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COVID-19 PATIENT HEALTH MANAGER FOR ISOLATION CENTER

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Abstract - *As we know, during this pandemic real time monitoring of so many patients have become a lot challenging for doctors and hospital management staff. In this paper, we are going to discuss a solution for the problems we have faced during the pandemic. Our Patient Health Manager will help the doctors and other hospital staff to manage a number of patients together without having any contact with the patients. Thus, the risk of doctors and nurses getting contracted to the disease is reduced to a greater extent. In short, our system will help doctors and medical staff to be safe against not only COVID but also many other contagious diseases. This indirectly will reduce the spread of diseases rapidly to a greater extent. Basically doctors have to control the robot from their cabin itself and make it travel towards the patient. It will travel to patients and sanitize the hands of the patients, provide them with required medicine, check for various health parameters and send details to the person handling the system. Even in an emergency a buzzer will be provided to patients for emergency care needed.*

Key Words: **Blynk Application**, **Covid-19**, **Health care**, **Microcontroller, WIFI modules**

1. INTRODUCTION

Health assistance of COVID-19 affected patients with modern technology and low cost systems have become very important in this pandemic times. In these times when there is a need to monitor or give medical assistance to a large number of patients there is an immediate need for a medical system that is cost effective and fast responding. Using our project it will help doctors to manage patients by keeping himself/herself and other medical staff at a safe distance from the patients. So it will improve the quality of medical assistance in our country. Not only COVID-19 but many other patients suffering from any contagious disease can be treated using the same. Our system will reduce the amount of doctors and other medical staff visits to the patients and thus reduce the risk of getting contracted to the disease. So our project will help to control the widespread of diseases like COVID-19.

To overcome all the disadvantages of currently existing automated medical systems we have created a system that will continuously monitor patients using cameras. The doctors can operate the robot through an application called Blynk and move it towards the required patient and continuously monitor patients using a camera. The doctors can operate the robot through an application called Blynk and move it towards the required patients by seeing the directions through camera video. After it has reached the patient the doctors can give command to the robot to sanitize the hands of patients. After sanitization, doctors can also be able to give the required medicine to the patients by indicating it through turning ON the LEDs. The system can also check for different health parameters of the patient if given command by the doctors. The details of the health parameters will be displayed on the same application .The robot also has an emergency button , if at any time a patient requires an urgent doctor assistance or wants to communicate with the doctor he or she can just press the buzzer. This buzzer will indicate to the doctor that there is a need for him or her to visit the patient. The various health parameters that our system will check for are temperature level/Oxygen level/heart of the patients.

All this will be made possible through the use of the latest technologies. Our system includes a microcontroller, WIFI module, motor driver,Sp02 sensor, temperature sensor and pump motor. Our system will be controlled by Blynk Application and a separate application will be used to monitor patients via IP camera.Our system proposed here will efficiently travel to the patients, sanitize hands of patient, provide medicines and also check for various health parameters of the patient. All this will be controlled by the doctor simply by sitting at his or her cabin. This will be a low cost implementation with much greater benefits for our medical conditions in hospitals during pandemic.

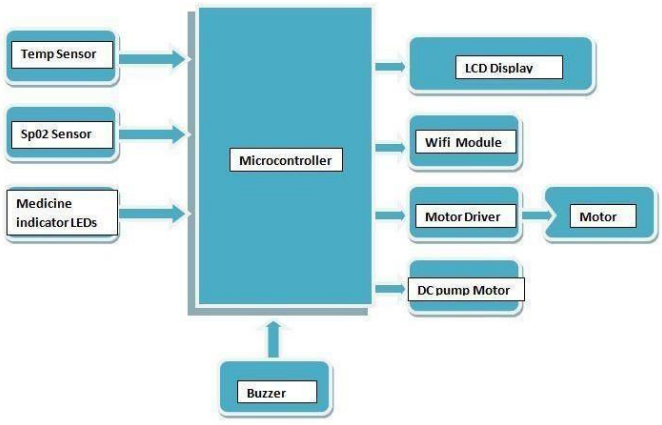


Fig -1: Block diagram

2. MODULES

In patient health manager to fight COVID- 19, We have used the following technologies and methodologies which will provide an active and user-friendly environment for the working of the system:

- Micro Controller (ATmega 328)
- SPO2 Sensor
- Temperature Sensor
- WIFI module (ESP8266)
- Motor Driver (L293D)
- Blynk Application

2.1 Microcontroller (ATmega 328)

The controller which has been used in this system is the ATmega328 microcontroller. ATMEGA328 is a high performance, low power controller from Microchip. ATMEGA328P is the most popular of all AVR controllers as it is used in ARDUINO boards. This high- performance Microchip 8-bit AVR RISC-based microcontroller combines 32 KB ISP Flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented Two-Wire serial interface, SPI serial port, 6- channel 10-bit A/D converter (8- channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.

