Zhengyang Kris Weng

Senior Mechanical Engineer - Robotic Systems R&D

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Professional Summary

Experienced robotics engineer with 5+ years developing surgical and medical robotic systems at leading companies. Expert in robotic arm and actuator design, calibration systems, and control software with proven track record in system integration and R&D. M.S. in Robotics with focus on dexterous manipulation and machine learning. Strong background in mechanical design, embedded systems, and real-time control.

Professional Experience

Senior Mechanical Engineer **Oct 2022 – Present**
Johnson & Johnson MedTech, Santa Clara, CA / Remote

- **System Hardware R&D:** Core team member for v2 robotic arm development, contributing to system specifications, design reviews, and validation strategy for the Monarch robot surgery platform
- **Verification & Validation:** Developed test cases and fixtures and conducted V&V for surgical robotic devices, ensuring compliance with performance and safety requirements
- **Software Development:** Developed robot calibration software in C++ and designed admittance control visualization prototypes using Python and CoppeliaSim
- **Innovation & IP:** Invented prototype fluid management system for Monarch Urology procedures (patent filed PCT/IB2025/055908)
- **Leadership & Development:** Transitioned to remote part-time work while pursuing M.S. in Robotics (2024-2025), maintaining full project responsibilities and deliverables

Mechanical/Robotics Engineer **Jun 2021 – Oct 2022**
Neocis Inc., Miami, FL

- **Mechatronics R&D:** Designed a 7-DoF robotic guidance arm for the Yomi robot, including kinematic analysis and component specification. Developed a series of custom compact high-precision joint actuators from scratch
- **System Integration:** Led hardware–software integration across three prototype arm iterations, achieving sub-millimeter accuracy for robotic dental surgery
- **Human–Robot Interface:** Designed an ergonomic robot end-effector with haptic and visual feedback to enable intuitive admittance control and surgeon guidance
- **Calibration Algorithms:** Implemented supervised learning–based kinematic calibration method, enhancing accuracy and robustness
- **Leadership:** Mentored interns and delivered training to new hires on robotics hardware team
- **Career Progression:** Promoted to Senior Engineer (Aug 2022) in recognition of technical leadership and system-level contributions

Mechanical Engineer Co-op **May 2020 – Dec 2020**
Harmonic Bionics Inc., Austin, TX

- **Exoskeleton Development:** Designed robotic systems for 14-DoF rehabilitative upper extremity exoskeleton, including linear sizing mechatronic systems
- **FEA & Analysis:** Performed static, fatigue, and non-linear dynamic analysis using ANSYS for various loading conditions
- **Operations:** Launched company machine shop, authored safety SOPs, and trained R&D team on manufacturing equipment

Education

M.S. in Robotics **Sep 2024 – Aug 2025**
Northwestern University, Evanston, IL Focus: Dexterous Manipulation, Kinematic Control, Imitation Learning

B.S. in Mechanical Engineering **Sep 2016 – May 2021**
Georgia Institute of Technology, Atlanta, GA Concentration: Robotics and Control Systems

Open-Source Projects

LeVR: A Modular VR Teleoperation Framework for Imitation Learning in Dexterous Manipulation **2025**
Northwestern University, Evanston, IL

- Developed modular VR teleoperation framework integrated with LeRobot platform for imitation learning in robotic manipulation
- Released open-source implementation (LeFranX) for Franka robotic arms and RobotEra XHand manipulator with high-frequency teleoperation and imitation learning
- Collected dataset of 100+ expert demonstrations and validated framework with state-of-the-art visuomotor policies

BiDexHand: Open-Source 16-DoF Dexterous Hand **2024-2025**
Northwestern University, Evanston, IL

- Designed low-cost 3D-printed 16-DoF anthropomorphic hand with a complete ROS 2 control stack for joint-level control, functional retargeting, inverse kinematics, simulation and teleoperation functions
- Implemented vision-based calibration using AprilTags and integrated numerical IK solver with MoveIt!2 for real-time control with Franka robot arm

Athena Upper-body Robot **2019-2021**
Georgia Tech LIDAR Lab, Atlanta, GA

- Led 7-member team developing 28-DoF upper-body robot, received President's Undergraduate Research Award
- Winner of IEEE AIM 2020 Best Late Breaking Results Poster for biomimetic robotics research

Technical Skills

Robotics & Simulation	Robot kinematics & dynamics, kinematic calibration, ROS 2, CoppeliaSim, Gazebo, MuJoCo, PyBullet, RViz, Unity
Software Development	Python (NumPy, Pandas, OpenCV), C++, MATLAB, Git, Linux, Bash
ML Frameworks	PyTorch, TensorFlow, HF Transformers, scikit-learn
Mechanical Design	SolidWorks (CSWE), OnShape, Fusion 360, ANSYS FEA, rapid prototyping, 3D printing (SLA, FDM, SLS, MJF)
Electrical	PCB design (KiCAD), oscilloscope, soldering
Machining	Mill, Lathe, Water Jet, 3D Printing (SLA, FDM, SLS, MJF)
Languages	English (native), Mandarin Chinese (native)

Publications & Patents

- **Z.K. Weng**, M. Elwin, H. Liu, "LeVR: A Modular VR Teleoperation Framework for Imitation Learning in Dexterous Manipulation", *IEEE ICRA 2026* (Submitted)
- **Z.K. Weng**, "BiDexHand: Design and Evaluation of an Open-Source 16-DoF Biomimetic Dexterous Hand", *IEEE ICRA 2025 Dexterity Workshop*, Spotlight Presentation
- A. Harapanahalli*, E. Muly*, H. Welch*, T. Brumfiel*, **Z.K. Weng***, et al. "Towards a Biomimetic and Dexterous Robot Avatar: Design, Control, and Kinematics Considerations," *IEEE/ASME AIM 2020*, Best Breaking Results Poster (*equal contribution)
- International Patent Application PCT/IB2025/055908 — "Fluid Management System for Medical Procedures"
- US Patent US20210150434A1 — "Accessible Ride Hailing and Transit Platform"

Awards & Recognition

- IEEE ICRA 2025 Dexterity Workshop — Spotlight Presentation for BiDexHand research
- IEEE AIM 2020 — Best Late Breaking Results Poster for biomimetic robotics
- First Place, 2021 Georgia Tech VIP Innovation Competition (Hardware, Devices & Robotics)
- Georgia Tech President's Undergraduate Research Award (2021)
- Toyota Mobility Foundation Challenge Winner (2017)
- Certified SolidWorks Expert (CSWE) — Highest mechanical design certification awarded by Dassault Systèmes