

# Sanjot S. Bains

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## Summary

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**Electrical Engineering graduate** with hands-on expertise in embedded systems, robotics, and electromechanical repair. Combines theoretical training with practical problem-solving skills honed through automotive, fabrication, and autonomous vehicle projects.

## Education

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**University of California, Santa Barbara**, BS in Electrical Engineering Sept 2019 – June 2025

- GPA: 2.92 (3.64 last 3 quarters)
- **Coursework:** Digital Signal Processing, Digital Communications, Embedded Systems
- **Distinctions:** Admitted as Regents' Scholar, Dean's List Winter 2025
- 3rd Place, HFA Creativity Contest (Prose), 2025

## Projects

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**Senior Capstone Project: Autonomous Racing** [github.com/ray-quasar](https://github.com/ray-quasar)

- *Software Architecture:* Designed and implemented complete ROS2-based autonomous racing stack for F1TENTH platform, featuring real-time LiDAR processing, dynamic speed profiling, and safety-critical control systems
- *Advanced Perception & Planning:* Developed novel disparity extender algorithm using vectorized NumPy operations, enabling high-performance obstacle detection and path planning with parametric speed control for racing conditions
- *Human-Machine Interface Design:* Built comprehensive teleoperation and testing framework with game controller integration, real-time visualization tools, and configurable safety systems for autonomous vehicle development

## Experience

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**Heavy-Duty/Trailer Mechanic**, Bains Transport, Inc. – Turlock, CA 2016 – Sept 2023

- Diagnosed and repaired electrical/mechanical failures in heavy machinery (e.g., tractors, forklifts).
- Fabricated and welded (SMAW, GMAW, GTAW) custom parts for equipment modifications.
- Troubleshoot hydraulic and pneumatic systems, demonstrating strong analytical skills.

**Handyman/Repairman**, Self-Employed – Turlock, CA 2018 – present.

- Designed and built custom structures (e.g., sheds, racks, cabinetry) using carpentry and metalworking skills.
- Repaired household electrical systems (e.g., wiring, outlets) and appliances.
- Created architectural schematics, filed for building and electrical permits.

**Board Member**, Sikh Student Association – Santa Barbara, CA Sept 2023 – June 2025

- Led biweekly meetings discussing Sikh theological and philosophical topics. Wrote original reading materials and facilitated discussion.
- Organized yearly *Langar* community kitchen event, coordinating transport, budgets, and \*THE DISTRIBUTION OF LITERALLY HUNDREDS OF POUNDS OF FOOD\*.
- Coordinated with national organization United Sikh Movement to ...

## Technologies and Skills

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**Languages:** Python, MATLAB, C/C++

**Technologies:** ROS2, AutoCAD, Fusion, Vitis, Ollama,  $\text{\LaTeX}$

**Mechanical Systems:** Hydraulics, pneumatics, machining, welding (SMAW/GTAW/GMAW), fabrication.

**Electrical:** PCB design, wiring, soldering, motor controls.

**Tools:** Oscilloscopes, multimeters, 3D printing, machining (manual/CNC), hand/power tools.