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COVID-19 based health monitoring smart-band

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Abstract - *In an ideal situation the covid-19 pandemic should be over as soon as possible with the least number of fatalities. Internet of Things (IoT) enabled healthcare system should be used for proper monitoring of COVID-19 patients, by employing an interconnected network. A Productive solution to overcome or confront this pandemic must be found out. Our solution seeks to resolve these issues by introducing IOT into the healthcare sector for covid-19. This system would be robust and the risk of infection transmission is negligible. The situation should be under control and the curve could be flattened by adopting these techniques. This paper introduces a wearable band which measures temperature, heart rate and blood oxygen levels. And if the value exceeds a predetermined limit then a alert is sent to the concerned medical centers.*

Keywords: Arduino, Pulse Oximetery, Heart-rate, WiFi Module, Temperature sensor Health monitoring.

1. INTRODUCTION

Our proposed system is a wearable band with a pulse oximeter and temperature sensor which would be given to the person who is quarantined. They have to wear it on their wrist. This wearable band would go on to measure the SpO2 levels (Blood oxygen levels) along with temperature. This Sensory Data will be sent via an application to the concerned hospital and the doctors can monitor the people for any abnormalities for the standard 14 days quarantine period. It will give the real time updates of the patient's condition. If the doctors notice any drop in blood oxygen levels (Typical in case of a corona virus patient) they can immediately ask the person to be admitted. Also a regular survey of questions (issued by WHO) will be displayed on the APP for the quarantined people to fill. This system will make easier for doctors to have the patient's data and oversee their health without a visit to the hospital. On the patients' side, it has greatly assisted in stress reduction as patients do not need to waste time in queues in hospitals, and they can contact and receive information from their doctors throughIoT enabled systems for health monitoring.Furthermore parameters of patients can be measured and transmitted to the database towards clinical diagnosis and advice on treatment.

2. LITERATURE REVIEW

IOT based healthcare monitoring system provides better healthcare service by improving the availability and transparency of the health data.[5] This project aims to developing a system which gives body temperature and heart rate using LM35 and pulse sensor respectively. These sensors interfaced with controller arduino nano board. The Data is transmitted by arduino through wi-fi module. This paper proposes an internet so things based real time remote patient monitoring system. This technology helps to monitor patients remotely .The physical contact between the medical staff and the alleged covid-19 patient should be minimised. But in reality, as all of us are aware this is far from the truth. The current global challenge of COVID-19 pandemic has surpassed what a common man expected. The number of new cases is rising rapidly and the number of lives this coronavirus is claiming is alarming. The impact it has on people ranging from all backgrounds is immense. Elderly people are at high risk due to this pandemic. All age groups including children are being affected directly or indirectly. Social distancing has reached a point where individuals are experiencing mental health issues. Using this system the physician and the family members themselves can use the cloud platform to diagnose patients at remote locations. The patient can access their medical records via this cloud service. These data can be analyzed by a doctor at a remote location or can be saved and retrieved later for analysis. With this design and development, we have attempted to fill the gap which was the main reason behind the growth of death rate due to cardiac diseases.[5]

3. PROPOSED SYSTEM

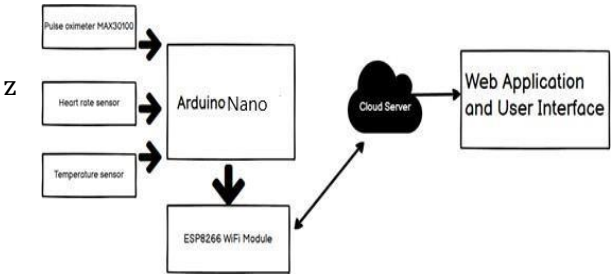

Figure 1: Block Diagram of System

The main objective of this project is the design and implementation of covid19 health monitoring smart-band. The above figure shows block diagram of our system. All the sensors interface with Arduino nano. Different sensors sense different parameters of patients and is sent to controller. If the health parameters exceed a specific value then a alert will be sent to concerned medical centres. Total two sensors are used in this system. Temperature sensor LM35 for measuring temperature and GYMAX30100 for measuring heart-rate and blood oxygen levels. This system seeks to resolve these issues by introducing IOT into the healthcare sector for covid-19. IoT is helpful for an infected patient who is suffering through COVID-19 to identify symptoms and provides better treatment rapidly. It will be useful for patients, physicians, surgeons and hospital management system. This system would be robust and the risk of infection transmission is negligible.[5]

