Preet Karia

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EDUCATION

University of California - Santa Cruz   Santa Cruz, CA
Bachelor of Science in Robotics Engineering and Computer Engineering   *June 2024 - Jun. 2027*
Relevant Coursework: Logic Design, Data Structures and Algorithms, Computer Architecture, Applied Discrete Mathematics, Microcontrollers and Design, Statics and Materials

TECHNICAL SKILLS/ INTERESTS

Skills: SolidWorks, Onshape, Structural Modeling, Kinematic Analysis, Sensor Integration, Basic Vibration, Frequency Analysis, MATLAB, Python, C++, ROS 2, Gazebo, RTL Design, Fixed-Point Arithmetic, Finite-State Machines, GTKWave
Interests: RTL Design, Digital Logic, Machine Learning, High-Performance Computing, Artificial Intelligence, Robotics

EXPERIENCE

Autonomous Systems Lab at UCSC   Sep. 2024 – Present
Robotics Research Intern

- Developing reflection-aware SLAM using depth, IR, and IMU fusion to distinguish reflections from valid obstacles while aintaining differential-drive robotics platform integrating LiDAR, IMU, and RealSense sensors.
- Working on recalibrating the Baxter and the Sawyer Robot from Rethink Robotics to perform numerous tasks

Formula Slug   Jun. 2024 – Present
Mechanical Systems Engineer

- Redesigned the chassis of the vehicle using SolidWorks and Onshape in order to create Version 3 of the car
- Created steering wheel kinematic diagram as part of ergonomics team to find ideal hip angle while modeling differential mount for the drivetrain

SELECTED PROJECTS

Limit Order Book Simulator + Market Strategy | *Python, NumPy, Pandas, Matplotlib*   Sep. 2025 – Present

- Built a high-performance limit order book (LOB) simulator modeling bids/asks, midprice, depth, queue priority, partial fills, and order matching logic.
- Implemented and backtested a market-making strategy using spread optimization, inventory risk controls, and stochastic midprice forecasting.
- Analyzed execution quality, PnL distribution, adverse selection, and fill probabilities using Monte Carlo simulations and synthetic order flow.

TinyTrainium - RTL Accelerator Project | *Verilog, Python/NumPy, Icarus, GTKWave*   Oct. 2025 – Present

- Designed a fixed-point 2×2 MAC array in Verilog with a scratchpad-fed datapath, FIFO dispatcher, and multi-stage control FSM, modeling the core of a small AI accelerator.
- Performed latency and throughput analysis across pipeline stages, optimizing MAC scheduling for maximum compute utilization — similar to evaluating execution efficiency in trading systems.
- Developed a self-checking testbench that compares RTL outputs with a Python/NumPy golden model to validate correctness across randomized test vectors.

Onboardly - Cal Hacks Winner | *Python, Flask, TypeScript, Gemini Vision*   Oct. 2025 – Present

- Architected an onboarding engine with a task-graph compiler, role-embedding generator, and LLM pipeline for curriculum synthesis.
- Implemented a Chrome extension using Gemini Vision to analyze DOM state and deliver real-time, step-level workflow guidance.
- Built automated Jira provisioning through a distributed worker queue, compiling epics/subtasks from inferred competency graphs.

Differential Drive Robot (Reflection-Aware SLAM) | *ROS 2, SLAM, Gazebo, Python*   Jun. 2025 – Present

- Designed and built a differential-drive robot capable of autonomous mapping and navigation through obstacle fields using ROS 2 and SLAM.
- Developing reflection-aware mapping methods to distinguish real obstacles from reflective surfaces using depth, IR, and IMU data; validated in Gazebo and RViz.
- Modeled measurement noise, uncertainty, and Bayesian update steps in the SLAM pipeline — directly applicable to reasoning under uncertainty in markets