



KALLAM HARANADHA REDDY INSTITUTE OF TECHNOLOGY
(Autonomous)

Approved by AICTE, New Delhi, Permanently Affiliated to JNTUK, Kakinada

Programs Accredited by NBA: B.Tech. in EEE, ME, ECE & CSE

Department of DCME



Heart monitoring & Emergency Alert System with GPS

PRESENTED BY: BATCH NO 4

UNDER THE GUIDANCE OF

V . Bhavya Sri (23608-CM-061)
V . Mohith (23608-CM-063)
N. Kiran (23608-CM-041)
G. Naga Lakshmi (23608-CM-015)

P. Srinivasa Reddy





Abstract

An IoT-based heart monitoring and emergency alert system with GPS and a mobile app can be designed to continuously track a patient's heart rate and other vital signs, and automatically send alerts with location data to designated contacts or healthcare providers in case of an emergency. This system combines wearable sensors, a microcontroller, GPS module, and a mobile application to provide real-time monitoring and rapid response capabilities.





Existing & proposed systems:

Existing:

Most commercial and wearable health monitoring systems today track vital signs like heart rate (HR), and some also include GPS or emergency alert features. However, these typically **require a Smartphone or internet** to send alerts or having high cost where middle class persons can't afford it:

- **Limitation**
- **Explanation**
-  Dependent on internet
 - SMS/alerts use mobile data or apps
-  Not customizable
 - Pre-set thresholds, no custom code
-  Expensive
 - ₹10,000–₹40,000 range
-  Limited real-time location
 - GPS through phone only, not standalone

Proposed:

- A low-cost, standalone, microcontroller-based system that:
- Continuously monitors **heart rate** using MAX30102
- Uses **ESP32** to process the data
- Sends **SMS alerts** using SIM800L GSM module
- Includes **GPS tracking** with NEO-6M
- Sends SMS without the need for any smartphone or app
- **Features**
-  Standalone Operation
 - No phone or internet required
-  Customizable Code
 - Set your own HR thresholds
-  Low-Cost Solution
 - Under ₹2,000 total cost
-  Portable & Battery Powered
 - Ideal for wearable or emergency use

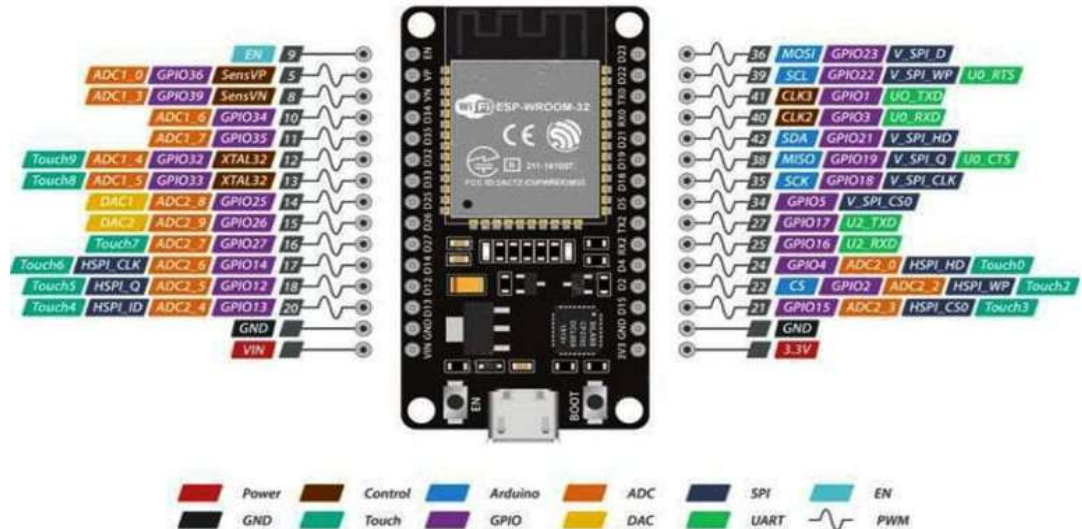
Hardware:

ESP32 DEVKITV1:

The **ESP32 DevKit v1** is a popular development board built around the **ESP32 microcontroller**—a powerful, low-cost Wi-Fi and Bluetooth-enabled chip developed by Espressif Systems. It's widely used in IoT, embedded systems, and wireless communication projects.

Role: Acts as the **main controller**: reads heart sensor, processes logic, and sends SMS via GSM

ESP32 DEVKIT V1 WIFI / BLUETOOTH



MAX30102(Heart rate sensor):

The **MAX30102** is an integrated pulse oximetry and heart-rate monitor sensor from Maxim Integrated. It works by shining **infrared (IR)** and **red LEDs** through the skin and measuring the reflected light with a photodetector.

