SARAH CHEN

Robotics Engineer | Medical Robotics Specialist

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PROFESSIONAL SUMMARY

Innovative Robotics Engineer with 5+ years specializing in medical robotics and human-robot interaction. Expert in developing robotic systems for rehabilitation, surgical assistance, and assistive technologies. Strong background in biomechanics, control theory, and FDA regulatory compliance for medical devices. Passionate about creating technology that improves quality of life for patients and healthcare providers.

CORE COMPETENCIES

Programming: Python, C++, C#, MATLAB, LabVIEW, R
Robotics Platforms: da Vinci Surgical System, Rethink Baxter, UR5/UR10, Kinova Jaco
Medical Imaging: ITK, VTK, 3D Slicer, DICOM processing
Control Systems: Impedance Control, Adaptive Control, Neural Networks
Simulation Tools: MATLAB Simulink, CasADi, OpenSim, MuJoCo
Hardware Integration: EMG sensors, Force plates, Motion capture systems
Standards & Compliance: ISO 13485, IEC 62304, FDA 510(k) process
Research Tools: Statistical analysis, Clinical trial design, Grant writing

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PROFESSIONAL EXPERIENCE

Biomedical Robotics Engineer | *Intuitive Surgical*

January 2022 - Present

- Develop next-generation surgical robotic systems focusing on enhanced dexterity and haptic feedback
- Lead cross-functional team of 8 engineers in designing robotic instruments for minimally invasive procedures
- Collaborate with surgeons to validate robotic system performance in clinical settings

- Implemented machine learning algorithms that reduced surgical procedure time by 12% on average
- Contributed to 3 patent applications for novel robotic surgical techniques
- Ensure compliance with FDA regulations and ISO 13485 quality management standards

Research Scientist - Rehabilitation Robotics | *MIT Computer Science and Artificial Intelligence Laboratory (CSAIL)*

September 2020 - December 2021

- Conducted research on robotic exoskeletons for stroke rehabilitation under Prof. Hugh Herr
- Developed adaptive control algorithms that personalized therapy based on patient progress
- Published 4 peer-reviewed papers on human-robot interaction in rehabilitation settings
- Secured $2.3M NIH grant for multi-site clinical trial of robotic rehabilitation system
- Mentored 3 graduate students and 2 undergraduate researchers
- Presented findings at 6 international conferences including ICRA and IROS

Robotics Engineer | *ReWalk Robotics*

June 2019 - August 2020

- Designed control systems for lower-limb exoskeleton for spinal cord injury patients
- Improved battery life by 25% through optimization of motor control algorithms
- Conducted user studies with 45 patients to evaluate system usability and safety
- Collaborated with clinical teams to develop training protocols for therapists
- Led FDA submission process for device modifications, achieving 510(k) clearance
- Developed MATLAB toolbox for gait analysis used by clinical partners

Junior Robotics Engineer | *Ekso Bionics*

August 2017 - May 2019

- Contributed to development of EksoNR neurorehabilitation exoskeleton
- Implemented sensor fusion algorithms for real-time gait analysis
- Created automated testing procedures that reduced quality assurance time by 40%

- Assisted in clinical studies at 8 rehabilitation hospitals across the US
- Developed training materials and technical documentation for clinical staff

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EDUCATION

Ph.D. in Robotics | *Massachusetts Institute of Technology*

September 2021 - Present *(Expected: May 2025)*

Dissertation: "Adaptive Learning in Robotic Rehabilitation: Personalizing Therapy Through Human-Robot Interaction"
Advisor: Prof. Hugh Herr
GPA: 3.9/4.0

Master of Science in Biomedical Engineering | *Johns Hopkins University*

September 2015 - May 2017
Magna Cum Laude, GPA: 3.85/4.0

Concentration: Medical Robotics and Imaging
Thesis: "Force Control Strategies for Safe Human-Robot Physical Interaction in Rehabilitation"

Bachelor of Science in Mechanical Engineering | *University of California, San Diego*

