Vishwanath Singh

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EDUCATION

University of California Irvine, Irvine, CA | GPA: 3.78/4 September 2023 - December 2024
Master of Engineering, Embedded and Cyber-Physical Systems

- Autonomous Systems, Embedded System Software, Control System for CPS, Cyber-Physical System Design, Embedded Systems Modeling and Design, Machine Learning, Internet of Things (IoT), GPU Parallel Programming.

Amrita Vishwa Vidyapeetham, Coimbatore, India | GPA: 8.4/10 July 2019 - June 2023
Bachelor of Technology, Computer and Communication Engineering

- Microcontrollers & Interfacing techniques, Computer System and Architecture, Design and Analysis of Algorithm, System Software.

SKILLS

Languages & Tools: C/C++, Assembly Language, System-C, Python, SQL, Embedded C, MATLAB, Simulink, Keil, Node-RED, Git.
Hardware: Xilinx Kria FPGA, STM32-L0, Quectel BG96, Quectel EVB, ESP32, Raspberry Pi 4. Arduino, JTAG Debugger.
Embedded Systems: MQTT, SPI, I2C, CAN, UART, Ethernet, AMD Vitis, Embedded Linux, ROS, RTOS, STM32CubeIDE, Device Drivers, Sensor Interfacing, Microcontrollers, Firmware Development, Deep Learning, Computer Vision, Unit & Integration Testing.

EXPERIENCE

Embedded Engineering Intern | Sieva Networks, San Ramon, CA, USA August 2024 - September 2024

- Spearheaded the integration of the BG96 module with the STM32L073RZT6 microcontroller, optimizing UART communication, enabling SMS reception and GPS coordinate transmission for real-time location tracking, reducing manual intervention by 80%.
- Processed over 200 SMS packets with location, elevation in meters and Horizontal Dilution of Precision within 2 seconds on average and transmitted GPS data with fix status, and UTC date to the server with an overall latency of under 5 seconds.
- Performed system tests over multiple cycles, with a 90% success rate and seamless integration with the existing system.

Management Associate AI/ML Team | Metvy, Gurugram, India October 2021 - January 2022

- Spearheaded the team for networking events and industry speaker sessions, serving as the primary liaison with top MNCs such as Google, Meta, and McKinsey & Company, resulting in a 30% increase in cohort size and an 11% growth in partnerships.
- Led the restructuring of cohort operations, enhancing industrial networking opportunities and improving customer engagement.

Cyber Security Intern | Mavro Mergers and Acquisition, Remote, India July 2021 - August 2021

- Performed comprehensive security audits and identified possible DDoS attacks, unauthorized DNS queries and responses, and 9 malicious IP addresses. Unauthorized devices attempting to capture and analyze traffic were identified through Wireshark logs and removed.
- Implemented intrusion detection system, incorporating role-based access control aligned with the principle of least privilege.

PROJECTS

FPGA-based ML Edge March 2024 - December 2024

- Optimized the ENet-SAD model for FPGA using AMD Vitis software, leveraging the Vitis-AI library to ensure model compatibility and develop a customized accelerator for enhanced performance and reduced processing time.
- Deployed the ENet-SAD model trained on the Tu-Simple dataset using the PyTorch framework on both multicore systems and Xilinx Kria KV260, achieving 75% CPU utilization and 80% concurrency for accurate road lane detection.

Cardiac Arrhythmia Detection Using Edge AI April 2023 - June 2023

- Developed a portable and cost-effective ESP32-based heart monitoring system to detect cardiac arrhythmias using AD8232 sensor. The system utilizes a 1D CNN model based on MIT-BIH Supraventricular Arrhythmia Dataset to analyze ECG data in real-time.
- Converted the model to C code using the Eloquent Tiny ML library, optimizing and quantizing weights and biases to 8-bit integers, minimizing memory footprint, reducing power consumption, and increasing calculation speed through fixed-point operations.
- Achieved a solid 71.53% test accuracy on the ESP32, showing potential for real-time heart monitoring despite optimization challenges.

Canny Edge Detector System-on-Chip Design January 2023 - April 2023

- Designed an embedded system model on canny edge detection for video processing of a 30fps using system level description language, IEEE System-C. Created a top-level structural hierarchy (design under test) including a system-on-chip model test bench.
- Profiling the algorithm provided computational complexity of its main functions, which helped in bottleneck removal and enhanced the throughput by a factor of 2.1. Pipelining DUT stages by using tools like RISC model analysis enhanced throughput by a factor of 3.5X.
- Parallelization of blur-x and blur-y improved the FPS from 0.142 FPS to 8.475 FPS, along with removing floating point operations to increase the FPS by 0.5, as accuracy was not critical for this application.

Object Detection Glass for Visually Impaired People September 2022 - April 2023

- Engineered a real-time object detection system utilizing a MobileNet-SSD model trained on the COCO dataset, seamlessly integrating dual-lens cameras for superior accuracy. Enhanced frame quality by reducing noise through grayscale conversion.
- Applied the Canny edge detection algorithm to precisely identify object edges and used the ApproxPolyDP function for accurate polygon contour estimation. The polygon's height and width, along with camera parameters, were used to calculate the object's distance.
- Achieved 88% object detection accuracy at an average distance of 3.2 meters, covering a 100-degree field of view.

CERTIFICATIONS

AWS Cloud Practitioner: Proficient in AWS tools such as Management Console, CloudFormation, IAM, S3, EC2, RDS and VPC.
Verzeo - Cyber Security: Experience in Kali Linux, Nmap, and Wireshark for comprehensive cybersecurity tasks.