2.2 SPO2 Sensor

SpO2 is the device which shows the saturation percentage of oxygen in the blood. Almost every patient monitor has a built-in or attachable capability to monitor this crucial vital sign. SPO2 is an indirect and noninvasive method of measuring oxygen saturation in blood. It should be tested along with all the other physiological parameters during preventive or corrective maintenance on a patient monitor, or stand-alone device. SpO2 is measured at the periphery, usually a finger, and is one measure of the health of the cardiovascular and respiratory systems. A pulse oximeter noninvasively measures the oxygen saturation of a patient's blood. This device consists of a red and an infrared light source, photo detectors, and a probe to transmit light through a translucent, pulsating arterial bed, typically a fingertip or earlobe. Oxygenated hemoglobin (O2Hb) and deoxygenated hemoglobin (HHb) absorb red and infrared light differently. The percentage of saturation of hemoglobin in arterial blood can be calculated by measuring light absorption changes caused by arterial blood flow pulsations.

2.3 Temperature Sensor:

The DS18B20 temperature sensor is a 1-wire digital temperature sensor. This comes with a sealed package that lets you precisely measure temperatures in wet environments with a simple 1-wire interface.It communicates on a common bus. It means it can connect several devices and read their values using just one digital pin of the Arduino. This is a pre-wired and waterproofed version of the DS18B20 sensor. The Sensor can measure the temperature between -155 to 125° (-67°F to+257°F). The cable is jacketed in PVC.

2.4 WIFI module (ESP8266):

The ESP8266 WiFi Module is a self contained SOC with TCP/IP protocol stack that can give microcontroller to access to your WiFi network.Each ESP8266 module comes pre- programmed with an AT command set firmware, you can simply connect this up to your Arduino and get about as much WiFi-ability as a WiFi Shield offers. The ESP8285 is an ESP8266 with 1 MiB of built-in flash, allowing the single-chip devices capable of connecting to WiFi.

2.5 Motor Driver (L293D):

The L293D is a 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. A single motor driver L293D IC is capable of running two DC motors at the same time and the direction of these two motors can be controlled independently. Due to its size it is very much used in robotic applications for controlling DC motors. The IC works on the principle of Half H- Bridge, H bridge is a set up which is used to run motors both in clockwise as well as anti clockwise direction.

2.4 Blynk Application:

Blynk is a platform that allows you to quickly build interfaces for monitoring and controlling your hardware projects from your Android and iOS device. After downloading the Blynk Application , you can create a project dashboard and arrange buttons, sliders, graphs, etc onto the screen. Using the widgets, you can turn pins on and off or display data from sensors.

3. WORKING

In our proposed system we have used various biometric sensors to continuously monitors the different parameters of the patient and report to the doctors/ nurses/wardboys for timely response in the case of critical situations.The working of our Patient health manager to fight COVID-19 pandemic is as follows:

- Power supply for the entire circuit is provided by a 12 volt rechargeable battery.
- The entire system requires 5 volts supply therefore a voltage regulator circuit is used with IC 7805.
- The main element of the system is a microcontroller (ATmega 328). Programming connector is used for uploading the program in the microcontroller. Reset switch, 16Mhz crystal oscillator and noise filtering capacitor are

provided for the microcontroller.

- Shift register is used to expand the output pins of a microcontroller.
- DC pump motor is used for the sanitization purpose.
- SPO2 sensor will measure the blood pressure and the oxygen level of the patient. Temperature sensor (BS18B20) will measure the temperature of the patient's body.
- Blynk application is developed for controlling the movement of the manager and to provide the readings taken by the various sensors to doctors.
- The instructions given by the doctor through the Blynk application will be displayed on the LED. Also all the readings captured by the various sensors will get displayed on the LCD. Potentiometer is provided for adjusting the contrast of the LCD.
- The WIFI module (ESP8266) will upload the readings taken by the sensors on the Blynk app so that doctors can see it.
- The DC motor is used for the movement of the manager.

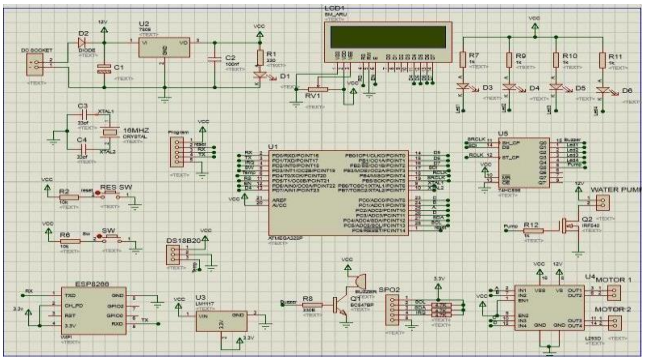
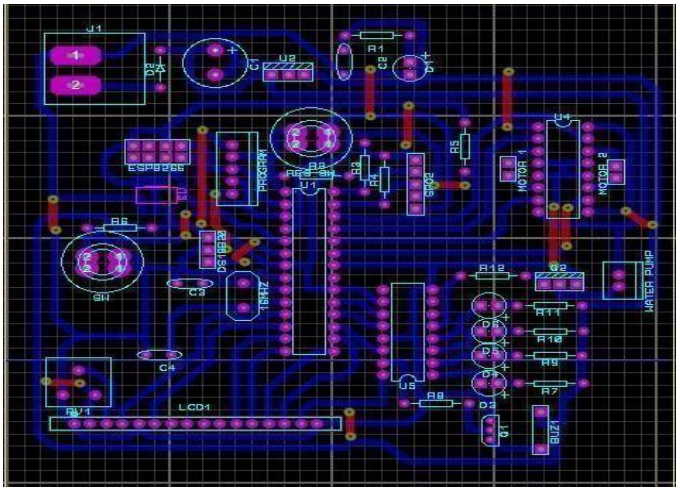


