goodson, B., Allman, D., Hou, H., Beck, S., He, J. and Bell, M.A.L., "*In vivo* demonstration of photoacoustic-guided liver surgery", Proc. SPIE, Photons Plus Ultrasound: Imaging and Sensing, 10878:108782T, 2019. https://doi.org/10.1117/12.2510500

Papers in Preparation:

Jang J., **Palmer, J. E,** Zhakypov Z., Klein M., Okamura, A. M., and J, J.-H. Ryu, "One Print, Many Moves: Monolithic Origami-inspired Soft Folding Actuator for Soft Multi-DoF Systems." In preparation, intended for Science Robotics.

Palmer J. E., Jang J, J.-H. Ryu, and Okamura A. M., "Comparison of Multi-Degree-of-Freedom Wearable Soft Haptic Devices on the Wrist, Index Finger, and Thumb." In preparation, intended for IEEE Transactions on Haptics.

Palmer J. E, Jang J., J.-H. Ryu, and Okamura A. M., "Co-located vs. Relocated Haptic Feedback: Using Soft Devices for Two-Finger Manipulation in Virtual Environments." In preparation, intended for IEEE Transactions on Haptics.

PRESENTATIONS

Palmer, J. E. (May 2024). 2024 IEEE International Conference on Robotics and Automation – "Feeling the Future: Augmenting Medicine with Relocated Haptic Feedback in Extended Reality Environments,", Speaker at the1st Workshop on Wearable Intelligence for Healthcare Robotics (WIHR): from Brain Activity to Body Movement, Presented at the 2024 IEEE International Conference on Robotics and Automation in PACIFICO Yokohama, Japan – **Best Presentation Award Recipient**

Palmer, J. E., Vuong, B. B., Zhakypov, Z., Qin, Y., Tilton, L., and Okamura, A. M., (April 2024). IEEE Haptics Symposium 2024 – "Haptic Relocation of Virtual Finger Forces via Pneumatic Wrist-Worn Haptic Devices,", Technical Paper Presented at the IEEE Haptics Symposium 2024, Long Beach, CA.

Palmer, J.E (2023, November). Psychonomic Society, Tactile Research Group – "Haptic Feedback Relocation in Virtual Reality with Soft Haptic Displays," Spotlight Talk at the Psychonomic Society, Tactile Research Group Annual Meeting 2023, San Francisco, CA.

Palmer, J.E (2023, November). RAD 206: Mixed Reality in Medicine – "Haptic Feedback for Dynamic Extended Reality Environments," Guest Lecture for RAD 206: Mixed Reality in Medicine, Stanford, CA.

Palmer, J.E., Zhakypov, Z. Okamura, A.M., (2023, October). Bay Area Robotics Symposium – "Haptic Feedback Relocation in Virtual Reality with Soft Haptic Displays," Spotlight Talk and Poster Presentation at the Bay Area Robotics Symposium, Stanford, CA.

Palmer, J.E., Zhakypov, Z. Okamura, A.M., (2023, July). IEEE World Haptics Conference – "Haptic Feedback Relocation in Virtual Reality with Soft Haptic Displays," Abstract, Poster Presentation, and Hardware Demonstration at the IEEE World Haptics 2023 Conference, Delft, the Netherlands.
Palmer, J.E., Zhakypov, Z. Okamura, A.M., (2023, July). IEEE World Haptics Conference – "Touching the Future: Science and Technology of Multisensory Cutaneous Displays," Panel Discussion at the IEEE World Haptics 2023 Conference, Delft, the Netherlands.

Palmer, J. E., Sarac, M., Garza, A. A., Okamura, A. M. (2023, February). eWear 2023 Symposium – "Haptic Feedback Relocation from the Fingertips to the Wrist for Two-Finger Manipulation in Virtual Reality," Poster Session at the eWear 2023 Symposium, Stanford, CA.

Palmer, J. E., Sarac, M., Garza, A. A., Okamura, A. M. (2022, October). IROS 2022 Conference – "Haptic Feedback Relocation from the Fingertips to the Wrist for Two-Finger Manipulation in Virtual Reality," Conference Paper Presented at the IROS 2022, Kyoto, Japan.

Palmer, J. E., Sarac, M., Garza, A. A., Okamura, A. M. (2022, May). 2022 StanfordXR Conference – "Haptic Feedback Relocation from the Fingertips to the Wrist for Two-Finger Manipulation in Virtual Reality," Work in Progress Presented at the 2022 StanfordXR Conference, Stanford, CA.

Palmer, J. E., Sarac, M., Garza, A. A., Okamura, A. M. (2022, March). IEEE Haptics Symposium 2022 – "Haptic Feedback Relocation from the Fingertips to the Wrist for Two-Finger Manipulation in Virtual Reality," Work in Progress Presented at the IEEE Haptics Symposium 2022 Mentoring Forum, Online.

