Vishwanath Singh

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EDUCATION

University of California Irvine, Irvine, CA — September 2023 - December 2024

Master of Engineering, Embedded and Cyber-Physical Systems — GPA: 3.84/4

- Autonomous Systems, Embedded Software, Embedded Systems Modeling and Design, Machine Learning, Internet of Things (IoT).

Amrita Vishwa Vidyapeetham, Coimbatore, India — July 2019 - June 2023

Bachelor of Technology, Computer and Communication Engineering — GPA: 8.4/10

- Microcontrollers & Interfacing Techniques, Computer Systems and Architecture, Design and Analysis of Algorithms, Operating System.

SKILLS

Languages & Tools: C, C++, Assembly Language, System-C, Python, Embedded C, MATLAB, Simulink, Git, AMD Vitis AI, AutoCAD.

Hardware: AMD Xilinx Kria KV260, GNSS, Nvidia Jetson Nano, STM32, ARM Architecture, ESP32, Raspberry Pi, Arduino, JTAG.

Embedded Systems: SPI, TCP/IP, I2C, UART, Wi-Fi, Zigbee, Linux, Linux Kernel, RTOS, Device Drivers, Computer Vision, Unit Testing.

EXPERIENCE

Research Assistant | UC Irvine School of Engineering, USA | GitHub — March 2024 - December 2024

- Deployed and optimized VPGNet, Ultrafast, and YOLOv3 on Xilinx Kria KV260 using Vitis AI for real-time lane detection warning.
- Improved FPS, accuracy, and energy efficiency over Jetson Nano, showcasing FPGA based hardware accelerator's edge AI potential.
- Applied INT8 quantization and neural network pruning to enhance DNN performance, reducing power consumption and execution time.
- Achieved up to 43 FPS and 95% accuracy on the TuSimple dataset, with 7–15 W energy consumption and safe operational temperatures.

Embedded Software Engineering Intern | Sieva Networks, San Ramon, CA, USA — June 2024 - September 2024

- Developed firmware for a GPS truck tracking system with a BG96 modem and STM32 microcontroller for real-time retrieval of coordinates, UTC data, precision metrics, and speed, reducing manual interventions by 80%.
- Reduced latency from 25 seconds to less than 15 seconds for over 200+ SMS packets and achieved a 95% transmission success rate by optimizing UART communication and SMS data formatting for phone and server delivery.
- Designed geofencing logic using Haversine distance calculation, triggering automated SMS/cloud alerts with 90% accuracy and reducing manual oversight by 40% via real-time boundary breach detection.

ACADEMIC PROJECTS

Code-Red IoT Based Swarm Array | *Python, Bluetooth, AWS* | GitHub — January 2024 – May 2024

- Designed a network of six ESP8266 with Bluetooth communication to collect environmental data and send it to a server using UDP.
- Integrated with a Raspberry Pi for real-time data display, trend visualization, and maintaining a time-stamped local data log.
- Implemented dynamic master selection and notification systems to ensure seamless data aggregation, efficient and enhanced monitoring.

Cardiac Arrhythmia Detection Using Edge AI | *C++, Micro Python, MATLAB* | GitHub — April 2023 - June 2023

- Developed a cost-effective cardiac arrhythmia detection system using an ESP32 microcontroller and AD8232 ECG sensor, achieving 71% accuracy with a 1D CNN trained on the MIT-BIH dataset.
- Optimized CNN for Edge AI by converting it to C code with Eloquent Tiny ML, reducing memory usage, improving calculation speed, and enhancing power efficiency.
- Designed a portable IoT-based solution for real-time ECG analysis without cloud dependency, enabling accessible cardiac health monitoring.

Canny Edge Detector System-on-Chip Design | *System C, Multithreading* | GitHub — January 2023 - April 2023

- Designed a real-time Canny edge detection system-on-chip for drones, achieving edge detection at 30 FPS from video streams.
- Improved FPS from 0.1 to 8.4 by profiling System-C algorithms, implementing pipelining, and parallelizing processes.
- Replaced floating point operations with fixed-point calculations, boosting performance by 0.5% while maintaining accuracy.

Object Detection Glass for Visually Impaired People | *OpenCV, CNN* | GitHub — September 2022 - April 2023

- Designed a real-time object detection system with Mobile Net-SSD, dual-lens cameras, and grayscale noise reduction for enhanced accuracy.
- Implemented Canny edge detection and Approx Poly DP for precise edge identification, contour estimation, and distance calculation.
- Achieved 88% detection accuracy at 3 meters with a 100° field of view, optimizing object recognition for practical applications.

CERTIFICATIONS

AWS Cloud Practitioner: Proficient in AWS tools, including Management Console, CloudFormation, IAM, S3, EC2, RDS and VPC.

Verzeo - Cyber Security: Experienced in Kali Linux, Nmap, and Wireshark for comprehensive cybersecurity tasks.

Udemy - STM32Fx Microcontroller Custom Bootloader Development.