Prabhvir Singh Babra

prabab@ucla.edu | prababameister.github.io

Technical Skills

Languages: C/C++ (4+ years), Python, JavaScript, R
Robotics & RL: ROS1/2, OpenCV, TensorFlow, Isaac Gym, Gazebo
Tools: Git, Docker, Bash

Experience

Robotics and Mechanisms Laboratory (RoMeLa) June 2025 – Present
Undergraduate Research Assistant *Los Angeles, CA*

- Improved expert model prediction accuracy in an AMP locomotion framework by **15%** by identifying incorrect contact forces on end-effectors and modifying URDF collision geometry and AMP observation frames in Isaac Gym.
- Trained a HiTorque humanoid robot to walk robustly while withstanding **0.5 m/s external pushes** through controller and reward fine-tuning.
- Increased data collection throughput by **50–70%** by developing a batch experiment runner enabling parallelized overnight training across parameter sweeps.

Projects

3D4E Robotics Track Sep. 2025 – Present
Project Lead *Los Angeles, CA*

- Coordinated subsystem integration from concept to physical assembly of **two quadruped robot leg prototypes** while leading an 8-person multidisciplinary team.
- Implemented analytical inverse kinematics and cubic-spline motion planning for spatial 3-DOF quadruped legs, and validated math via offline Python simulation and visualization.

Codename FF Dec. 2024 – Mar. 2025
Robotics Project

- Designed, 3D-printed, and assembled low-cost omniwheels using paper-clip axles to build a Kiwi-drive mobile robot.
- Implemented COBS-framed serial communication between Arduino and Raspberry Pi for robust packetized control.
- Developed motion planning and velocity control for omnidirectional drivetrain.

BrandonW Robot Arm Feb. 2024 – Jun. 2024
Robotics Software

- Built a full **6-DOF** robot arm software stack in C++/ROS, including numerical IK, custom controllers, and COBS-framed UART motor control (**99% reliability**).
- Modeled and validated the arm in URDF and Gazebo, containerizing the workflow with Docker for reproducible development.
- Deployed Cartesian (x, y, z), yaw-pitch-roll, control enabling autonomous pick-and-place with electromagnetic and gripper end-effectors.

FRC 299 Valkyrie Robotics Nov. 2021 – Aug. 2023
Software Lead *Los Angeles, CA*

- Led and trained **5–8** software members, shipping competition-ready C++ code through a structured robotics curriculum.
- Implemented multi-camera AprilTag vision by encoding UART data with COBS on a Teensy and forwarding via UDP to RoboRIO (**0.5% message drop rate**).
- Developed robot localization using AprilTags with $\leq$**10°** **alignment error** and autonomous balancing via IMU-based proportional control (**50% success rate**).

Education

University of California, Los Angeles Los Angeles, CA
B.S. Computer Engineering *B.S. Mathematics* *Expected March 2028*