Will Kraus

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EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Mechanical Engineering - Research; GPA: 3.96 / 4.0 — *May 2025*

Pennsylvania State University — State College, PA
Bachelor of Science in Mechanical Engineering, Minor in Engineering Leadership — *May 2023*

SKILLS

Programming: C++, ROS/ROS2, Python (Pytorch, Pinocchio), Git, Linux, MATLAB/Simulink, Julia
Simulation: MuJoCo, Webots, Gazebo
Hardware: CAD (SolidWorks, Fusion 360, Onshape), Prototyping (3D Printers, Mills, Lathes, CNC, GD&T)

RESEARCH EXPERIENCE

Graduate Researcher — September 2023 - Present
Robotic Exploration Lab, under Dr. Zachary Manchester — **C++, Optimal Control, SysID**

- Constructed flexible satellite testbed with reaction wheels, IMUs, and CAN + I^2C communication
- Integrating optimal controller, sensor calibration, state estimation, and System Identification (SysID) for flexible satellite in C++ and MATLAB, mitigating model complexity for controlling flexible structures

WORK EXPERIENCE

Graduate Course Support: Modern Control Theory — September 2024 - December 2024
Carnegie Mellon University — **Control Theory, Whole Body Control, AWS**

- Creating AWS version of quadruped bimanual manipulation paper ***LocoMan: Advancing Versatile Quadrupedal Dexterity with Lightweight Loco-Manipulators*** for graduate student course
- Developing whole-body control teaching material, homework assignment, and simplified quadruped stack for improved student-level understanding of key concepts

Vibration Analyst Engineering Intern — June 2022 - August 2022
KCF Technologies — **Robotics, IMU Sensors, Predictive Maintenance**

- Presented framework for optimizing sensor collection on different robots into predictive maintenance platform by timing additional sensor collection windows directly to robot movements
- Interfaced with 6 product suppliers and customers across the United States for customer support and system triage, reducing downtime of equipment by 10%

PROJECT EXPERIENCE

Robust Drone Flight under Strong Wind || C++, Control Theory September 2024 - December 2024

- Designed drone testbed with ROS2 and Gazebo to simulate wind for cascaded controller in C++
- Implementing Sliding Mode Control (SMC) for onboard flight with Extended Kalman Filter for IMU and position sensor in C++

RL & Transformer with Humanoid Robot || MuJoCo, Model-based RL January 2024 - May 2024

- Incorporated a decision transformer with a reinforcement learning algorithm to reduce unnecessary movement in simulation with expected reward levels
- Constructed a model-based reinforcement learning architecture with trained and untrained transformer in a MuJoCo simulation of a humanoid robot, shortening training time by >50% with similar reward

Autonomous Vehicle Control Simulation || State Estimation, Control August 2023 - December 2023

- Created and tested LQR control system, Extended Kalman Filter, SLAM, and A* path planning
- Achieved 20% faster track speed over PID with < 3.5 meter average distance from road median
- Transferred algorithms into ROS and Gazebo framework, improving sim-to-real transfer potential