

Zhang Zhang

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EDUCATION

Carnegie Mellon University (CMU)

Pittsburgh, PA

M.S in Artificial Intelligence Engineering-Mechanical Engineering

08/2024- 12/2025

- Relevant Coursework: ML & AI for engineers, Electromechanical System Design, SLAM, Intro to Deep Learning, Optimal control & Reinforcement Learning

University of Illinois at Urbana-Champaign (UIUC)

Champaign, IL

B.S Degree in Engineering Mechanics

09/2020 – 05/2024

Cumulative GPA: 3.62/4.0

- Relevant Coursework: Robot Dynamics, Finite Element Analysis, Computational Methods, Computational Mechanics, Behavior of Materials, Intermediate Dynamics

RESEARCH EXPERIENCE

CERLAB | Advisor: Prof. Kenji Shimada

CMU

YKK Window Sealant Inspection

10/2024-05/2025

- Designed a UR5 end-effector assembly to apply controlled compression on sealant samples, enabling detection of hidden defects with >90% repeatability.
- Integrated a force sensor into the assembly, preventing sample damage while maintaining consistent contact force.
- Developed an automated inspection pipeline delivering **200% faster processing speed** while maintaining defect detection accuracy.

Automated Delamination Inspection Tool – Mechatronics & Housing Design

05/2025-08/2025

- Developed a motorized actuator system (NEMA 17 stepper, lead screw, spring suspension, guide rail, HX711 load cell) to deliver a controlled **35 N $\pm$ 2 N contact force** for defect detection.
- Created a modular frame integrating actuator, rollers, and camera/LED mounts; ensured precise alignment, reduced vibration, and allowed compact integration of subassemblies.
- Implemented a closed-loop control scheme that zeroed sensor baseline, detected roller engagement, and maintained stable force application by adjusting actuator commands in real time.

HIGHLIGHTED PROJECT

Automatic Bookshelf Managing System

09/2024-12/2024

- **Mechanical:** Designed a 3D gantry + gripper to store/retrieve books of varying thickness, with rail-guided motion for stability and space efficiency.
- **Algorithm:** Implemented dynamic shelf allocation and collision-free path planning for book placement/retrieval.
- **Electronics:** Developed an Arduino + Raspberry Pi control system with motor drivers and sensor feedback for reliable gripper-gantry coordination.

Real-Time Indoor Mapping with RTAB-Map

01/2025-05/2025

- **Developed** a real-time SLAM framework in ROS/Gazebo by optimizing RTAB-Map with OpenMP-based CPU parallelization and feature-detector selection (ORB, SIFT, SURF).
- **Validated** performance in simulated TurtleBot3 experiments with RGB-D sensors, demonstrating >10% reduction in RMSE compared to default RTAB-Map configuration.
- **Engineered** a quantitative evaluation pipeline using SDF-to-point-cloud conversion and Open3D-based ICP alignment, computing error metrics (RMSE, mean error, Chamfer distance).
- **Overcame** integration challenges across ROS versions and Dockerized environments, ensuring reproducibility and source-level customization.

LQR-Based Balance Control for Bipedal Wheeled Robot (MATLAB Simulation)

01/2025-05/2025

- Modeled a five-bar leg linkage and derived full state-space dynamics for control system design.
- Designed an adaptive LQR controller with gain scheduling, maintaining upright balance and trajectory tracking under varying leg geometries.
- Integrated Virtual Model Control (VMC) to map task-space forces to joint torques, ensuring stable posture regulation, precise velocity tracking, and efficient torque distribution across actuators.

SKILLS

Engineering Software: SolidWorks, Fusion 360, Creo, Abaqus (FEA), Autodesk CFD, OriginPro

Programming Languages: Python (Numpy, Pandas, Scikit-learn, Keras, PyTorch), C++, ROS, SQL

Hardware & Application: Arduino, Raspberry Pi, 3D printing, Mechanical testing, Mold Design