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COVID-19 Biomedical Device

[1]Aniket Dwivedi, [2]Adarsh Kumar Verma, [3]Rohit Pal, [4]Agrim Malviya,
[5]Santosh Dubey (Assistant Professor)

aniketdwivedi99@gmail.com, engadarsh.verma11@gmail.com, rohitpal1636@gmail.com, agrim.malviya@gmail.com, sdubeyece@gmail.com

Department of Electronics & Communication,

United College of Engineering & Research,

Prayagraj, Uttar Pradesh, India

Abstract : **This paper describes the use Arduino and its various sensors for developing a COVID-19 Biomedical Device. The ongoing pandemic proliferated the usage of IoT based health monitoring devices which proved to be potentially beneficial for the patients. This study presents an IoT based, real-time detection system employing the values of body temperature, pulse rate, and blood oxygen saturation level (SpO2) of the patients. This device has a liquid crystal display (LCD) indicating the measured values which can be easily synced with a mobile application (Blynk IoT) for instant access. The proposed device is equipped with a GPS module capable of identifying the location in which it is present in the form of latitude and longitude and comes with an Arduino Nano based system whose results are promising: the data acquired from the device can be viewed and stored very briskly. The results obtained were found to be accurate when compared to the other commercially available devices. IoT-based tools are potentially valuable during the pandemic and beyond for saving people's lives .**

IndexTerms **- Covid, detection, monitoring, patients, IoT.**

INTRODUCTION

COVID-19 pandemic is still one of the major global issues faced by the various health organizations across the globe. This is a concept DIY of COVID-19 Biomedical device that helps to detect the symptoms of the virus, so as to help individuals quarantine and isolate themselves and practice social distancing.

In this we have used Arduino Nano and other different sensors for different applications. The DIY works by detecting the basic symptoms of the virus, which are: Increased body temperature and shortness of breath. Although it is not necessary that shortness of breath will cause low levels of oxygen in our blood in general cases, coronavirus infection in our lungs which leads to low oxygen level or hypoxemia.

Visiting the hospitals often becomes time-consuming and difficult for most of the people for getting regular health checkup appointments, such IoT-based devices can be beneficial to individuals going for routine health checkups and will save the time of patients, prevent overcrowding in hospitals and clinics.

The main objective of this project is to develop and implement an IoT-based smart health monitoring system for people based on human body temperature, heart rate, and SpO2 levels. It can also display the measured human body

temperature, oxygen saturation level, and heart rate through a mobile application, which has been done in order to seek medical attention even if the doctor is unavailable.

The proposed device is even equipped with a GPS module capable of identifying the location in which it is present in the form of latitude and longitude.

RESEARCH METHODOLOGY

Arduino Nano:

Arduino Nano is a small, complete, flexible and breadboard-friendly Microcontroller board, based on ATmega328p, developed by Arduino.cc in Italy in 2008 and contains 30 male I/O headers, configured in a DIP30 style.

Arduino Nano Pinout contains 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins.

It is programmed using Arduino IDE, which can be downloaded from Arduino Official site.

Arduino Nano is simply a smaller version of Arduino UNO, thus both of them have almost the same functionalities.
It comes with an operating voltage of 5V, however, the input voltage can vary from 7 to 12V.
Arduino Nano's maximum current rating is 40mA, so the load attached to its pins shouldn't draw current more than that.
Each of these Digital & Analog Pins is assigned with multiple functions but their main function is to be configured as Input/Output.
Arduino Pins are acted as Input Pins when they are interfaced with sensors, but if you are driving some load then we need to use them as an Output Pin.
This board doesn't use standard USB for connection with a computer, instead, it comes with Type-B Micro USB.
The SRAM memory of 2KB is present in Arduino Nano.
Arduino Nano has an EEPROM memory of 1KB.

NEO 6M GPS Module

To connect GPS Module with Arduino, we need one Arduino and one Neo 6M GPS Module.
There is one Antenna attached with GPS module.
It has 4 pins
1-Ground
2-Tx
3-Rx
4-Vcc
There is an LED which indicates GPS signal. When the GPS module detects signal than this led will blink. Arduino and GPS Module are connected via. Jumper wires.
Black wire is ground pin.
White wire is Vcc pin.
Orange wire is Tx of GPS.

In coding part make Pin 4 as Rx pin and Pin 3 as Tx pin.
Set GPS baud equal to 9600.
In Void setup() function set GPS baud as 9600 and define GPS baud.

In Void loop

When SS.available() > 0 then GPS will encode by this inbuilt GPS function.
In this way I get latitude and longitude values.
Upload the code on Arduino board.
GPS led blinking means it founded GPS signal.

DS18B20 Waterproof Temperature Sensor

The SB18B20 is one of the popular temperature sensors because it is cheap, easy to use and is also waterproof.

Its application can be made in Thermostatic Controls, Industrial systems, Consumer Products, Thermometers, Thermally sensitive systems.

The Unique 1- wire interface requires only one port pin for communication.

Measures temperature from -55°C to +125°C

Its Accuracy is +-0.5 Degree Celsius

Arduino nano connection with DSB18B20 connect the efficiency to 5V of Arduino ground to ground and data wire to any pin you want and we put 4.7K resistor.

