



ARTI KUMARI

Embedded Firmware Developer

Contact:

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TECHNICAL COMPETENCIES

Embedded C | C++ | Python | Bash Scripting | Verilog

PLATFORMS

Embedded Linux | STM32 | Raspberry Pi | ESP32 | ESP8266 | Arduino | FreeRTOS | LoRa (RFM95, RFM69) | NRF24L01 | ZedBoard | ATmega2560

TOOLS & IDE

STM32CubeIDE | ESP-IDF | EasyEDA | GCC | Arduino IDE | VS Code | Vivado | GVim | Jira | Proteus | Git

PROTOCOLS

UART | I2C | SPI | TCP/IP | MQTT | Zigbee | Wi-Fi | BLE | HTTP/HTTPS

NETWORKING & CLOUD TOOLS

ThingsBoard | Mosquitto MQTT Broker | NTP | TLS/SSL

SOFT SKILLS

Project Management | Leadership | Teamwork | Problem-Solving | Engaging Presentation

EDUCATION

Bachelors in Electronics and Communication Engineering | DCRUST | CGPA: 7.46 | 2022-2025

Diploma in Electrical Engineering | CCET (Diploma Wing), Chandigarh | CBSE | Percentage: 81.9% | 2020-2022

Intermediate (CBSE) | Kendriya Vidyalaya No 2, Chandimandir Cantt. | CBSE | Percentage: 84% | 2019-2020

PROFESSIONAL SUMMARY

BTech graduate in Electronics and Communication Engineering with a strong foundation in embedded linux and firmware development. Skilled in low-level programming, peripheral integration, real-time debugging and embedded networking through hands-on projects in medical devices, IoT systems and safety applications.

WORK EXPERIENCE & TRAINING

CSIR-Central Scientific Instruments Organisation(CSIO)
| Project Associate-I | September 2025 - March 2026

- **Affordable IoT System for Soil and Crop Monitoring for Region Specific Smart Agriculture(RSSA):** Developed ESP32-based IoT nodes interfacing with multiple **RS-485** sensors for water, soil, and crop monitoring, with local data logging on **SD card** and user interaction via **Nextion HMI**.
- Implemented **LoRa** (RFM95/RFM69) **gateways** on both **ESP32** and **Raspberry Pi**, handling packet reception, parsing, buffering, and **MQTT**-based data upload to **Har Ghar Nal Neeri** Dashboard and **ThingsBoard** cloud platforms.
- **Technical Skills:** C++, ESP32, LoRa (RFM95, RFM69), BLE, Python, Raspberry Pi, MQTT, ThingsBoard, Linux

Kritikal Solutions Private Limited | Firmware Developer
| January 2025 - September 2025

- **Alpha-Stim Device (STM32U5):** Developed firmware for a neuromodulation device managing audio, haptics, etc. Implemented event-driven state management and low-power optimization using **STM32CubeIDE**. Gained hands-on experience with Microcontroller peripherals and interfaces like UART, SPI, I2C, ADC, DAC and PMW.
- **Smart Water Lid (STM32 & ESP32):** Developing embedded IoT based solutions for sensor-enabled smart water lid with **RF-based communication** between home and tank units. Involved in **TM1637** 4-digit seven segment display integration.
- **Panic Button System (ESP32-WROOM-32):** Built an emergency alert system with **SPIFFS**-based event logging, NTP time sync, and HTTP log uploads using Arduino IDE.
- **Technical Skills:** Embedded C, C++, **STM32**, **ESP32**, FreeRTOS, Wi-Fi

CSIR-Central Scientific Instruments Organisation(CSIO)

| Summer Intern | June 2024 - August 2024

- **VGA RGB Signal Generator:** Developed a system to generate RGB colour patterns via the VGA port on the ZedBoard Zynq-7000 SoC using the **AXI4-Stream to Video IP** without utilizing the ZYNQ Processor.
- **SPI Controller:** Designed and implemented SPI Controller for Zedboard and In-System Debugging using Vivado ILA Core.
- **Technical Skills:** Vivado, Verilog, Xilinx Vitis

PROJECT

SPI-Driven RF COMMUNICATION

July 2025 - Aug 2025

- Designed and implemented a reliable wireless data transmission system using ESP32-WROOM-32 and nRF24L01 modules via SPI. Developed firmware using Arduino IDE to enable bidirectional communication for IoT applications.
- **Technical Skills:** ESP32, C++, Arduino IDE

RAILWAY TRACK CRACK DETECTION SYSTEM USING ARDUINO

August 2024 - Nov 2024

- Developed a system using Arduino to monitor railway track conditions, utilizing sensors to detect cracks and send real-time alerts. Successfully tested the prototype for improved safety.
- **Technical Skills:** Arduino IDE, C++

UART RECEIVER WITH BRAM

July 2024 - August 2024

- Designed a **UART Receiver** for the ZedBoard using **PL** portion only, which efficiently receives data transmitted from a microcontroller and stores the data in Block RAM (**BRAM**).
- **Technical Skills:** Xilinx Vivado, Verilog

WHITE LINE FOLLOWER ROBOT

June 2024 -

July 2024

- Programmed a white line follower robot using the Fire Bird V platform with P89V51RD2 and ATmega2560 microcontrollers.
- **Technical Skills:** Fire Bird V, P89V51RD2, ATmega2560