Raymond (Mingguang) Yang

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EDUCATION BACKGROUND

University of Pennsylvania, Philadelphia, PA — ***Aug 2024 – May 2026 (Expected)***

M.S.E. in **Mechanical Engineering** (Mechatronics and Robotics stream), **GPA:3.95/4.00**

University of Toronto, Toronto, Canada — ***Sep 2019 – June 2024***

B.A.Sc. with Honor in **Mechanical Engineering** (Mechatronics and Manufacturing stream), **GPA:3.77/4.00**

SKILLS & QUALIFICATIONS

Programming & Control: ROS1/2, Python, C++, MATLAB, Linux, Git, control algorithms (PID, LQR, MPC), sensor fusion (EKF/IMU–Vision), robotic kinematics & dynamics

Perception & Simulation: OpenCV, computer vision, visual–inertial odometry (VIO), SLAM, Gazebo, RViz,

Design & Prototyping: SolidWorks, 3D printing, machining, hardware integration (Raspberry Pi, Jetson, microcontrollers), hardware communication (I^2C, UART, CAN), PCB design basics

ROBOTICS PROJECTS

Multi-Platform Lunar Rover System (NASA LASSIE),* UPenn,** Philadelphia, PA — ***Jan 2025 – Feb 2026 (Expected)

- **Designed and prototyped** aluminum docking interfaces using **SolidWorks**, capable of handling up to **60 kg** combined load, enabling multiple robots to physically attach and detach for **cooperative push–pull operations**.
- **Implemented low-level control firmware** on **Raspberry Pi 4** for differential-drive motors and sensor feedback, **achieving <2% velocity tracking error** during field tests.
- **Programmed** an **AprilTag-based** self-docking system in **ROS2**, integrating camera feedback and **dual-axis motor control** for real-time yaw–pitch alignment to achieve **>95% success** in fully automated docking and undocking.
- **Integrated GPS + IMU sensor fusion (Extended Kalman Filter)** to maintain localization drift below 0.3 m over 50 m trajectory, improving global positioning accuracy by **40%**.

Autonomous VIO-based Quadcopter,* UPenn,** Philadelphia, PA — ***Jan 2025 – May 2025

- **Built a ROS2-based simulation of drone dynamics** with integrated IMU and stereo camera sensors for state estimation and control testing in Gazebo.
- **Implemented and tuned visual–inertial odometry (VIO)** achieving **<1% drift over 100 m trajectory**.
- **Developed trajectory planning and control nodes** for autonomous waypoint tracking, maintaining **±2 cm positional accuracy** in simulated flight tests.

Franka Panda Block Stacking Competition*, UPenn,** Philadelphia, PA — ***Aug 2024 – Dec 2024

- **Implemented inverse kinematics and QP-based trajectory control** in ROS/Python for real-time motion planning of the 7-DOF Franka Emika Panda arm.
- **Integrated camera-based object detection and pose calibration** using OpenCV, achieving **<2 mm stacking precision** and earning **2nd place among 10 teams** in the competition.

Autonomous Maze-Solving Robot,* UofT,** Toronto, Canada — ***Aug 2024 - Dec 2024

- **Developed a real-time sensing and planning system** on Arduino using Python, integrating **5 ultrasonic sensors, dual encoders, and IR trackers** for dynamic obstacle avoidance and localization with **<2 cm error** at **10 Hz update rate**.
- **Implemented A* path-planning** algorithm**,** enabling full maze traversal and block transport with **±2 cm** waypoint accuracy**.**

WORK EXPERIENCES

Process Engineer*, Bittele Electronics Inc.,** Toronto, Canada — ***May 2022 - Sep 2023

- **Applied DFM and IPC-610 standards to optimize PCB assembly workflow**, improving manufacturing consistency and reliability for automation and embedded hardware applications based on **ISO 9001**.

Mechanical Engineer, Jiangnan Mould & Plastic Technology Co., Ltd, Shanghai, China — ***May 2021 – Aug 2021***

- **Designed and optimized plastic injection molds and automotive bumper components in SolidWorks**, applying **DFM and GD&T principles** to improve part precision and manufacturability for automated production lines.