Project Proposal: TEMPRO

# 1. Project Title:

Tempro – A Distributed IoT-Based Multi-Node Temperature Monitoring System

# 2. Project Overview:

Tempro is a real-time, distributed IoT-based temperature monitoring system designed to gather and visualize environmental data across multiple locations. It uses 10 independent sensor nodes built with NodeMCU ESP8266 boards and DHT22 sensors. The data is transmitted wirelessly using MQTT protocol and visualized on a centralized HTML dashboard.

# 3. Objective:

- Real-time temperature monitoring from 10 different locations.  
- Wireless data transmission using MQTT.  
- Energy-efficient, battery-powered sensor units.  
- Scalable and user-friendly architecture.

# 4. Key Features:

- 10 NodeMCU-based sensor units.  
- Accurate DHT22 temperature & humidity readings.  
- MQTT-based data transmission.  
- Battery-powered portable design.  
- Central HTML-based dashboard.  
- Modular setup with switch & booster circuit.  
- Durable casing for outdoor/indoor deployment.

# 5. System Components:

|  |  |
| --- | --- |
| Component | Function |
| NodeMCU ESP8266 | Microcontroller with Wi-Fi |
| DHT22 Sensor | Temperature and humidity measurement |
| Switch | Manual ON/OFF for each unit |
| Boost Converter | Boost 3.7V battery to 5V |
| Battery (3.7V) | Power source |
| Battery Case | Enclosure for battery |
| Wires | Connections between components |
| Protective Case | Housing for the complete sensor unit |

# 6. Working Principle:

Each NodeMCU reads environmental data from the DHT22 sensor and publishes it to an MQTT broker over Wi-Fi. A centralized HTML dashboard subscribes to the MQTT topics and displays the data in real-time. All nodes are battery-powered and individually controlled by switches.

# 7. Use Cases:

- Factory & warehouse temperature monitoring  
- Smart home environmental tracking  
- Hospital/laboratory air condition monitoring  
- School/college IoT projects & research

# 8. Expense Breakdown:

Single Unit Cost:

|  |  |
| --- | --- |
| Component | Cost (INR) |
| NodeMCU | ₹400 |
| DHT22 Sensor | ₹200 |
| Switch | ₹10 |
| Booster Board | ₹150 |
| Wires | ₹30 |
| Battery Case | ₹50 |
| Battery (3.7V) | ₹200 |
| Protective Case | ₹50 |
| Total | ₹1,090 |

Total Cost for 10 Units:

|  |  |  |  |
| --- | --- | --- | --- |
| Component | Unit Cost (INR) | Quantity | Total Cost (INR) |
| NodeMCU | ₹400 | 10 | ₹4,000 |
| DHT22 Sensor | ₹200 | 10 | ₹2,000 |
| Switch | ₹10 | 10 | ₹100 |
| Booster Board | ₹150 | 10 | ₹1,500 |
| Wires | ₹30 | 10 | ₹300 |
| Battery Case | ₹50 | 10 | ₹500 |
| Battery (3.7V) | ₹200 | 10 | ₹2,000 |
| Protective Case | ₹50 | 10 | ₹500 |
| Total |  |  | ₹10,900 |

# 9. Expected Outcomes:

- Fully functional IoT-based temperature monitoring system  
- Scalable and portable sensor node architecture  
- Clean, real-time, browser-based dashboard  
- Efficient data communication using MQTT

# 10. Project Timeline:

|  |  |
| --- | --- |
| Task | Duration |
| Hardware Assembly | 3 Days |
| Firmware Development & Testing | 4 Days |
| MQTT Setup and Broker Configuration | 1 Day |
| HTML Dashboard Design | 2 Days |
| Final Integration & Testing | 2 Days |

# 11. Project Developer:

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