Purab Balani

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EDUCATION

University of California, San Diego (GPA: 3.73 Current)
Bachelor of Science, Electrical and Computer Engineering (Expected: December 2025)
Skills: C, C++, C#, Verilog, Python, Matlab, Altium, Solidworks, ML Algorithms, Computer Vision, Image Processing

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ENGINEERING EXPERIENCE

Undergrad Research, Collaborative Intelligence Systems Lab (CISL)   **January 2024 - Current**
Technologies Used: CNN, Lidar, Python, Linux, Pointpillar, Tensorflow, Camera, VScode, Docker, Jetson Nano, OpenCV

- Developing a fully autonomous vehicle by integrating *vehicular communication, lidar, and camera sensing* to improve real-time perception and decision-making for autonomous driving.
- Generated **3D point-cloud** elements and incorporated them with **pointpillar** for object detection and used the data to train the *Convolutional Neural Network* **(CNN)** model for autonomous driving in **Python**.
- Utilizing visualization software to run simulations for autonomous driving and test and improve the model.
- Built an autonomous RC car for f1tenth competitions by adding lidar and cameras and training data on **Jetson Nano**

Autonomous GoKart Project   **November 2023 - Current**
Technologies Used: CNN, Python, Linux, Camera, Altium, LTSpice, Solidworks, Tensorflow, OpenCV, Jetson Nano

- *Cut the cost by 30%* and *decreased weight by 10%* while maintaining structural integrity by using recycled parts.
- I*ncreased the battery life by 50%* using a voltage boost converter allowing for 2 hours of run time at full speed.
- Designed battery structure using **LTSpice**, creating schematics and power distribution simulations.
- Created PCB designs using **Altium** able to implement a **voltage divider** to direct power to the 1800W drive motor alongside the servo used for steering and the **lidar**
- Planning on using cameras to gather depth perception data and train on a **Jetson Nano** for autonomous capabilities.

Undergrad Research, Robotics and Medical Systems (RaMS)   **October 2022 - December 2023**
Technologies Used: Arduino, Matlab, Solidworks, Simulink, Altium, LTSpice, C++

- Designed a model and test bench of a *steerable microcatheter* and *brain surgery robot* using **Solidworks**.
- Implemented **Arduino** and **Simulink** to communicate inputs from various sensors such as bend sensors and optic fibers and calibrate them to receive data from the medical device with **C/C++** to implement **PID (proportional-integral-derivative)**.
- Analyzed data to create a PID loop using **MATLAB** to control the motor *increasing accuracy to the nearest 0.05mm.*

BearCare (Hackathon project)   **Github: https://github.com/PurabB/bearhack2024**
Technologies Used: Google Maps API, Github, Javascript, Next.js, React.js, Python

- A website to find hospitals around you based on your insurance provider
- Developed using **Next.js** to create a front-end interface and added styling for a neat and concise website.
- Created datasets with information on hospitals, locations, and insurance types to locate hospitals providing specific insurance providers by web scraping data to input into Google Maps.
- Integrated **Google Maps API** and wrote an algorithm locating all hospitals covering the specific insurance plan and populating it on the map.

LEADERSHIP AND COLLABORATIVE EXPERIENCE

Software Engineering Group Project   **Github: https://github.com/PurabB/Final-Project-CS100.git**
Technologies Used: C++, googletest, Valgrind, VScode, Cmake, Makefile

- Developed a story-making game using a tree data structure, enabling dynamic user-created storylines.
- Implemented gameplay features including progression saving, respawn mechanics, and personalized login.
- Conducted unit testing using Googletest and performed memory leak checks with Valgrind to ensure robustness.

Combat Robotics, UC Riverside - Co-Founder   **June 2023 - June 2024**
Technologies Used: Arduino, C/C++, Altium, Solidworks

- Co-founded the club, and successfully managed a team for creating a 1-2 lb robot competition.
- Led classes and created tutorials for new members on **Arduino(C/C++), Altium,** and **SolidWorks** for new members to be able to design a functional robot.

CERTIFICATIONS / AWARDS

- **IBM AI Professional Certification**   **August 2024**