

# PRABAL KANTI KHAN

Embedded Software Engineer | Firmware Development

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## SUMMARY

B.Tech graduate in Electronics & Communication Engineering (2026, lateral entry) building a foundation in embedded systems. Comfortable working with GPIO and SPI (wrote basic drivers from scratch), with UART and I2C at a working/learning stage. Practicing bare-metal programming on the STM32F446RE, including on-target debugging via SWV over ST-Link and signal analysis with a logic analyzer. Background in hands-on electronics and DIY builds (documented on YouTube), and more than one year of experience teaching electronics and robotics fundamentals to 500+ school students after Diploma (EIE 2022). Currently deepening embedded C and driver-development skills through structured coursework, and looking to grow into a firmware/embedded engineering role.

## SKILLS

**Programming Languages:** C, C for Embedded Systems

**Microcontrollers & Platforms:** STM32F446RE (bare-metal, learning), ESP32, Arduino, Raspberry Pi 4B

**Communication Interfaces:** LoRa, GPIO, SPI (working knowledge - wrote basic driver), I2C (basic/learning), UART(basic/learning)

**Debugging & Instruments:** SWV via ST-Link, Logic Analyzer (signal analysis), STM32CubeIDE, Multimeter, DSO, 3D printer.

**Tools & Version Control:** Git & GitHub, Linux command-line, VS Code

## EXPERIENCE

**STEM Innovation Engineer** (Remote, WB) — STEMROBO Technologies Pvt. Ltd., Noida *Feb 2022 – Jul 2023*

- Taught basic electronics, robotics, Arduino, and ESP32 to 500+ students across Atal Tinkering Lab (ATL) sanctioned schools.
- Guided students through hands-on project builds including a smart dustbin, smart irrigation system, Bluetooth-controlled robot with matrix LED eyes, servo-based hand-gesture control, and motor-driven wheeled robots.
- Consistently received positive feedback from students and class teachers for a clear, practical teaching style, later carried into tutorial videos on YouTube.

## ACADEMIC PROJECTS (Uploaded on Youtube)

**LoRa-Based Agriculture Automation System — Final-Year Project — Team Lead** | YouTube [@TechnicZ](#) | 2026

- Designed and built a solar-powered, off-grid farm automation system using dual ESP32 nodes communicating over long-range LoRa (RYLR998, up to 10 km range), removing dependence on internet connectivity or subscription-based IoT platforms.
- Implemented automated climate control: DHT22 temperature readings above 26°C trigger a Peltier cooling system, while MQ135 air-quality readings above an AQI of 30 trigger exhaust fans to clear toxic air.
- Built a handheld remote control node with OLED display and five-button navigation across sensor-data, auto/manual mode, farm-control, and lighting-control pages; extended the same LoRa network to control dual-floor lighting in an adjacent smart-house model.
- Automated irrigation and humidity control: capacitive soil-moisture sensors below 70% trigger a pump-driven drip system routed through a custom copper-tube distribution setup, while a misting module activates when humidity drops below 80%.
- Designed a hardware fail-safe for a rooftop water tank using BC547 transistor and LED-based level-sensing circuitry, which cuts pump power via relay once the tank is full to prevent overflow.
- Built a LoRa-to-MQTT gateway on the remote node, streaming telemetry every 10 seconds to a custom web dashboard for real-time monitoring and control of the farm from anywhere in the world.

**Smart Home Automation System — Arduino + Bluetooth — Team Lead** | YouTube [@TechnicZ](#) | 2022

- Wrote complete Embedded C firmware from scratch for a multi-module relay panel (Bluetooth-controlled door, IR doorbell, LDR-based lighting, automatic water-tank cutoff with Water level Indicator, Solar Power); tested each module independently before integration.

## PERSONAL PROJECTS (Uploaded on Youtube)

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### STM32F446RE Bare-Metal Driver Development

- Writing GPIO and SPI drivers from scratch as part of ongoing embedded systems coursework; debugging on-target using SWV via ST-Link and analyzing signals with a logic analyzer.

### Portable Raspberry Pi 4B Touchscreen Linux Computer

- Built a portable touchscreen Linux computer around the Raspberry Pi 4B, including a custom-built power supply circuit, Microphone, Raspberry Pi Camera Module V2 (8MP), Speakers.

### Electric Cycle Li-ion Battery Pack with BMS

- Designed and assembled a custom 42V, 7.8Ah lithium-ion battery pack with BMS for a personal electric cycle.

### Arduino & ESP32 DIY Projects

- Designed and built multiple Arduino and ESP32 based projects, documenting the build process and results on the YouTube channel @TechnicZ.

## EDUCATION

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**B.Tech, Electronics & Communication Engineering** — Heritage Institute of Technology, Kolkata · 2026 (Lateral Entry, 2023) · DGPA 7.98/10

**Diploma, Electronics & Instrumentation Engineering** — Siliguri Government Polytechnic · 2022 · GPA 7.7/10

## CERTIFICATIONS & COURSES

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- Microcontroller Embedded C Programming — Udemy (FastBit / Kiran Nayak)
- Mastering Microcontroller & Embedded Driver Development (MCU1) — Udemy (FastBit) — in progress
- IoT & Django Development — Euphoria GenX (via Heritage Institute of Technology), 2025

## ADDITIONAL INFORMATION

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Open to relocation · Immediate availability · Batch 2026 · Languages: English, Hindi, Bengali (native)