NODE MCU ESP8266

Node MCU is an open source IOT platform and It's based on ESP8266.It is programmed by Lua scripting language and also can be programmed by Arduino.

It's a microcontroller.

On the board we have ESP8266,3.3 Volt regulator. Two buttons present are Reset and Manual flash need couple of capacitors to stabilize.

Its own API and SDK are available.

GPIO are general purpose input output pin.

Minimum 5V is recommended and maximum 10V.

and speculations which create the chances of arbitrage and the investors have the chance to earn above the normal profit. But the assumption of the APT is that there should not be arbitrage in the market and the investors can earn only normal profit. Jarque bera test is used to test the normality of data.

MAX30100

A Pulse oximeter is a device that is used to quickly and easily monitor a person's oxygen saturation that means arterial blood without using any invasive means.

It measures the oxygen saturation of pulsating blood and it is known as SP02.Heart rate is automatically calculated alongside the percentage of oxygen.

SPO2 percentage-(95 to 100) (Normal)

It has 7 pins VCC, SCL, SDA, INT, IRD, RD, GD.

LCD 16X2

The LCDs have a parallel interface, meaning that the microcontroller has to manipulate several interface pins at once to control the display. The interface consists of the following pins:

A register select (RS) pin that controls where in the LCD memory you're writing data to. You can select either the data register, which holds what goes on the screen, or an instruction register, which is where the LCD controller looks for instructions on what to do next.

A Read/Write (R/W) pin that selects reading mode or writing mode

An Enable pin that enables writing to the registers

8 data pins (D0 -D7). The states of these pins (high or low) are the bits that you're writing to a register when you write, or the values you're reading when you read.

There is also a display contrast pin (Vo), power supply pins (+5V and GND) and LED Backlight (Bklt+ and BKlt-) pins that you can use to power the LCD, control the display contrast, and turn on and off the LED backlight, respectively.

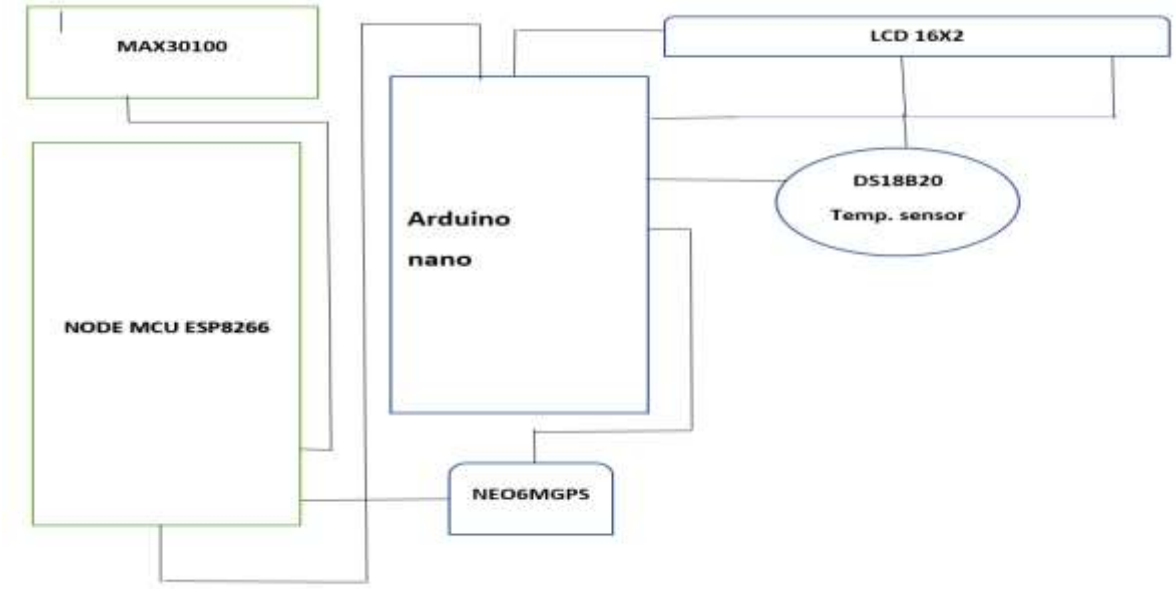

Fig1: Block diagram of COVID-19 Biomedical Device

FUTURE

1. Wearable electronic devices, which allow physiological signals to be continuously monitored, can be used in the early detection of asymptomatic and pre-symptomatic cases of COVID-19.

2. Such devices can provide unique insights into our health and well-being. Unlike conventional testing in a clinical setting, which may occur a few (or less) times a year, wearables offer continuous access to real-time physiological data.

3. During the coronavirus pandemic the potential of such devices has become increased apparently and will continue to increase.

4. In future, more sensors can be added to this device to monitor more physiological parameters of the human body.

5. This type of devices are extremely important in the medical sector as they can help increase the life expectancy of people across the globe.

6. The digital solutions are moving towards low power consumption and small-form-factor devices, sensors will cover diverse physiological parameters,
engendering digital databases using cloud services to analyze the impact of treatment of the patients.

7. In the future, there are possibilities that the world may face another virus, so we should be ready to address the threat.

8. It can also be used in remotely monitoring the recovery of individuals undergoing treatment or self-isolating at home.

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