September 2011 - June 2015
Summa Cum Laude, GPA: 3.92/4.0

Minor: Bioengineering
Senior Design: Robotic prosthetic hand with EMG control

RESEARCH & PROJECTS

Adaptive Exoskeleton Control System

- Developed reinforcement learning algorithm that adapts to individual patient needs in real-time
- Integrated multiple sensor modalities including EMG, IMU, and force sensors
- Achieved 30% improvement in rehabilitation outcomes compared to fixed-parameter systems
- **Technologies:** Python, TensorFlow, ROS, CAN bus, Real-time Linux

Haptic-Enabled Surgical Training Simulator

- Created VR-based training system for laparoscopic surgery with force feedback

- Developed physics-based tissue models for realistic haptic rendering
- Validated system with 50+ medical residents showing 40% improvement in skill acquisition
- **Technologies:** C++, OpenGL, CHAI3D, Oculus Rift, Phantom Omni

Robotic Pill Dispenser for Elderly Care

- Designed autonomous medication management system with computer vision
- Implemented safety protocols and emergency notifications
- Completed 6-month pilot study with 25 elderly participants
- **Technologies:** Raspberry Pi, OpenCV, Python, IoT sensors, Mobile app

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PUBLICATIONS

Peer-Reviewed Articles (15 total):

- Chen, S., et al. (2023). "Personalized Rehabilitation Robotics: A Machine Learning Approach." *Nature Biomedical Engineering*, 7(3), 156-168.
- Chen, S., & Martinez, R. (2022). "Safety Considerations in Physical Human-Robot Interaction for Medical Applications." *IEEE Transactions on Biomedical Engineering*, 69(8), 2401-2410.
- Williams, K., Chen, S., et al. (2022). "Clinical Validation of Adaptive Exoskeleton Control in Stroke Rehabilitation." *The Lancet Digital Health*, 4(7), e456-e465.

Conference Proceedings (12 total):

- Chen, S., et al. (2023). "Real-time Adaptation in Robotic Rehabilitation Systems." *IEEE International Conference on Robotics and Automation (ICRA)*.

PATENTS & INTELLECTUAL PROPERTY

- US Patent 11,456,789: "Adaptive Control System for Rehabilitation Robotics" (2023)
- Patent Pending: "Multi-modal Sensor Fusion for Surgical Robotics" (Filed 2023)
- Patent Pending: "Haptic Feedback Optimization in Robotic Surgery" (Filed 2023)

GRANTS & FUNDING

- **NIH R01 Grant** - "Personalized Robotic Rehabilitation for Neurological Disorders" - $2.3M (2021-2026)
- **NSF Graduate Research Fellowship** - $138,000 (2021-2024)
- **MIT Presidential Fellowship** - $50,000 (2021)

CERTIFICATIONS & PROFESSIONAL DEVELOPMENT

- **ISO 13485 Lead Auditor Certification** - BSI Group (2023)
- **Good Clinical Practice (GCP) Certification** - CITI Program (2022)
- **Medical Device Development Certificate** - Stanford Medicine (2021)
- **Human Subjects Research Certification** - MIT COUHES (2021)

HONORS & AWARDS

- **MIT EECS Rising Star Award** (2023)
- **IEEE Robotics and Automation Society Early Career Award** (2022)
- **Best Paper Award** - International Conference on Rehabilitation Robotics (2021)
- **Outstanding Graduate Student Award** - Johns Hopkins BME (2017)
- **Tau Beta Pi Engineering Honor Society** (2014)

PROFESSIONAL SERVICE

- **Reviewer:** IEEE Transactions on Robotics, Nature Biomedical Engineering
- **Program Committee Member:** International Conference on Rehabilitation Robotics (2022-2024)
- **Workshop Organizer:** "Ethics in Medical Robotics" - ICRA 2023
- **Volunteer:** Girls Who Code - Robotics workshops for high school students

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PROFESSIONAL MEMBERSHIPS

- **IEEE Engineering in Medicine and Biology Society** - Senior Member
- **International Association of Rehabilitation Robotics** - Board Member
- **Biomedical Engineering Society (BMES)** - Member since 2015

- **American Society of Mechanical Engineers (ASME)** - Member since 2013