**LoRa (Long Range) and LoRaWAN Technology for IoT Applications in COVID-19 Pandemic**

**Aim**

The main aim of the project is to track health parameters, including body temperature and blood oxygen saturation, then updates the smart phone app to display the user health conditions.

**Abstract**

IoT in healthcare can be categorized as remote monitoring and real-time health systems. An IoT system for healthcare is typically composed of many sensors connected to a server; it gives real-time monitoring of an environment or users. Sensors can be used to help predict whether or not people are infected with the virus, based on signs such as body temperature and blood oxygen levels, Governments may try to use these platforms and information for permanent surveillance after a pandemic to control and track people’s behaviors.

**Existing System**

User smart phone to collect proximity data using Bluetooth and to communicate with the server through the cellular data network. And a LoRa module for data communication in the absence of a cellular data network and Wi-Fi. The system then is synchronized with the software to monitor the user’s behavior during daily activities. The app can notify users of new restrictions and provide useful tips given by the health service and governments. Meanwhile, the app sends the participations’ body parameters for further processing. The app can display the heart rate, body temperature, blood oxygen saturation.

**Proposed System**

The proposed system a low-cost and lightweight IoT node to monitor continually a person’s body temperature, heart rate, and blood oxygen saturation, a smart phone app to display the parameters and individual risk factors, a physical distance tracking mechanism using firebase cloud server technology to alert the user in case of violation of safe physical distance, a fog server that collects data from the IoT nodes and applies necessary information to users.

**Advantages**

* The advantages of a fuzzy system are that it can handle uncertainty and its linguistic rules can be better realized.
* The region-based risk value can be calculated on the server using parameters such as the last time an exposed case was detected.

**Block diagram:**

**TX Module:**

Arduino uno

SPO2 sensor

Temperature

Bluetooth

LoRa TX

Power unit

Firebase cloud

Mobile app

Above the block diagram contain ArduinoUNO, SPO2 sensor, temperature sensor LoRa and Bluetooth. SPO2 and LM35(Temperature) sensor are connected to GPIO pin of Arduino uno. These sensors are used to collect health parameters of patient or people. Bluetooth will send the sensor value from controller to mobile app. after then mobile will send all detail of patient to cloud. Sensor value will send via LoRa at a network not reachable time.

**RX Module:**

Arduino Nano

LoRa RX

ESP8266

Firebase cloud

Power unit

Above the diagram is contained Arduino Nano, ESP8266, LoRa and power unit. The receiver module is used when there is no network. LoRa receiver will receive the sensor value from TX module and send to cloud via ESP8266.

**Requirements:**

**Hardware Requirements:**

* Android Smart Phone
* Arduino UNO
* Node MCU
* Arduino NANO
* LORA - 2
* Bluetooth
* SpO2

**Software Requirements:**

* Compiler: Arduino IDE, python IDLE
* Language: python, c++

**Conclusion**

The proposed system integrates a IoT node with a smart phone app by which the IoT sensor node can collect a user’s health parameters, such as temperature and blood oxygen saturation, and the smart phone connects to the network to send the data to the serve. Firebase server to monitor distance which operates both for indoor and outdoor environments to notify users to maintain the physical distancing.