**Project Proposal**

Project Title: **Smart Patient Monitoring System**  
Team ID: **65**

**Introduction:**

The Smart Patient Monitoring System is designed to enhance healthcare by providing real-time monitoring of vital signs, including body temperature. The system consists of two components:

1. A **wristband** that continuously monitors the patient’s oxygen saturation level and pulse using the **MAX30102** sensor and transmits data.
2. A side biometric module that periodically alerts the patient to check their vitals, incorporates a **proximity sensor**, **temperature sensor** and includes a **capacitive touch** emergency alert system.

All collected data is sent to a secure web server for remote monitoring. If any parameter falls outside the predefined **safe** **range**, the system will send an **SMS** alert to a designated caregiver via a SIM module and activate an alert mechanism. The goal is to improve response times in medical emergencies and provide a user-friendly health monitoring solution.

**Hardware Requirements**:

**Wristband:**

1. Body Pulse and Oximeter (MAX30102)
   * Quantity: 1 per wristband
   * Purpose: Continuously monitors body oxygen saturation level and the pulse for abnormal fluctuations.
2. ESP32 Microcontroller
   * Quantity: 1 per wristband
   * Purpose: Collects sensor data, processes it, and transmits it to the web server via WiFi.
3. Rechargeable Battery
   * Quantity: 1 per wristband
   * Purpose: Ensures portability and uninterrupted operation.

**Side Biometric Module**:

1. Body Temperature Sensor (MAX30205)
   * Quantity: 1 per module
   * Purpose: Allows periodic measurement of temperature for validation.
2. ESP32 Microcontroller
   * Quantity: 1 per module
   * Purpose: Collects sensor data, processes it, and transmits it to the web server.
3. Proximity Sensor
   * Quantity: 1 per module
   * Purpose: Detects when the patient is away from their bed for more than 30 minutes and triggers an alert to the caregiver.
4. Capacitive Touch Sensor
   * Quantity: 1 per module
   * Purpose: Allows the patient to send an emergency signal to the caregiver by touching the sensor.
5. SIM Module (GSM/GPRS Module)
   * Quantity: 1 per module
   * Purpose: Sends emergency SMS alerts to caregivers via Twilio when critical conditions arise.
6. Buzzer

* Quantity: 1 per module
* Purpose: makes noise when something unusual happens.

**Data Collection Plan**:

* Data Acquisition:
  + The wristband will continuously monitor the patient’s temperature.
  + The side biometric module will periodically prompt the patient to check their vitals.
  + The proximity sensor will monitor the patient's movement in relation to their bed.
* Data Transmission & Storage:
  + The ESP32 microcontroller in both components will process the data and send it to a secure web server.
  + The web server will store and display the patient’s vitals on an online dashboard accessible by caregivers.
* Alert Mechanism:
  + If the patient’s temperature is outside the safe range, the system will:
    - Send an SMS alert to the caregiver via Twilio.
    - Activate an alert mechanism on the patient’s side biometric module.
  + If the patient is away from the bed for more than 10 minutes, an alert will be sent to the caregiver.
  + If the patient touches the emergency capacitive sensor, an immediate signal will be sent to the caregiver.

Expected Outcomes:

* Continuous, real-time patient monitoring.
* Automated emergency alerts for quick response.
* A web-based dashboard for remote access to patient vitals.
* Improved safety and timely interventions for at-risk patients.
* Enhanced mobility tracking and emergency assistance features.

Conclusion:

The Smart Patient Monitoring System leverages IoT technology to provide real-time health tracking, emergency alerting, and remote access to vital signs. By integrating a wearable wristband and a side biometric module with additional alerting features, this system enhances medical response efficiency. It ensures proactive healthcare management and timely medical interventions, improving patient safety and comfort.

Note: The system components have been selected to ensure feasibility for a tabletop prototype. Further modifications may be made based on testing and implementation feedback.