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 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 surgical robotics platform
- **Innovation & IP:** Invented prototype fluid management system for Monarch Urology procedures (patent filed PCT/IB2025/055908)
- **Software Development:** Developed robot calibration software in C++ and designed admittance control visualization prototypes using Python and CoppeliaSim
- **Verification & Validation:** Established test cases and performed design verification for multiple surgical robotic devices, ensuring compliance with performance and safety requirements
- **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

- **System Integration:** Led system integration for next-generation dental surgical robotic platform, driving cross-functional collaboration between hardware and software teams
- **Machine Learning Applications:** Designed supervised learning-based robot kinematic calibration method, significantly improving system accuracy and robustness
- **Robotics Development:** Engineered compact joint actuators for 7-DoF robotic arm, built and debugged 3 generations of prototypes with custom inverse kinematic modules
- **Human-Robot Interface:** Created physical end-effector providing haptic and visual user feedback for intuitive robot guidance
- **Leadership:** Mentored summer interns and delivered training to new hires on robotics hardware development
- **Career Progression:** Promoted to Senior Engineer in Aug 2022 based on exceptional performance and technical leadership

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, inverse kinematics, real-time control, calibration systems, ROS 2, CoppeliaSim, Gazebo, MuJoCo, PyBullet, RViz, Unity
Software Development	Python (NumPy, Pandas, OpenCV), C++, MATLAB, embedded systems, 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), sensor integration, actuator selection, system debugging, 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
- 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