

Vijay Kumar

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SUMMARY:

Embedded software engineer with expertise in linux build environment, firmware development, IoT integration and hardware - software co-design. Skilled in building consumer IoT products using **WiFi**, **BLE** and secure communication protocols. Hands on experience with **BEKEN 7238, 3633, ESP32, STM32 and nRF52** series MCUs, **FreeRTOS**, **embedded linux** and **custom PCB design**.

EDUCATION:

- **Kurukshetra University, Kurukshetra (2022-2024)**
M.Sc in Electronic Science CGPA: 7.01
- **Institute of Integrated and Honors Studies (IIHS) (2019 – 2022)**
Bachelor of Science in Electronics Science Percentage: 69.7%

TECHNICAL SKILLS:

Programming Languages: C, Embedded C, Makefile, Cmake
Microcontrollers/SoCs: ESP32, BK7238, BK7258, STM32, Mind Motion, SNC85F.
RTOS / Platforms: FreeRTOS, Embedded Linux (Basic build environment experience).
Communication Protocols: BLE, Wi-Fi, MQTT, UART, SPI, I2C, USB.
Tools & IDEs : ESP-IDF, STM32CubeIDE, Keil, Arduino IDE, VS Code, MATLAB, GIT
Hardware & PCB Design : KiCad, Proteus,

EXPERIENCE:

Embedded Software Engineer - Cionlabs Pvt. Ltd.

Aug 2024 - Present

- **Air Quality Monitoring Sensor Node :** Design Complete IoT firmware with BLE onboarding , Wi-Fi provisioning, MQTT connectivity, configurable publish intervals, and OTA updates. Integrated DHT11, PMS5003, and TVOC sensors with real-time data and fault diagnostics. Design a custom 2-layer PCB with **USB Type - C** for programming and debugging.
- **Coffee Vending Machine - Common Controller Board :** Designed an industrial grade 24V controller PCB for coffee vending machines, capable for driving pumps, SSR-based heating elements, solenoid valves, motors and the actuators. The hardware includes **short-circuit and over-current protection**, isolated AC load switching, and robust power regulation. Integrated water level ,pressure and the **NTC temperature sensor** interfaces with an EMI-aware, high-current 2-layer PCB design and UART connectivity to HMI boards.
- **Smart Traffic and Pedestrian Light Controller:** Design a smart traffic light controller using **Esp32 and P10 displays**. The system dynamically display the countdown timer for the both vehicle and pedestrian for all the signal. The solution include firmware development, real-time synchronization, and custom **PCB design**.
- **Smart Socket (Firmware Development):** Designed and implemented firmware for a **WiFi - BLE** enable smart socket using **BK7238**. Features include relay control , energy monitoring, OTA updates, and secure MQTT based app integration.
- **Smart Door Lock :** Developed a battery powered smart door lock using **BK7238** microcontroller with complete firmware and hardware design. The system includes **RFID** for the contactless entry, a **touch keypad** and a **display** for PIN entry and showing all other details, and a high end fingerprint module (**FPC5789**) for biometric high-security. Integrated a proximity sensor (**JIRS40**) to wake the lock from deep-sleep for power saving. Designed a custom two-layer PCB to integrate all modules, ensuring compact form factor, high efficiency and reliable battery performance.
- **IR Blaster Development :** Developed an efficient **IR blaster** using the **BK7238** microcontroller,programmed in **Embedded C**,Implemented **NEC Protocol** without using any libraries. Used **BLE and MQTT** protocols for communication. Also design **PCB** for the same .
- **Secure IOT Stack (IC for firmware module):** Developed **secure iot stack** upon **beken 7238** with certificates and **OTA** enabled for general purpose consumer market and OEM business.
- **Audio Playback System using SNC85F :** Built a system using **SNC85F** microcontroller to trigger the audio playback based on received data. Focused on real time data decoding and efficient audio output. And also design **PCB** for the programming and to connect speakers.

Embedded Systems Intern - Cionlabs Pvt. Ltd.

Jan 2024- June 2024

- **Building Energy Management Systems (BEMS):** learned and implemented IOT strategies controlled **relays** based on the needs from mobile and also works automatically and creates a **Energy Meter** for actually reading of current voltage used in real time, further added DWIN to display sensors values. Used **UART, I2C, SPI , MQTT** etc protocols for the same.
- **Smart Locker:** Created a robust sytem lock using **Python** for backend and its a two step verification locker and for frontend I'm using **Bk7238** which handle the locker and match OTP with python OTP. Used **BLE** and **USB Communication** protocols for the same.

LANGUAGES:

- Hindi
- English