

# Pranav Prabu

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## EDUCATION

### University of California, San Diego

Bachelor of Science in Computer Science

La Jolla, CA

September 2022 – Present

## EXPERIENCE

### Undergraduate Research Assistant

Duarte Lab at UCSD

September 2024 – Present

La Jolla, CA

- Improved jet classification at the Large Hadron Collider using contrastive learning on large unlabeled jet datasets.
- Pretrained with augmentations and checkpoints, then finetuned on labeled sets to optimize GPU use.
- Conducted scalability experiments with JetClass and Top Tagging datasets for efficiency and accuracy.

### Computer Cluster Research Intern

San Diego Supercomputing Center

September 2023 – June 2024

La Jolla, CA

- Finetuned BERT models on single- and multi-GPU AMD MI210 clusters to evaluate system performance.
- Applied MLPerf Inference to optimize cluster resource use, reducing power and CPU/GPU strain.

### Home Team Member

Super Computing Competition 2023

July 2023 – December 2023

La Jolla, CA

- Benchmarked HPC performance using OSU MPI microbenchmarks and STREAM memory tests on multi-node clusters.
- Placed 3rd internationally against leading global university teams.

### Particle Physics Research Intern

Elementary Particle Experiment Group at UW

June 2020 – December 2021

Seattle, WA

- Implemented Lorentz Boost and Lorentz Group Networks to classify particles from CERN collision data.
- Presented comparative model performance at the EPE Winter Workshop.

## PROJECTS

### AI Mood Calendar | YOLO, OpenCV, Speech Recognition, SQL, Google ADK

August 2025 – September 2025

- Built an AI mood tracker with YOLO-based emotion detection, speech-to-text, and SQLite storage.
- Integrated an agent assistant with LLMs for personalized mood insights.

### Emotion-Driven Adaptive Gaming | YOLO, OpenCV, Pygame, Python

July 2025 – August 2025

- Created a Dino Runner variant where YOLO-detected facial emotions adapt game difficulty in real time.
- Linked webcam input with dynamic speed control for immersive gameplay.

### Emotion-Based Spotify Music Recommender | YOLO, Spotipy, Pandas, Python

June 2025 – July 2025

- Developed a hybrid recommender combining YOLO audio features with collaborative filtering.
- Leveraged YOLO embeddings for rhythm/spectral features to improve playlist personalization.
- Benchmarked against baselines, improving recommendation accuracy and diversity.

### Sentiment Analysis Model Comparison | BERT, SVM, Bayes, Logistic Regression

June 2023 – August 2023

- Tested four unique sentiment classification models with the same parameters to test the overall effectiveness of each model, using F1 score, precision, recall, and accuracy as the main key metrics

### Deep Learning for Jet Tagger Classification | Python, Keras, PyTorch

June 2020 – December 2020

- Worked with Dense layer models, finding ROC and AUC results for each implementation, comparing them with deep, convolutional, and recurrent neural networks to find the most accurate particle jet tagger classification model

## TECHNICAL SKILLS

**Languages:** Python, Java, C/C++, SQL, JavaScript, HTML/CSS, Bash

**Frameworks:** React, Flask, FastAPI, JUnit, Hugging Face, Kubernetes

**Developer Tools:** Git, Google Cloud Platform, VS Code, IntelliJ, Eclipse

**Libraries:** PyTorch, TensorFlow/Keras, YOLO (v5–v8), OpenCV, Pandas, NumPy, Matplotlib, Scikit-Learn

**Specialized Areas:** Computer Vision, Deep Learning, Natural Language Processing, Recommendation Systems