Michael Jenz

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Education

Northwestern University | *GPA: 4.0/4.0* Apr. 2025 – Jun. 2026
Master of Science in Mechanical Engineering *Evanston, IL*

Northwestern University | *GPA: 3.8/4.0* Sept. 2022 – Jun. 2026
Bachelor of Science in Mechanical Engineering *Evanston, IL*

Professional Experience

Mechanical & Embedded Systems Intern Jun. 2025 – Pres.
Applied Thin Films Inc. *Skokie, IL*

- Built IoT HVAC monitor system to monitor gas concentration using MQTT communication between Pico based sensing unit and server running on Docker (node-RED, influxDB, Grafana)
- Coded UI and algorithm using OpenCV to provide quantitative characterization for microstructure images
- Optimized material production parameters to improve final material density by 6%

Projects & Research

Actuated Prosthetic Arm | *Human-Robot Interaction, Embedded C++, PCB Design, CAD* Jun. 2024 – Pres.

- Developed an actuated prosthetic elbow that imitates natural elbow rotations to restore arm swing in walking
- Controlled BLDC motor using SimpleFOC approach with PID control along arm swing trajectories in real time
- Created human-machine interface for control, using IMU to detect heel strike and estimate walking speed
- Molded and machined elbow joint to translate motor output to prosthesis movement using ball bearings, and dowel pins to ensure axis-alignment and reduce friction in the electro-mechanical system

Line Following Robot | *Computer Vision, Microcontroller, Control Design* May 2024 – Jun. 2024

- Designed and built a two wheeled robot to follow a line circuit using only camera feedback
- Programmed image processing algorithm with OpenCV to identify robots position relative to the center of the line
- Input image processing result into PID controller that corrected motor speed to keep robot on course

Task Space Control in Simulation | *Motion Planning, Kinematics, Mobile Manipulator* Nov. 2024 – Dec. 2024

- Wrote software to plan, simulate, and control the execution of pick and place tasks by a mobile robot in simulation
- Controlled robot to follow planned path using PI task-space control resulting in 5 second average settling time
- Enforced joint limits to prevent self collision by altering Jacobian columns to inhibit certain joint's movement

Electronic Continuously Variable Transmission | *Machine Design, CAD, DFM, FEA* Sept. 2024 – Jun. 2025

- Designed an E-CVT for fast tuning in various Baja SAE events to maximize power output and vehicle acceleration
- Used ball screw drive train from DC motor source to actuate the primary's moving sheave and set the E-CVT ratio
- Manufactured entire primary system and integrated with existing secondary to be used successfully in testing

Chassis Leveling for Hexapod via Q-learning | *Reinforcement Learning, Python* Mar. 2025 – Mar. 2025

- Defined state space and goal state (level chassis) using IMU sensor, forcing us to reduce space size with bucketing
- Trained with epsilon-greedy exploration, rewarding when robot made progress towards being level and at goal state
- Reached goal state 14% of epochs, with marked increase in goal state frequency as training continued

Wireless Web-Camera | *PCB Design, Microcontroller Firmware, Web Design* Jan. 2025 – Mar. 2025

- Wrote firmware, designed PCB, and debugged embedded web-camera that captures pictures, verifies image validity, and transfers image to ESP32 for upload to local website via websocket resulting in video streaming up to 2 FPS

Publications

M. Jenz *et al.*, "Design and Control of an Actuated Prosthetic Elbow to Restore Arm Swing for Persons with Upper Limb Absence," *International Conference on Rehabilitation Robotics (ICORR)*, 2025.
doi:10.1109/ICORR66766.2025.11063135

Technical Skills

Mechanical: Solidworks, Fusion 360, Onshape, NX, Milling, Turning, FDM Printing, Injection Molding, Water Jetting
Robotics: ROS/ROS2, Localization, Mapping, Kinematics, Trajectory Planning, Robot Dynamics, Motion Control
Embedded: Pico, Teensy, ESP32, freeRTOS, Zephyr RTOS, I2C, SPI, UART, Raspberry Pi, PlatformIO, Micropython
Software: Python, C, C++, MATLAB, Git, GitHub, Sympy, Numpy, SciPy, Pandas, OpenCV