

## KATHERINE (KATY) CHRISTIAN

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## EDUCATION AND AWARDS

Purdue University

Expected May 2026

## Bachelor of Science in Mechanical Engineering

Purdue University President's Scholarship, 2022, 2023, 2024, 2025

**RELEVANT COURSEWORK:** Dynamics, Statics, Control Systems, Mechanics of Materials, Finite Element Analysis, C programming

**SKILLS:** CAD (SolidWorks, Solid Edge, Siemens NX, Onshape), FEA (Abaqus, ANSYS), Python, MATLAB, GD&T, Slicing software (Bambu Studio, Cura), Welding (MIG, SMAW), Mechanical design based on DFM / DFA principles, Machining (CNC, Lathe, Mill)

## INTERNSHIPS / JOBS

Undergraduate Researcher – TRACE Lab (Terrain Robotics Advanced Control and Experimentation Lab)

*May 2025 - Present*

- Humanoid Robot Gripper: Mechanical Team Lead for the design and testing of an end effector capable of holding a 140 lb humanoid. Utilized MATLAB to optimize gripper design based on torque requirements and performed calculations to determine gear geometry. Sourced components and collaborated with manufacturers and electrical team to integrate the gripper with the humanoid robot using CAN bus.
- Human Robot Interaction Project: Designed and manufactured a wearable device to determine forces experienced by a humanoid robot while assisting someone walking with limited mobility. Device contained three 1D load cells (to measure overall force application using imbedded strain gauges) and a tactile sensor (to measure grip strength and location) with the overall system controlled by an Arduino. Designed custom load cell calibration test setup and compared testing data to predicted force values based on load cell calibration geometry.
- Repaired and designed replacement components for a damaged Unitree Go1 quadruped. Assisted in running experiments for Unitree Go1 in non-inertial environments (dynamic motion platform with treadmill and boat testing on water)
- Fixture design for experiment setup and testing
  - Unitree Go2 quadruped: Camera setup and adjustable rail mount system for battery and NVIDIA Jetson Nano
  - Table tennis playing robot: Designed paddle adaptors for the Booster T1 humanoid (Booster Robotics). Optimized filament type, infill density, and orientation for 3D printed components to withstand stringent testing. Modified URDF file to contain correct mass properties and coordinate frames for simulation in Isaac Sim and policy training in Isaac Lab. Designed and manufactured paddle marker mounts compatible with a Vicon motion capture system.
  - Designed and assembled IMU mounts for Digit (Agility Robotics) to use during testing in non-inertial environments.

Lincoln Electric Internship, Plant Engineering – Consumables Automation

Summer 2024

- Designed a system to transfer empty cans between conveyors (ground-up design) and created a mathematical model to determine the optimal values for critical dimensions of a can transfer system
- Modeled parts and assemblies in Solid Edge; designed parts to be manufactured for a lid mounting/installment prototype and programmed a FANUC Robot to perform reliable lid placement

Lincoln Electric Internship, Plant Engineering – Facilities Engineering

Summer 2023

- Modeled parts and assemblies in Solid Edge and created engineering drawings using company standards
- Redesigned the air compression system for the entire plant (1.6 million sq ft) by modeling the existing system, analyzing its efficiency, and determining the necessary improvements (system was installed the Summer of 2024 with only a few changes to the design). Redesigned, implemented, and coordinated the installation of a water pump system.

Shaker Numeric Internship, Manufacturing Intern

Summer 2021

- Operated machinery (mill, lathe, 5 axis CNC, bandsaw, drill press) in a machine shop to manufacture custom parts for aerospace companies. Collaborated with machinists, operators, quality control and management.

## TECHNICAL EXPERIENCE / PROJECTS

Mechanical Lead for the NEMO Project – Humanoid Robot Capable of Legged Locomotion

*January 2025 – Present*

- Designed parts and assemblies in SolidWorks to create a 3.3 ft tall, 50 lb humanoid robot with 12 DOF in its legs and 8 DOF in the upper body. Engineered components to be directly actuated by Unitree GO-M8010-6 motors, noting the required tolerances and expected torque output. Collaborated with the electrical team to construct a cable routing system compatible with CAN bus.
- Performed FEA on components to determine required geometry for 6061 Aluminum framing and PLA motor casings. Refined components and validated material selection based on stress and deformation results under loading conditions.
- Utilized feedback from the MuJoCo simulation and reinforcement learning policy training results to iteratively redesign the leg system to minimize leg height, width, and overall weight. Analyzed existing humanoid designs to determine optimal motor placement, joint orientation, and range of motion to facilitate training policy success.
- Designed harness setup and calibration system to consistently test walking capabilities with the humanoid deployed on ROS2. System tethered to robot pelvis with overhead suspension rig attached to 8020 framing to create 3 x 3 x 6 ft mobile test stand.

Drivetrain Team Engineer - Purdue Electric Racing

August 2022 – Spring 2024

- Utilized the Computer Aided Machining capabilities of Fusion 360 to manufacture parts. Selected bearings for the car based on force/load calculations and determined required tolerances for bearing setup. Machined components using CNC and mill.