BALAJI S

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Electronics and Communication Engineering graduate with hands-on experience in Verilog HDL, embedded systems, and IoT hardware design. Skilled in developing faulttolerant digital systems and smart energy devices using ESP32. Passionate about hardware–software co-design and building reliable embedded solutions.

Skills

- Python | C Programming | Embedded Systems & IoT (ESP32, PIR Sensors)
- Backend Development (MySQL, PHP) | PLC Design | Deep Learning (OpenCV, CNN)

Key Achievements

- Demonstrated expertise in applying deep learning to real-world problems by creating vision-based systems capable of emotion classification in real time.
- Innovated energy-efficient IoT solutions by integrating embedded hardware with smart automation techniques, contributing to sustainable technology practices.
- Contributed to the advancement of fault-tolerant computing by combining theoretical research with practical Verilog HDL implementations for matrix operations in high-reliability systems.
- Strengthened full-stack monitoring skills through the design of robust backend systems that enable proactive network diagnostics and timely alerting mechanisms.
- Consistently applied interdisciplinary skills across software and hardware domains, evidencing a strong foundation in embedded design, data systems, and intelligent automation.

Education

Bachelor of Engineering in Electronics and Communication Engineering **Aug 2021 - May 2025**

Sri Ramakrishna Engineering College
- Major in Electronics and Communication.
- GPA : 7/10

Higher Secondary School Certificate **Jun 2020 - Apr 2021**

Vallalar Matriculation Higher Secondary School
- Major in Physics, Chemistry, Mathematics, Biology.
- Percentage : 87.83 %

Secondary School Leaving Certificate **Jun 2018 - Apr 2019**

Vallalar Matriculation Higher Secondary School
- Major in Tamil, English, Mathematics, Science, Social Science.
- Percentage : 86.8 %

Projects

Fault Tolerant Matrix Computation on Systolic Arrays — Feb 2025 - May 2025

- Published a research paper proposing a hybrid error detection and correction method combining Light ABFT, Hamming code, and parity codes.
- Implemented fault-tolerant matrix multiplication in Verilog HDL and validated error resilience using Vivado simulation for AI accelerators, embedded systems, and high-performance computing .

OpenWISP Monitoring: Real-Time Network Health Insights — Feb 2025

- Developed and implemented network monitoring checks (Ping, Iperf3, WiFi Clients) using Python and Django, ensuring real-time health and performance assessment of devices.
- Utilized InfluxDB for efficient time-series data storage and retrieval, implementing caching strategies to enhance data access speed and reduce database load.
- Established alerting systems to notify stakeholders of critical device statuses, improving response times to network issues and enhancing overall system reliability.

IoT-Based Smart Energy Meter for Energy Efficiency — Jun 2023 - Apr 2024

- Developed an ESP32-based smart energy meter integrated with PIR sensors for occupancy detection, reducing unnecessary power consumption by 30%.
- Implemented real-time energy monitoring on an I2C LCD and cloud dashboard (Ubidots), with automatic email alerts when consumption exceeds thresholds .

Video Based Emotion Detection Using Deep Learning — Jun 2022 - May 2023

- Built a real-time emotion recognition system using OpenCV and Convolutional Neural Networks (CNN) trained on the FER2013 dataset, achieving 89% classification accuracy.
- Optimized real-time processing with grayscale conversion and histogram equalization, enabling smooth webcam-based mood detection without external hardware .

Additional Information

- **Languages:** English (Professional), Tamil (Native).
- **Certifications:** Python Programming, Backend Web Development (MySQL, PHP), PLC Design.
- **Tools and Technologies:** Python, OpenCV, ESP32 Microcontroller, PIR Sensor, I2C LCD, Relays, MySQL, PHP, Ubidots IoT Platform, PLC Design Tools.
- **Interests:** Artificial Intelligence, Deep Learning, Computer Vision, IoT-Based Automation, Smart Energy Systems, Hardware–Software Integration, Real-Time AI Applications.