Palmer, J. E. (2021, December). Stanford Medical Mixed Reality Forum: XR for Medical Simulation Open House – "Mixed Reality Simulation for Training of the Lumbar Puncture Procedure," Presented at the Stanford University Wu Tsai Neurosciences Institute, Stanford, CA.

Palmer, J. E., Okamura, A. M. (2021, October). Wu Tsai Neurosciences Symposium: The addiction epidemic from neuroscience to policy – "Relocated Haptic Feedback in Dynamic Virtual and Mixed Reality Environments," Poster Session at the Stanford University Wu Tsai Neurosciences Institute, Stanford, CA.

Palmer, J. E. (2019, August). Summer 2019 Internship Presentation – "Intracranial Access Device Design and RoboSally Rebuild," Slide Show Presentation at the Johns Hopkins University Applied Physics Laboratory, Laurel, MD.

Palmer, J., Wiacek, A., Bell, M.A.L. (2018, July). "Design of a Light Delivery System for Visual Servoing of Scissor Locations During Photoacoustic-Guided Liver Surgery," Poster session presented at the meeting of the Leadership Alliance National Symposium, Hartford, CT.

Palmer, J., Wiacek, A., Bell, M.A.L. (2018, August). "Design of a Light Delivery System for Visual Servoing of Scissor Locations During Photoacoustic-Guided Liver Surgery," Poster session presented at the meeting of the Johns Hopkins Summer Research Symposium, Baltimore, MD.

SERVICE & OUTREACH

MECON 2024 Organizing Committee February 2024 – May 2024

- Organizing committee member for student-run department-wide conference
- Main developer of the website for MECON 2024

CHARM Lab Outreach Coordinator September 2020 – May 2023

- Reached out to programs with students from underserved communities or students from backgrounds underrepresented in STEM and arranged for them to visit the CHARM Lab, meet current graduate students, and learn more about research and graduate school

MENTORING

CHARM Lab Ph.D. Student Mentor Fall (Quarter) 2021 – Spring (Quarter) 2025

- Wangrui (Kevin) Xu (Stanford University, MS ME): Develop multiple haptic feedback enabled-mixed reality demonstrations for medical training applications using relocated haptic feedback from fingertip interactions to a wrist-worn device — Winter 2025 – Spring 2025
- Talise Baker-Matsuoka (University of Southern California, BS ECE): Develop a mixed reality environment for medical training applications using relocated haptic feedback from fingertip interactions to a wrist-worn device — Summer 2024
- Chris Pedraza (Stanford University, BS ME): Design and manufacture of multi-device experiment setup for human subject studies — Spring 2024
- Hugo Chacon (University of Southern California, BS CS): Integrate CHAI3D haptic rendering in and augmented reality environment — Summer 2022
- Liana Tilton (Washington University in St. Louis, BS EE): Design and analyze a soft wrist haptic device for multi-DoF feedback — Summer 2022

  Sidra Nadeem (Stanford University, BS ME): Develop experiment protocols for virtual manipulation tasks with haptic feedback in Unity environment — Winter 2022
- Aaron Garza (Stanford University, PhD ME): Improve the design of a 1-DoF wrist-worn haptic device for virtual manipulation tasks in CHAI3D environment — Fall 2021

TEACHING

Stanford:

Guest Lecturer *– Mixed Reality in Medicine (RAD 206)* November 2023

- Developed original course materials and presented the lecture "Haptic Feedback for Dynamic Extended Reality Environments"

Graduate Course Assistant *– Advanced Dynamics (ME 334)* March 2022 – June 2022

- Developed assignments for graduate-level course in kinematics and rigid body dynamics
- Held review sessions and office hours and graded assignments

MIT: September 2018 – May 2019

Undergraduate Teaching Assistant *– Classical Mechanics (8.01) and Differential Equations (ES.1803)*

- Developed classical mechanics example problems and led problem-solving sessions
- Held office hours and graded assignments

SKILLS

Computer

- Programming: MATLAB, C#, C++, Python, Java, C
- Other: Microsoft Office Suite, SolidWorks, Unity3D, CHAI3D, QT Creator, Fusion 360

Fabrication

- Rapid Prototyping: FDM and SLA 3D printing
- Machine Shop: Laser cutter, Drill Press, Soldering, Water jet, Mill, Lathe

Non-Technical

- Project Management, Survey Development, Experiment Design, Scientific and Technical Communication, Grant and Fellowship Writing, Curriculum Development

PROFESSIONAL MEMBERSHIPS

Stanford Black Engineering Graduate Student Association (BEGSA)
Member September 2019 – June 2025

Stanford Black Graduate Student Association (BGSA)
Member September 2019 – June 2025

National Society of Black Engineers (NSBE)
Member September 2015 – Present

Society of Women Engineers (SWE)
Member September 2015 – Present

Pi Beta Phi Fraternity for Women
Member September 2015 – Present