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IoT Based Wrist Band for Monitoring Quarantined Covid-19 Patients

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Abstract - Wearable technology plays a significant role in our daily life as well as in the healthcare industry. The recent coronavirus pandemic has taken the world's healthcare systems by chaos. The goal of this project is to discuss the different existing wearable monitoring devices (heart rate, temperature, and oxygen saturation) and respiratory support systems (oxygen therapy) which are frequently used to assist the coronavirus affected people. It is conjointly critically vital to look at the technologies and systems for effort sickness emergence, sensational its unfold and particularly the strategy for diseases prevention. The objective of this project is to review enabling technologies and systems with various application scenarios for handling the COVID-19 crisis.

Key Words: Monitoring devices, Pandemic, Enabling technologies, Arduino NANO, Wi-Fi Module, Buzzer

1.INTRODUCTION

The net of things (IoT) describes the network of physical objects "things" that square measure embedded with sensors, software, and different technologies for the aim of connecting and exchanging knowledge with different devices and systems over the Internet. convergence of multiple technologies, fundamental measure analytics, machine learning, artefact sensors, and embedded. Wearable devices are used to monitor the human condition as they are very convenient. The device monitors the temperature, oxygen level and heart rate. It tracks the human movements using GPS tracker, the location is recorded and the information is sent to the monitored person.

Today COVID-19 pandemic has created a lot of chaos and created disturbance in the normal functioning of the human race, throughout the world. Inspite of the precautionary measures taken and mandatory lockdown efforts by the concerned government authorities, the overall spread of the disease has not come under control. Although the number of COVID positive cases registered in the rural areas are lesser compared to the urban areas, community spread has to be avoided.

The development of new methods and devices for the diagnosis of COVID-19, including inexpensive portable devices, is a very urgent task. Modern technologies are able to provide important tools for diagnosing a wide range of various diseases, including COVID-19. Monitoring the health and quarantine period of the COVID patient is very critical to avoid community spread and thus supports in maintaining social distancing as well. Hence, we design an IoT based wrist band to remotely monitor the quarantine period, health and movement of the COVID-19 patients.

2. LITERATURE SURVEY

The data of the body vitals which are collected using Arduino NANO is processed and analyzed. Through GSM network data will be sent to monitoring center by the means of SMS.

Both analysis and industrial medically approved devices area unit reviewed with a stress on the physics needed to appreciate the sensing.

These sensors include temperature sensors for fever monitoring, pulse oximetry sensors for blood oxygen levels and other state sensors that can be integrated into a single system and connected to a smartphone or a data center.

The performance characteristics, like accuracy, power, resolution, and size of every detector modality are critically examined.

Research can be focused on developing flexible and stretchable sensing solutions for prolonged periods of use and continuous monitoring. Intelligent fabrics employing wearable sensors should also be developed as it helps to monitor all the vital symptoms regarding coronavirus.

In this project the sensor readings will provide a new concept on real time body monitoring system by referring the above works.

3. PROPOSED SYSTEM

Hardware Requirements:

- Arduino Nano
- LCD Display
- LED Display
- SPO2 Sensor
- Temperature Sensor
- GPS
- Heartbeat Sensor
- Power Supply
- Alarm
- Ultrasonic Sensor
- Node MCU Wi-Fi module

Arduino Nano: A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (1/0) peripherals on a single chip. Arduino Nano is used as a microcontroller because it is small, flexible and compatible with the Arduino software.

LCD Display: LCD is used in a project to visualize the output of the application. We have used sixteenx2 digital display that indicates 16 columns and a pair of rows. So, we can write sixteen characters in each line. So, total thirty-two characters we can display on sixteen two (16*2) LCD. LCD may use in an exceedingly project to visualize the output of various modules interfaced with the microcontrollers. Thus LCD plays a vital role in a project to see the output and to debug the system module wise in case of system failure in order to rectify the problem.

LED Display: LED is used to detect the heart rate. The normal heart beat range is about 78 bpm. This provides an immediate output digital signal.

SPO2 Sensor: The sensor used is MAX30100. It is used to uniform oxygen level of the patient. The MAX30100 is associate degree integrated pulse oximetry and heartrate monitor detector answer. It combines two (2) LEDs, a photodetector, optimized optics, and low-noise analog signal process to sight pulse oximetry and heart-rate signals. The MAX30100 can be operated from 1.8V and 3V power provides and might be supercharged down through package with negligible standby current, allowing the facility offer to stay connected the least bit times.

Temperature Sensor: The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in C). This device is employed to live the temperature of the patient

GPS: This is a complete GPS module that is based on the Ublox NEO 6M GPS. This unit uses the newest technology from Ublox to administer the most effective attainable positioning info and includes a bigger integral twenty-five x 25mm active GPS antenna with a UART TTLn socket. A battery is additionally enclosed so you'll acquire a GPS lock quicker. This is degree updated GPS module that will be used with Associate in Nursing ardupilot mega v2. This GPS module offers the most effective doable position info, leaving higher performance along with your Ardupilot or different Multirotor management platform.

NodeMCU module: NodeMCU is an open-source Lua based firmware and development board specially targeted for IoT based Applications. It includes computer code that runs on theESP8266 Wi-Fi SoC from Espresso Systems, and hardware that is predicated on the ESP-12 module.

Software Requirements:

- Arduino Application
- Blynk
- Telegram

Arduino Application: The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that's written in functions from C and C++. It is want to write and transfer the programs to the Arduino compatible boards. Arduino is especially used for writing, compilation and uploading the code within the Arduino device. It primarily contains 2 basic parts: editor and compiler wherever former is employed for writing the code and later is used for compiling and uploading the code into the given Arduino compatible boards.