A. Arduino Nano:

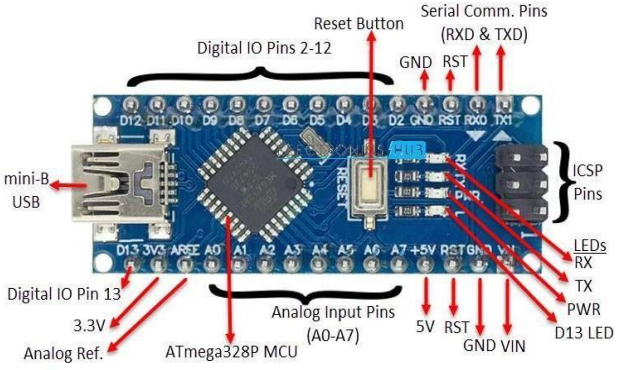

Fig 1.1-Arduino nano

Arduino nano is a small and breadboard friendly board which is based on atmega328 or atmega168.It operates on 5V , however the input voltage can vary from 7V to 12 V. It has 14 digital input -output pins out of which 6 provide PWM output. It is simply a smaller version of arduino uno. It comes with a crystal oscillator of frequency of 16Mhz.It has breadboard friendly nature which makes it different from the other boards. It has micro USB port with the help of which it can be programmed or monitored. It can be powered up through USB connector or the Vin pin present on the board.[6]

A. Temperature sensor LM35:

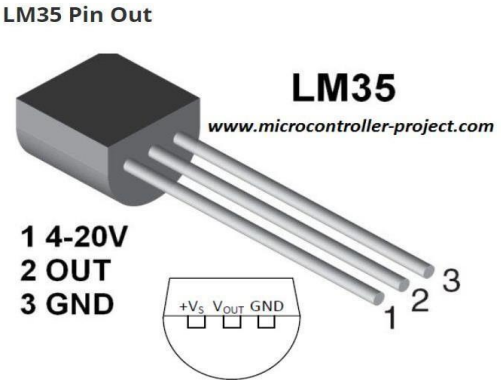

Fig 1.2-LM35 Temperature sensor

LM35 is an integrated analog temperature sensor whose electrical output is proportional to Degree Centigrade. LM35 Sensor does not require any external calibration or trimming to provide typical accuracies. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. Main advantage of LM35 is that it is linear i.e. 10mv/°C which means for every degree rise in temperature the output of LM35 will rise by 10mv. So if the output of LM35 is 220mv/0.22V the temperature will be 22°C. So if room temperature is 32°C then the output of LM35 will be 320mv i.e. 0.32V. LM35 can also be directly connected to Arduino. The output of LM35 temperature can also be given to comparator circuit and can be used for over temperature indication or by using a simple relay can be used as a temperature controller.[6]

C. MAX30100 Sensor:

Fig 1.3-MAX30100 Sensor

The MAX30100 sensor is used to measure heartrate & blood oxygen levels. It has 2 LED's emitting red & infrared light. Infrared light is used for pulse rate. And both the lights are required for measuring blood oxygen levels. It has ultralow power operation which increases battery life for wearable devices. It has fast data output capability. It also consumes low power (operates between 1.8V and 3.3V). This sensor is generally used in wearable devices, medical monitoring systems etc. [4]

D. ESP8266 Wi-Fi Module:

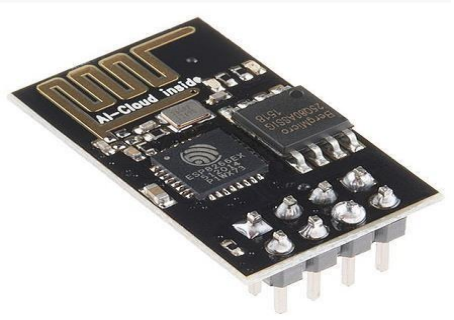

Fig 1.4-ESP8266 Wi-Fi Module

ESP8266 is an highly integrated chip designed to provide full internet connectivity in a small package. It can be used as an external wifi module ,using the standard AT command set firmware by connecting it to any microcontroller or directly serve as w wifi enabled microcontroller. It has built in TCP/IP protocol stack and it also supports antenna diversity.[1] It is normally used in IOT cloud based projects and is the most widely used wifi module because of its small size and low cost. It operates from 3V to 3.6V and requires external logic level converter for using 5V supply.We can connect this module to any microcontroller like pic microcontroller, Arduino and we can use it as a stand-alone device.[5]

4. CONCLUSION:

In this paper, a covid 19 smart band is developed that helps measuring temperature, blood oxygen levels and heart rate. This system continuously measures heart rate, body temperature and blood oxygen levels and provides monitoring and tracking through an web application. This is a wearable band with a pulse oximeter and temperature sensor which would be given to the person who is quarantined, this band will be able to measure the SpO2 levels (Blood oxygen levels) along with temperature. This system is based on Arduino and IOT. When the patient's data crosses a pre-determined limit, the application alerts the patient and doctors concerned. The main purpose of this system is to make sure that the patients get medical aid as soon as possible. Also this system enables monitoring patients from their homes that saves time [3]. It will humanity in the reduction of coronavirus infection . It will also useful for avoiding crowd in the hospitals.

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