Fig -2: Circuit Diagram

4. Proteus Design



Automated sanitization of patient's hands are included.	No such feature is present in this system.
Medicine to the patients will be delivered by the robot itself.	Doctors or other hospital staff need to visit the patients to provide medicines.
COVID or other communicable diseases transmission will be reduced and quality of life will be improved.	It will not help much to reduce the spread of COVID.

5. PROPOSED SYSTEM VS EXISTING SYSTEM

Patient Health Manager To Fight COVID Pandemic.	**Patient Monitoring System.**
Doctors visit required only in case of emergency as medicine will also be provided by our system.	Doctors need to visit frequently to provide medicines for the patients as the system will only monitor the parameters.
Using camera in our patient can be monitored with more care.	As the system will only monitor and update data on website doctor will have to visit patient regularly to check for emergency situation.
Doctors and other hospital staff will not be at risk of getting affected by COVID.	Doctors and other hospital staff willbe at a greater risk of getting affected by COVID.

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6. LIMITATIONS

1. **Security:** Security is the biggest concern for the users from using IoT technology for medical purposes, as these systems can be compromised or hacked. The health information of the patient and their location can have dangerous consequences, which can counter the benefits of IoT.

2. **Risk of failure:** The system also has risk of failure in the hardware or sometimes the power failure can also affect the sensors which can place the healthcare operations at risk. The risk of not getting an update on time is more dangerous.

3. **Integration:** Devices are produced by different manufacturers and sometimes may not work well together.So the limitation of full scale integration of the system can limit its potential effectiveness.

7. FUTURE SCOPE

Further modification that can be made in the proposed system that will allow the two way communication between the doctor and patient. This will be helpful in the cases where the patient needs to directly communicate with the doctor. This will allow doctors to provide effective service and consultation to the patient.

ECG monitoring system can be applied to the proposed system for monitoring the various kinds of heart diseases and quality of transmission and reception of ECG signals.

This system is also developed by using advanced GSM and GPRS technology in future,A graphical LED can be used to display a graph of the change of heart rate over time.

8. CONCLUSION

The spread of COVID-19 in the world is increasing rapidly so it is expected there is high demand for healthcare systems with affordable costs.Motivated by these, our project aimed to create a patient monitoring system which will help the Health specialists/doctor's to continuously monitor the patient's health status remotely. We have presented the design and implementation of our proposed system by integrating various available biometric sensors, WIFI modules and microcontrollers. One of the beneficiary parts of the system is Health specialists staying at a distance can monitor the patient's condition and can give them required facilities.This proposed system will operate in an effective manner to monitor the patient's health and will definitely help doctors to manage the increasing number of patients safely.

REFERENCES

[1] Details of Blood Pressure sensor from fingers, Available on www.coolcircuit.com

[2] Upkar Varshney, Patient monitoring using infrastructure-oriented wireless LANs.

[3] Matthew Kane, Amy kesluk, Edward Teawetal., "A Wireless Health Monitoring System," in Proc .IEEE, 2005.

[4] https://circuitdigest.com/microcontroller-papers/iot-heartbeat-monitoring-using-arduino

[5] https://www.papersof8051.com/arduino-and-iot-based-patient-health-monitoring- system-paper/

[6] Alexandros Pantelopoulos, Nikolaos G. Bourbakis,"A Survey on Wearable Sensor- Based Systems for Health Monitoring and Prognosis",Publisher: IEEE DOI: 10.1109/TSMCC.2009.2032660.

[7] "Arduino Architecture" https://www.engineersgarage.com/what-is- gsm-gprs-module [Oct. 1, 2017] in press.

[8] Mr. Bhavin Mehta, Ms. Divya rengarajan, Mr. Ankit Prasad "Real time patient Tele-monitoring system using Labview" engineering research , volume 3, issue 4, April 2002.

[9] M.P. Nirmala, Rampriya mahendra, "Home based wireless health monitoring system",international journal of advanced research in electrical electronics and instrumentation engineering, vol.3, issue 11, November 2014.

[10] [10]M priya, M. Kathiresh, "Wireless patient health monitoring system using labview", international journal of emerging technology in computer science and electronics (IJETCSE) ISSN: 0976-1353 volume 22 issue 2, may 2016.