Blynk: This means that the hardware you choose should be able to connect to the internet. Some of the boards, like Arduino Uno can would like AN LAN or Wi-Fi protect to speak, others are already Internet-enabled: just like the ESP8266, Raspberry Pi with Wi-Fi electronic device, Particle gauge boson or Spark Fun Blynk Board. But even though you don't have a protect, you'll connect it over USB to your portable computer or desktop

Telegram Bot: Bots area unit merely wire accounts operated by software system - not individuals – and infrequently have AI options. They can do something - teach, play, search, broadcast, remind, connect, integrate

with different services, or perhaps pass commands to the net of Things. In our case we pass commands to Arduino regarding threshold values of asthma attributes. We have to form a larva supported wire that uses associate ESP8266 to manage peripherals.

4. METHODOLOGY

In this section, the methods related to the work are presented. The diagram below shows the workflow of the model.

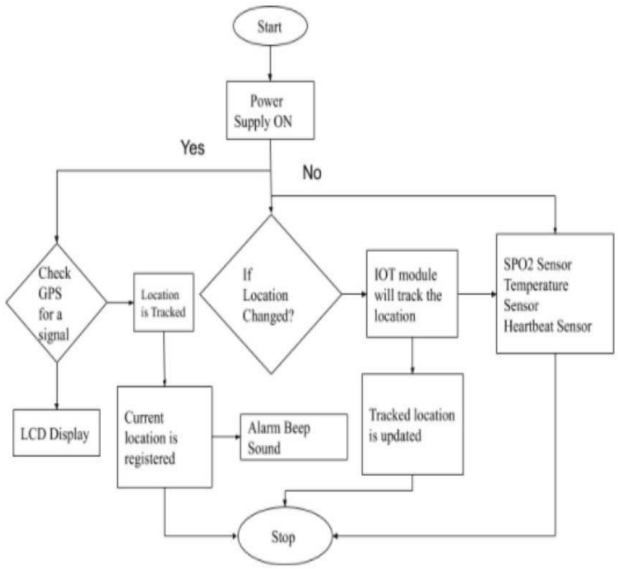

Figure 4.1: Methodology Diagram

SPO2 sensor and Temperature sensor are connected to the Microcontroller. The temperature sensor gives the temperature value in degree Celsius. To measure the heart rate, the heart beat/pulse is detected and therefore the variety of pulses for one minute is counted to induce the beats per minute.

The GPS and Nodemcu modules area unit interfaced with the microcontroller. The GPS module finds out the latitude and line of longitude of the patient. The temperature and Spo2 values area unit measured and compared with a configurable threshold to be classified as “low”, “normal” or “high”. The Nodemcu module is used to send a message to the management’s mobile in case of emergencies. The message contains the temperature, Spo2 values and the patient’s latitude and longitude. The management can thus take immediate action with the help of this alert system and if in case of changing the position of COVID-19 Patient also detect by using GPS value and send alert to the concern persons.

The measurement results are transmitted via a wireless interface to a PC, tablet or Smartphone and are recorded in the blynk server and this will allow the accumulation of data to adapt the processing results for a specific patient and more accurately monitor the change in its health. When the measurement results exceed the set limits, an alarm is generated, which is displayed as a message on the screen of the mobile device and can be sent to the medical center.

The described individual system can be useful for continuous express monitoring of the condition of a person suffering from COVID-19 during the day. In addition, it can be useful in medical institutions for monitoring the condition of a patient in hospital.

In this section, the figure 4.2, shows the connections done to microcontroller.

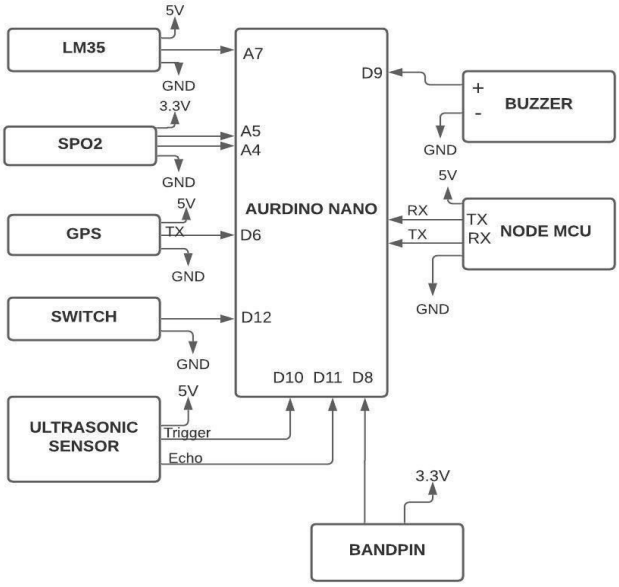

Figure 4.2: Connection Diagram

5. CONCLUSIONS & FUTURE WORK

The advantages of using wearable technologies allow us to apply the planned structure to observe the condition of patients of all age terms, together with young children. With technologies moving towards lower power and smaller devices, multi-sensor wearable devices that are capable of monitoring patients showing epidemic disease symptoms, storing the data and enabling access for medical personals. There is no doubt that wearable technologies cannot not only work as an early warning system but also as life-saving devices.

The current trials demonstrate the convergence of wearable data, self-reported symptoms, molecular testing, and data toward developing platforms for managing COVID-19 and other outbreaks which may arise in the future.

To develop multi-parameter flexible and stretchable sensing based wearable devices, allowing application in a wider range of both clinical and public contexts. To design patient-oriented telehealth technologies and services, and undertake proper, evaluation to ensure effectiveness and safety.

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