

# 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, robot control and machine learning. Strong background in mechanical design, embedded systems, and real-time control.

## Professional Experience

### Senior Mechanical Engineer

*Johnson & Johnson MedTech, Santa Clara, CA / Remote*

**Oct 2022 – Present**

- **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

*Neocis Inc., Miami, FL*

**Jun 2021 – Oct 2022**

- **Mechatronics R&D:** Designed a 7-DoF robotic guidance arm for the Yomi S robot, including kinematic analysis and component specification. Developed a series of custom compact high-precision joint actuators from scratch
- **System Integration:** Led build and 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:** Developed optical robot kinematic calibration methods using optimization with regularization, 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

*Harmonic Bionics Inc., Austin, TX*

**May 2020 – Dec 2020**

- **Exoskeleton Development:** Designed robotic systems for 14-DoF rehabilitative upper extremity exoskeleton, including linear sizing mechatronic systems and handheld user interface
- **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

*Northwestern University, Evanston, IL Focus: Dexterous Manipulation, Kinematic Control, Imitation Learning*

**Sep 2024 – Aug 2025**

### B.S. in Mechanical Engineering

*Georgia Institute of Technology, Atlanta, GA Concentration: Robotics and Control Systems*

**Sep 2016 – May 2021**

# Open-Source Projects

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**LeVR: A Modular VR Teleoperation Framework for Imitation Learning in Dexterous**

**2025**

**Manipulation**

*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**

*Georgia Tech LIDAR Lab, Atlanta, GA*

**2019-2021**

- 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

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

## Publications & Patents

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- **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

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- 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