**Tuberculosis Wearable using(MicroPython + MQTT + ESP32)**

**Project Overview:**

The **TB Wearable** aims to monitor patients for early symptoms and management of Tuberculosis. It tracks parameters like coughing patterns, temperature, and respiratory rates, sending real-time data to healthcare providers using **MQTT**. The **ESP32** runs the system, and **MicroPython** handles the coding.

**Features:**

1. **Cough Detection**: Use a microphone to monitor cough frequency and intensity.
2. **Body Temperature**: Measure body temperature using a temperature sensor (e.g., MLX90614).
3. **Respiratory Monitoring**: Track breathing patterns using a piezoelectric sensor or airflow sensor.
4. **Data Transmission**: Send real-time data to an MQTT broker for monitoring by healthcare providers.
5. **Alerts**: Trigger notifications for abnormal conditions (e.g., excessive coughing or high fever).

**Components Required:**

1. **ESP32**: Microcontroller with Wi-Fi capabilities.
2. **Temperature Sensor**: MLX90614 (non-contact) or DS18B20 (contact-based).
3. **Microphone Module**: For detecting cough patterns.
4. **Piezoelectric/Flow Sensor**: For respiratory monitoring.
5. **OLED Display**: To show patient stats (optional).
6. **MQTT Broker**: For data communication (e.g., Mosquitto).
7. **Battery**: For portability.
8. **Push Button**: For resetting or manual control.
9. **LED**: For status indication.

**System Functionality:**

1. **Cough Monitoring**:
   * The microphone detects sound waves corresponding to coughs.
   * An algorithm filters and identifies cough patterns.
2. **Temperature Monitoring**:
   * The sensor records the patient’s body temperature.
   * Triggers an alert if the temperature exceeds a threshold.
3. **Respiratory Rate**:
   * Tracks breaths per minute using a piezoelectric sensor.
   * Sends alerts for irregular breathing patterns.
4. **Data Transmission**:
   * All data (cough count, temperature, respiratory rate) is sent via MQTT to a broker.
   * Healthcare providers access this data on a dashboard.
5. **Alerts**:
   * Visual (LED) and audible (buzzer) alerts for abnormal conditions.

Project Link :- https://wokwi.com/projects/418249304047870977