CATHERINE MAGLIONE

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EDUCATION

Northwestern University, McCormick School of Engineering
MS Robotics | expected 12.2025

Columbia University, Fu Foundation School of Engineering and Applied Science
BS Operations Research | 5.2022

SKILLS

Robotics Systems: ROS/ROS2 · MoveIt · Simulation (CoppeliaSim, Gazebo, RViz) · KUKA System & Language
Software Engineering: Python · C++ · C · SQL · Linux · Git · Docker · CMake · Unit Testing · Jekyll
Computer Vision: OpenCV · MediaPipe · Object Detection (YOLO) · Intel RealSense
Machine Learning: Convolutional Neural Networks · MediaPipe · PyTorch · scikit-learn · Differentiable Graphics (DiffVG)
Control Systems: PID Feedback Control · Forward/Inverse Kinematics · Multi-Loop Trajectory Control · Simulation & Optimization
Embedded & Hardware Interfaces: PIC32, ISR scheduling · UART/I2C Communication · Microcontrollers (PIC32, Arduino) Raspberry Pi
Data & Analytics: SQL Pipelines (EHR) · Data Cleansing/Integration · Analytics Dashboards (Tableau, SQL) · GIS & Spatial Analytics
Fabrication & Prototyping: Laser Cutting · 3D Printing (including clay extrusion) · Onshape (CAD) · PCB-level Motor Controller Integration
Leadership & Mentorship: Mentor (Robogals K–12 Robotics) · Program Lead (Columbia Eye to Eye) · Trained & Managed 30-Person Team

PROJECTS

Multi Robot Swarm System | Fall 2025
- Engineered a Python choreography framework for a 50-robot swarm, training a PyTorch pose model on human motion data.
- Applied computer vision and machine learning to map Laban-inspired movement qualities into coordinated swarm behaviors.
- Designed and tested ORCA-based collision avoidance to ensure safe, emergent group behavior in large-scale swarm deployments.

Human Robot Interaction with Turtlebot | Winter 2025
- Built a ROS2-based perception and control pipeline in Python and C++ for TurtleBot navigation and interactive response
- Applied real-time computer vision (OpenCV, convolutional neural networks) to detect and classify light-traced movement patterns
- Generated deterministic robot behaviors by coupling perception with ROS2 control loops for real-time human–robot interaction.

Real Time Motor Controller | Winter 2025
- Programmed an embedded motor controller in C on a PIC32 microcontroller, implementing timer-driven interrupts and multi-loop PID
- Integrated UART and I2C drivers for deterministic communication with sensors and actuators, achieving precise closed-loop control.
- Developed a companion Python interface for command parsing, trajectory streaming, and dynamic gain tuning.

7-DOF Robot Arm for Autonomous Pool Game | Fall 2024
- Collaborated with a team to develop a ROS2 package for a Franka 7-DOF arm, focusing on motion planning and force control.
- Engineered computer vision pipelines using Intel RealSense and OpenCV to detect, classify, and track billiard balls.
- Generated precise trajectories for strategic shot planning, enabling autonomous gameplay with repeatable, high-accuracy execution.

Mobile Manipulation Pick and Place with KUKA youBot | Fall 2024
- Simulated a 5-DOF mobile manipulator in CoppeliaSim, applying modern screw theory and odometry for trajectory generation.
- Implemented a feedforward + PI controller with physics-based simulation to minimize error between commanded and actual motion.

Generative Dance with Stable Diffusion XL | Spring 2025
- Built a real-time pipeline linking dancer motion features to Stable Diffusion XL, conditioning prompts with choreography-derived data.
- Optimized GPU inference to achieve interactive frame rates, enabling live AI-generated visuals that responded to human movement.

EXPERIENCE

Refik Anadol Studios
Robotics Intern | Los Angeles, CA | 6.25 - 9.25
- Engineered a robotic painting system in Python in 10 weeks, building an exhibit-ready installation pipeline for DATALAND museum.
- Developed KUKA control software with safety constraints, ensuring reliable brush handling and deterministic tool-switch execution.
- Designed optimization-driven image-to-stroke rendering methods, converting digital inputs into robotic paint trajectories.
- Implemented automated color-matching algorithms for paint dispensing, enabling accurate reproduction of target colors in hardware.

Planned Parenthood of Illinois
Business Operations and Data Intelligence Analyst | Chicago, IL | 9.22- 5.24
- Engineered SQL pipelines and dashboards to maintain patient data integrity during a system-wide EHR migration.
- Ensured database accuracy and continuity of care during a 47% surge in patient volume post-Dobbs.
- Built real-time analytics tools (Tableau, SQL) to inform staffing models and resource allocation across statewide health centers.

ThredUP (largest resale platform for secondhand fashion)
Industrial Engineer Summer Intern | Atlanta, GA | 6.21 - 9.21 & 6.22- 8.22
- Applied queueing theory and SQL to optimize checkpoint timing in Vanderlande inbound automation, reducing reprocessing by 8%.
- Directed launch of thredEX, consolidating multi-DC shipments into single orders, reducing CO_2 emissions and fulfillment overhead.
- Redefined warehouse layouts and trained 30-person teams to accelerate pick–pack–load cycles, surpassing throughput expectations.
- Advanced circular logistics by scaling thredEX across facilities, driving measurable sustainability and spatial optimization gains.