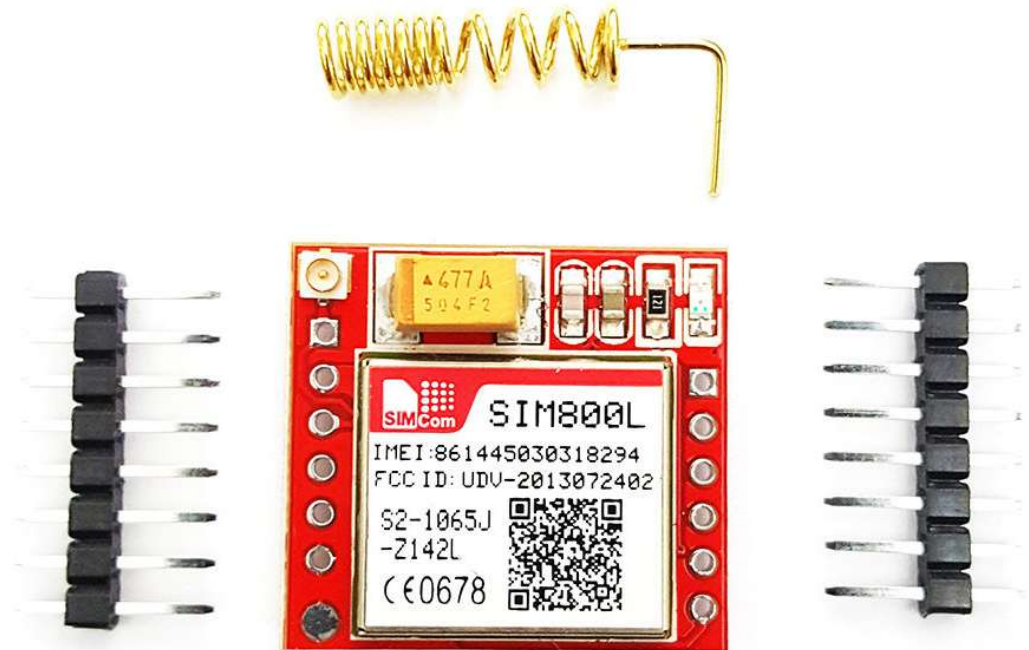
Role:**Monitors heartbeat (BPM)** and oxygen level using infrared light



SIM800L(GSM module):

The **SIM800L** is a **GSM/GPRS** module used for mobile communication. It can **send/receive SMS**, **make calls**, and **connect to the internet** over 2G networks.

Role:**Sends SMS alerts** to caregiver/doctor when BPM is too low/high



NEO-6M (GPS Module):

The **NEO-6M** is a low-power **GPS module** from **u-blox**, used to receive **location data (latitude, longitude, altitude)** from GPS satellites.

Role: Sends real time **location coordinates** in SMS (for emergency tracking) to the embedded contacts



Power Supply / Battery:

(ESP32 + SIM800L + sensors) is **critical** to ensure your project works reliably and doesn't fail during real-world use. so we need to supply current or battery to all the modules to work properly

Role: Provides power to ESP32 and modules; battery needed for portability

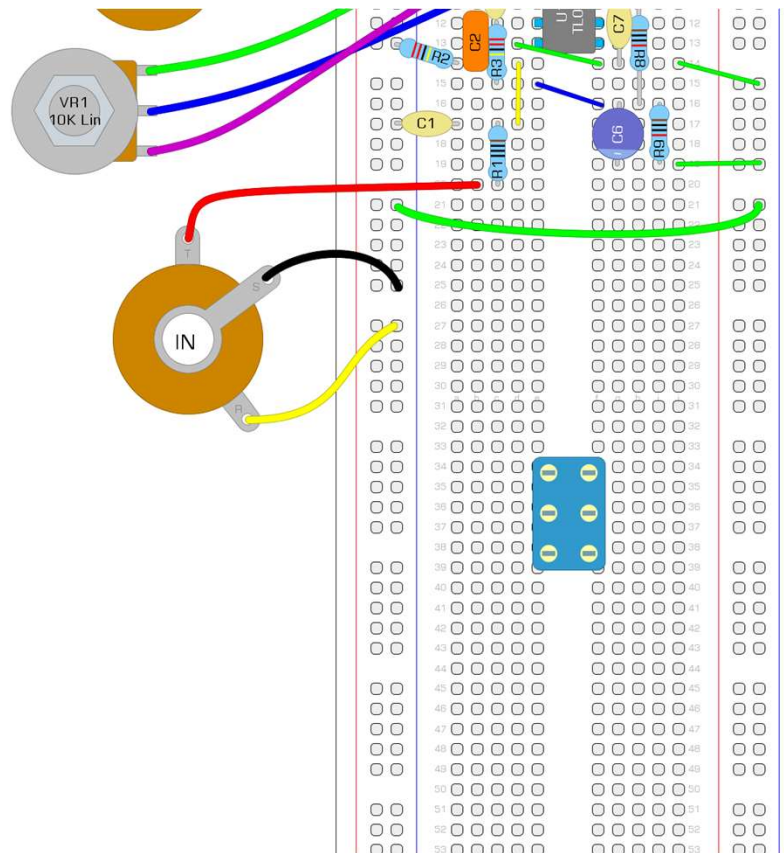


Breadboard & Jumper Wires:

