Surpreet Kaur

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Education

University of Southern California — Los Angeles, CA
Computer Engineering and Computer Science (B.S.) | Minor: Artificial Intelligence Applications — *December 2026*
Relevant Coursework: SWE, AI/ML, Embedded and Digital Systems, Probability/Statistics, Calc/LinAlg, Physics EnM

Contra Costa College - Honors Student Trustee Recognition, Congressman Garamendi — San Pablo, CA
Liberal Arts: Math & Science (A.A.) | Liberal Arts: STEM Certificate | GPA: 3.667 — *May 2023*

Experience

Network Reconnaissance Lab — Los Angeles, CA
Undergraduate Research Assistant — *January 2025 – Present*
- Conducted cybersecurity research, with Prof. Corey Baker, on developing advanced network recon. and threat detection methods.
- Identified and mitigated vulnerabilities in complex network architectures using pen-testing tools and security analysis frameworks.
- Applied machine learning algorithms to network traffic analysis for real-time anomaly detection and intrusion prevention.

Autonomous Networks Research Group — Los Angeles, CA
Edge Computing Intern — *May 2025 – Present*
- Deployed automated Kubernetes cluster management system on Intel-sponsored UP7000 edge-computing testbed infrastructure.
- Developed and maintained SAGA, an open-source scheduling framework for resource-aware distributed edge computing.
- Integrated Apache Airflow with SAGA to enable workflow orchestration and DAG-based task scheduling across edge nodes.

Quantum Programming Seminar — Los Angeles, CA
Undergraduate Research Assistant — *May 2025 – Present*
- Designing and simulating quantum algorithms with IBM Qiskit and Google Cirq in a project-based, peer-driven environment.
- Implementing quantum circuits that leverage superposition, entanglement, and quantum measurement for practical applications.
- Collaborating with participants to debug quantum code, optimize algorithm efficiency, and present solutions to challenging circuit problems.

Projects

Mood-Based Music Player | *Python, OpenCV, DeepFace, Spotify API, Raspberry Pi, Flask* — January 2025 – Present
- Developed a real-time emotion detection system using DeepFace and OpenCV to analyze facial expressions from webcam input.
- Integrated Spotify API to dynamically create and control playlists based on detected emotions with automatic song selection.
- Built a Flask web interface for remote monitoring and manual mood override controls deployed on a Raspberry Pi device.

Automated Vehicle Speed Detection System | *C, AVR, Arduino, Ultrasonic Sensors* — September 2024 – December 2024
- Engineered an embedded system using ultrasonic sensors with interrupt-driven architecture for accurate speed calculations.
- Implemented PWM-based timing control with microsecond precision and EEPROM for persistent data storage capabilities.
- Designed an alert system featuring LCD display for real-time speed readouts and configurable buzzer notifications.

Deep Neural Network for Pattern Recognition | *Python, TensorFlow, Keras* — December 2024 – January 2025
- Built a multi-layer DNN from scratch implementing forward propagation, backpropagation, and gradient descent algorithms.
- Incorporated dropout regularization and batch normalization techniques to prevent overfitting on complex datasets.
- Optimized network performance by experimenting with ReLU, sigmoid, and tanh activation functions across layer depths.

Neural Network Image Classifier | *Python, PyTorch* — January 2025 – February 2025
- Developed a convolutional neural network for multi-class image classification using custom architecture design.
- Implemented comprehensive data augmentation including rotation, scaling, and color transformations for improved accuracy.
- Deployed the trained model with a RESTful Flask API endpoint enabling real-time image upload and classification.

Social Justice Data Analytics Dashboard | *Python, Streamlit* — September 2024 – December 2024
- Analyzed demographic and socioeconomic datasets to identify patterns of systemic inequality using statistical methods.
- Built an interactive Streamlit dashboard with dynamic visualizations presenting findings to community stakeholders.
- Implemented correlation studies and regression models revealing resource allocation disparities across neighborhoods.

Technical Skills

Languages: C++, C, Python, Java, SQL, JavaScript/TypeScript, HTML/CSS, Bash/PowerShell/Zsh, MATLAB

Libraries/Frameworks: PyTorch, TensorFlow, scikit-learn, OpenCV, DeepFace, Flask, Pandas, Streamlit, SAGA

DevTools: Git, Docker, Linux, Apache Airflow, Kubernetes, Arduino, RPi, Jupyter, Microsoft Office Suite, Vercel, GCP

Certifications

Financial Modeling Fundamentals, Project Destined — October 2024 – December 2025
Real Estate Investments and Underwriting, Project Destined — October 2024 – December 2025