NFC-IET, Multan
BSAI-2k24

Project Proposal

Project Title:

"ResQTemp — Intelligent Temperature-Based Emergency Response System"

Submitted by:

Moavia Amir	(2k24_BSAI_72)
Mirza Dawood	(2k24_BSAI_31)

Semester: 3rd

Submitted to: Prof. Gulam Mustafa

Submitted Date: December 09, 2025

Abstract

ResQTemp is an intelligent temperature-monitoring and emergency-response system designed to detect hazardous temperature levels in laboratories and enclosed environments. The system uses the **ESP8266** microcontroller, **LM35** sensor, and **GSM** module to continuously monitor temperature, generate real-time alerts, and automatically initiate emergency communication.

The device responds in three stages—normal, warning, and critical—activating LEDs, a buzzer, SMS alerts, and phone calls to ensure rapid response. A built-in web interface allows users to view real-time data, enable demo mode, and monitor system status. The system aims to enhance safety in academic labs and IoT-based smart environments.

Introduction:

Safety monitoring in labs and technical environments is essential to avoid fire hazards and equipment damage. Temperature fluctuations often go unnoticed until they reach dangerous levels, resulting in delays in intervention.

ResQTemp addresses this issue by providing an automated, real-time monitoring solution. The system combines IoT communication, **GSM**-based emergency calling, and local alert indicators to deliver a fast and reliable response when the temperature exceeds a safe threshold.

The project demonstrates the use of embedded systems, web-based interfaces, GSM communication, and IoT integration in a single compact device.

Problem Statement:

Laboratories in educational institutes often lack continuous temperature monitoring, increasing the risk of overheating, fire hazards, and damage to sensitive equipment. In emergency situations, human-based monitoring is unreliable and slow.

There is a need for:

- Automatic, real-time temperature monitoring

- Instant alerting mechanism without human involvement

- Affordable and portable emergency-response devices

- A system that remains active even without internet

ResQTemp solves these limitations through automated monitoring and GSM-based communication.

Hardware Components:

- **ESP8266 (NodeMCU)** – Controls system logic and hosts web interface
- **LM35 Temperature Sensor** – Measures ambient temperature in real time
- **SIM800L GSM Module** – Sends SMS and makes emergency phone calls
- **LED Indicators**
  - Green: Normal
  - Red: Alert (High Temperature)
  - Blue: GSM Alert State
- **Buzzer** – Activates during critical temperature alerts
- **Power Supply (5V to 12V)**
- **Jumper Wires & Breadboard/PCB**

Working Methodology

ResQTemp operates in three stages:

1. Normal State

- Temperature is below threshold
- Green LED remains ON
- No alerts triggered

2. Alarm State (High Temperature Detected)

- Temperature crosses safe limit
- Red LED turns ON
- System waits for configurable hold time
- If still high → moves to Critical State

3. Critical State

- Blue LED starts blinking
- Buzzer activates
- Automatic SMS is sent through GSM
- Automatic call is made for emergency response
- Event is saved into EEPROM memory

The user can also access a built-in WiFi-based web panel to monitor data and toggle **Demo Mode**.

Interface Overview:

The ESP8266 hosts a lightweight HTML interface that provides:

- Real-time temperature display
- LED state visualization
- Live system status (Normal, Alarm, GSM Alert)
- A **Demo Mode** button for presentations
- Countdown timer before emergency call
- Device restart option

The interface works **offline** without internet and connects via ESP's Access Point.

Results & Discussion

The system was tested under multiple temperature conditions. Key observations:

- **LM35 provided stable and accurate readings**

- **GSM SMS delivery time averaged 2–4 seconds**

- **Call initiation triggered reliably after threshold delay**

- **Demo Mode proved useful for showcasing system behavior**

- **LED and buzzer indicators ensured local visibility of alerts**

- **EEPROM successfully stored event logs**

Overall, the system performed reliably and responded quickly to emergency conditions.

Timeline and Milestone

Future Enhancements:

- Add cloud connectivity for remote monitoring

- Implement email notifications

- Replace LM35 with higher-precision sensor

- Add battery backup for power failure scenarios

- Develop Android app interface

- Add fire/smoke sensor for multi-parameter monitoring

Conclusion:

ResQTemp successfully demonstrates an intelligent emergency-response mechanism that combines IoT, embedded systems, and GSM communication.

It provides:

- Accurate temperature monitoring
- Fast emergency alerting

- Offline operation capability
- User-friendly web interface

The system can be deployed in laboratories, server rooms, storage units, and industrial environments to enhance safety and prevent damage.