Breadboard: A reusable plastic board with internal metal strips to build **temporary circuits** without soldering

Jumper Wires: Flexible wires used to connect components on the breadboard or between the breadboard and ESP32

Role: **Connects all modules** without soldering

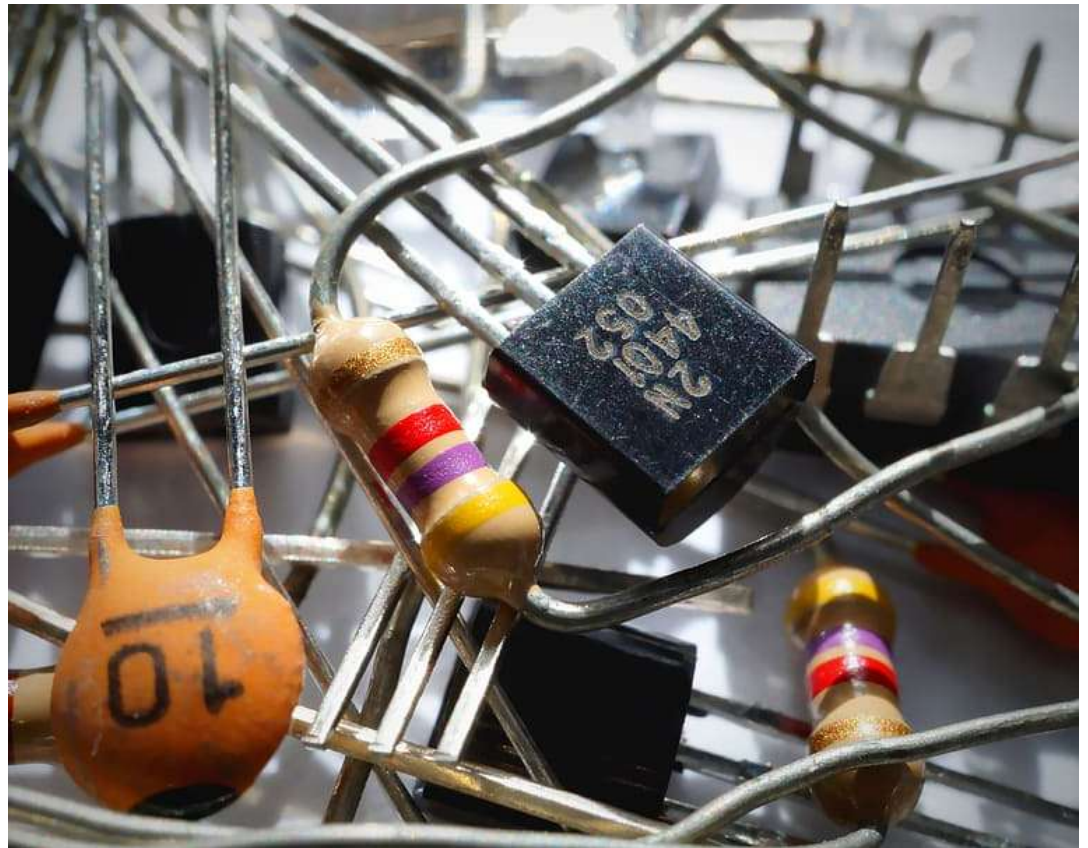


Resistors/Capacitor:

Resistor:Limits or controls the flow of electric current

Capacitor:Stores and releases electrical energy to stabilize voltage or filter noise

Role:Improves signal stability and prevents brownouts on GSM modules



Software:

Arduino IDE & libraries:

Arduino IDE : Main platform to write, upload, and debug code for ESP32

Libraries: To communicate with sensors.

libraries:

MAX30105: handling I2C communication, bit-shifting, and register operations to measure heart rate

TinyGPS ++: Parses data from the GPS module

Software serial: Enables serial communication with GPS and GSM modules on different digital pins (other than TX/RX).

Wire . H: library is used in Arduino programming for facilitating communication with devices using the I2C





Circuit Diagram

Here's a simplified block diagram:

