Gianlorenzo Cavallo

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EDUCATION

University of Detroit Mercy *Aug 2022 - Present*
Bachelor of Electrical Engineering (GPA: 3.43) *Graduation: Dec 2026*

Coursework: Control Systems, Hardware and Software Integration, Senior Design, Electronic Systems, Intro to Microcontrollers
Affiliations: IEEE Student Member - Control Systems Society (CSS), Robotics and Automation Society (RAS)

SKILLS & INTERESTS

Hardware: Digital Multimeter, Oscilloscope, Function Generator, Arduino and ARM MCUs, Raspberry Pi

Software and Simulation Tools: KiCad, MATLAB, Simulink, LTSpice, Python, C++, Embedded C, ROS 2, PyTorch, Git, Bash

Interfaces and Protocols: UART, I2C, SPI, SCI, USB, GPIO, Ethernet, Quadrature Encoder Interface (QEI)

Interests: Real-Time Control, Embedded Systems, PCB Design and Layout, Autonomous Mobile Robots, Analog and Mixed-Signal Circuit Design, Dynamical Systems Modeling, Numerical Methods, Machine Learning

WORK EXPERIENCE

Disruptive Labs *Remote*
Research Intern – Machine Learning and Control *Jan 2026 - Apr 2026*

- Designed and implemented a real-time reinforcement learning and adaptive control algorithm for a wearable-driven, human-in-the-loop system measuring physiological anxiety indicators
- Conducted a focused literature review on reinforcement learning, adaptive control, and safe learning methods, and translated findings into design decisions with bounded adaptation and conservative learning strategies
- Developed physiological state estimators to infer latent regulation states from noisy wearable sensor data

ACADEMIC PROJECTS

AGV Motor Control Subsystem | KiCad, Simulink, ROS2, Embedded C, C++, ARM MCU, QEI *Aug 2025 - May 2026*

- Collaborated with a team of 10 electrical engineers to develop an autonomous ground vehicle for Senior Design
- Modeled brushed DC motors and designed discrete PI speed-control loops in Simulink to meet <1s rise time, <3s settling time, and <10% overshoot specifications
- Developed real-time control firmware using embedded C on an ARM MCU for discrete controller implementation
- Designed a custom 2-layer PCB for the ARM MCU and built a ROS2 high-level control stack for differential-drive motion

Three-Band Audio Equalizer | Multisim *Nov 2024 - Dec 2024*

- Designed a three-band audio equalizer with active filters in Multisim and built with off-the-shelf components
- Validated hardware and signal chain via listening tests to ensure proper bass, mid and treble changes

Drive with PID Control | MATLAB, Simulink, Arduino Microcontroller *Sept 2024 - Oct 2024*

- Assembled a 4-wheeled mobile robot in my Electronic Systems class
- Implemented a discrete PID velocity controller on an Arduino Mega Microcontroller for robot rectilinear motion
- Tuned PID gains via iterative real-world testing to reduce speed overshoot and steady-state error

PERSONAL PROJECTS

Three-DOF Gimbal | ROS 2, Python, C++, Embedded C, ARM MCU, Raspberry Pi *Aug 2025 - Present*

- Architecting a three-DOF gimbal with multiple operating modes to achieve stable position control using a PID control algorithm
- Developing a ROS 2 control pipeline that maps joystick inputs to precise servo position commands
- Implementing embedded C firmware on a ARM MCU for real-time gimbal attitude control via I2C protocol

Simulation of Inverted Pendulum on Cart with Cascaded Control | MATLAB, Simulink *Oct 2025*

- Simulated the dynamics of a linearized inverted pendulum on a cart system using MATLAB and Simulink
- Designed a cascaded PD-PID control architecture for pendulum angle and cart position stabilization
- Tuned controller gains to achieve less than 30% position overshoot and maintain stable upright balance