

# TOMAS FRANCO

650.722.9645 | tofranco@calpoly.edu | linkedin.com/in/tomasfranco7 | github.com/TomasEzFranco | tomasezfranco.github.io

## EDUCATION

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**California Polytechnic State University** **San Luis Obispo, CA**  
M.S. Mechanical Engineering, Thesis: LLM-Guided Robotic Manipulation **Expected June 2026**  
GPA: 3.71

**California Polytechnic State University** **San Luis Obispo, CA**  
B.S. Mechanical Engineering, Focus: Mechatronics **March 2025**  
GPA: 3.68 | Dean's List

## PROJECTS

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**M.S. Thesis Research - California Polytechnic State University** **2025 - June 2026**

- Conducting thesis research in autonomous robotic manipulation, integrating perception, motion planning, and grasp execution for pick-and-place tasks.
- Developed a closed-loop RGB-D manipulation pipeline using YOLO instance segmentation, current sensing, encoders, and LLM-based planning for text-prompted cube sorting and stacking on the Quanser QArm.
- Improved reliability through root-cause analysis across perception and grasp execution, adding grasp checks, gain tuning, motion safety limits, planner failure-mode analysis, and IK transformation tuning.

**Custom PCB Controlled Unconventional RRP Plotting Robot** **Spring 2025**

- Designed a custom PCB, wiring diagrams, and supporting software for an RRP robotic drafting system; performed soldering, board bring-up, and debugging to resolve initial design errors.
- Used the board to drive a plotting robot with RRP joint architecture to draw 2D images using G-code, overcoming structural challenges.

**Autonomous Mobile Platform (MXcarkit)** **Spring 2025**

- Built autonomous driving pipelines in Docker, including a PilotNet-based behavioral cloning model for steering/speed control and a YOLOv11 traffic-light detection backup.
- Ran 10 training trials using Weights & Biases, compared RGB vs. grayscale inputs, validated behavior in Foxglove, and deployed the best model live.
- Exported the YOLO traffic-light model to ONNX and integrated it into a ROS 2 Python node, achieving 0.98 F1 across red, yellow, and green classes.

**Heal Bot - Vision and Speech-Driven Robotic Arm Pipeline** **Winter 2025**

- Built a speech-driven service robot using YOLO object detection, LLM request interpretation, and forward/inverse kinematics to retrieve requested items on the Quanser QArm.
- Designed the pipeline from speech input to robot command, improving reliability through prompt engineering and structured output validation.

**Line-Following with IMU Differential Drive Robot (Romi)** **Winter 2025**

- Integrated IR sensor array, wheel encoders, BNO055 IMU, and bump sensing to implement closed-loop line following, heading control, and dead reckoning for a differential-drive robot.
- Tuned control thresholds and loop timing to reduce oscillations and improve stability during tight turns.

**Vanlife Desalinator - Senior Design Project** **2024 - 2025**

- Designed a compact, cost-efficient desalination concept for off-grid vanlife, including functional decomposition and a researched bill of materials for architecture trade-offs.

**Two-Stage Beam Spring - Lawrence Livermore Sponsored** **2023**

- Developed a two-stage beam spring concept considering preload/thermal effects; performed FEA, then validated deformation and stress predictions through Instron compression testing.

## EXPERIENCE

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**CSM STEM Center** **San Mateo, CA**  
*Engineering and Physics Tutor* **January 2022 - May 2022**

- Tutored students in Engineering and Physics, adapting teaching methods to individual learning styles and demonstrating strong communication and interpersonal skills.

**Lindamood-Bell** **Menlo Park, CA**  
*Clinician* **Summer 2025**

- Delivered personalized instruction to children with reading difficulties, adapting to support their progress.

**Peninsula School** **Menlo Park, CA**  
*Head Teacher* **Summer 2015 - 2025**

- Led daily sports and recreational sessions for children, managing group safety and adapting activities for mixed ages and skill levels.

## SKILLS

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- Robotics & Autonomy: Robot manipulation, perception pipelines, kinematics, controller tuning, sensors, root-cause analysis
- Software & Tools: Python, MATLAB, Linux, ROS 2, Docker, Weights & Biases, ONNX, Foxglove, OpenCV, YOLO
- Mechanical & Electrical: PCB design, microcontrollers, electrical schematics, mechanical drawings, GD&T, CAD, FEA, 3D printing
- CAD: SolidWorks, Fusion 360