Original Article

An Iot Based Healthcare Monitoring System

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DOI: 10.47750/pnr.2023.14.03.19

Abstract

The fitness tracker can measure oxygen saturation, heart rate, blood pressure, and temperature. With the help of the Internet of Things, a new era for medicine has begun. A health tracker based on IoT is used in this proposal to measure factors. In addition, it is quite useful for displaying and saving data. Through the Internet of Things, all resources can be easily connected and quality of life can be enhanced. Whenever an irregularity occurs, users will receive email or SMS notifications from this IoT-based healthcare tracking system. Using the Internet of Things, doctors can also access and save data to read on their mobile devices. Using the Internet of Things, doctors can obtain information that is useful to them and allow them to make quick decisions.

Keywords: Internet of things, BMP180, MAX30100, Arduino, Ubidots.

I. Introduction

The body's temperature and pulse have a significant influence on one's health. Using IoT-based health monitoring systems, people can check their heart rate, blood pressure, body temperature, and oxygen saturation. Values are determined through sensors. The LCD display is connected to the sensor by a microprocessor. With the advancement of medical science, the great tragedy caused by the coronavirus can be avoided. In the event of an emergency, emails are sent to doctors and patients. Health always comes first in any growth. Utilizing remote monitoring technologies to keep an eye on patient health makes sense. This issue might be resolved by implementing an IoT health monitoring platform. Priority is given to the happiness of the people. Serious illnesses are treated with excessive hospitalizations.This should be considered, particularly if an outbreak occurs in an area where medical personnel are at risk. Using intelligent sensors to halt the spread of disease is an effective approach to save lives.

II. Related work

In 2017, Niket Patil and his associates created an Internet of Things (IoT)-based system to monitor the physical activity and captures of soldiers. Patil advises employing LM35 sensors, heart rate monitors, and spot oxygen sensor devices for monitoring. According to Patil, the system's Node MCU ESP 8266 WiFi module connects to the internet, and the highly accurate SIM28M GPS is used to track the soldiers. There is also a panic button that you can use to summon assistance in an emergency. The system is relatively affordable and the sensors are coupled to an MCU board called Arduino Uno (ATMega 328p).

Naina Gupta et al. suggested a way for transmitting data using a GSM module connected via Bluetooth to cut down on unnecessary time in both inpatient and outpatient settings. Tracking various physiological variables and doing routine health checks are the major goals of using several sensors linked to the body. They concentrated on creating a small mobile phone with GPRS capabilities for sending data to secure networks. Uddin et al. (2012) proposal, a real-time monitoring system that is helpful in intensive care units was created. The data is assembled by this system using an Arduino Uno and body sensors before being sent to the application. This tool assists in keeping track of numerous variables that fall inside a specific range and degree of connectedness.It offers a range of IoT protocol and IoT cloud-based application-specific data transfer techniques.

This Internet of Things (IoT)-based method was suggested by Zia Uddin Ahmed and colleagues in 2019 to use wearable biomedical equipment to monitor patient health. The system has sensors connected to a microcontroller and her GSM module to warn the user or her family in case of an emergency. There are numerous hardware parts of this system that are directly attached to the patient. Additionally, clients may find this information from a variety of sources due to the fact that it is dispersed throughout numerous businesses.

Chowdhury and others Al (2011) proposed a system that connected a GSM module to a Raspberry Pi and contained a variety of different health monitoring sensors. They sought to make patient monitoring portable so that hospitals wouldn't have to worry about it. In order to update the new values and store the data in the system, a read speed of 20 seconds was attained.

Piyush Maheshwari, Amit Agarwal, and Sapna Tyagi created the concept of the Internet of Things (IOT) (2016). If all of these can be connected to the appropriate information and communication technologies, technological revolutions are anticipated in the fields of logistics, smart homes, care, and cargo surveillance. The fundamental elements and features that distinguish each IOT application are included in this post's description of IOT apps.

IoT-Based Intelligent Health Platform (2016), an Internet of Things-based health monitoring system for emergency medical services is designed and implemented in this article. The system makes use of Intel's 2nd generation galileo development board to show how IoT data may be dynamically gathered, integrated, and disseminated to support emergency medical services like nursing units. In order to reduce healthcare expenses and improve health risks, the suggested approach enables users to effectively gather, record, analyze, and share enormous data streams in real-time.

III. IOT based healthcare monitoring system

As a result of the discovery of the Coronavirus, healthcare has gained tremendous importance around the world. An IoT-based health monitoring system is therefore the ideal way to contain an outbreak of this nature. An emerging field of study called the Internet of Things (IoT) is revolutionizing the Internet, particularly in healthcare.

3**.1. Arduino UNO**

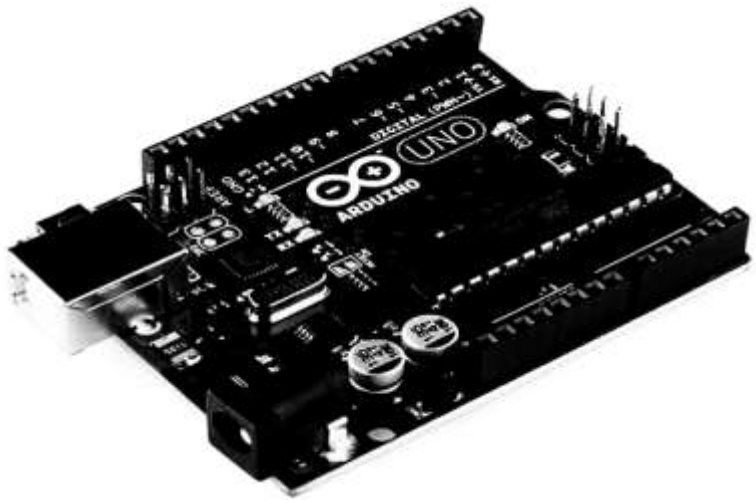

Figure 1 : Arduino UNO Board

The Arduino Uno microcontroller board is built on the ATmega328 (datasheet) as shown in figure 1. It contains a 16MHz ceramic resonator, a USB connector, a power jack, an ICSP button for connection, a reset button, and 14 digital input/output pins, six of which can be used as PWM outputs. It includes all the components required to support the microcontroller. It attaches a USB cable, AC-DC converter, or battery to a power source to begin using it. Due to the fact that it does not utilize the FTDI USB serial controller chip, the Uno differs from all previous cards. Atmega16U2 chips (Atmega8U2 versions up to R2) that support USB-serial are used.3.2. LCD

3.2. LCD

The main operating system for LCD is Liquid Crystal Display. Solid or liquid materials are used to create LCD panels as shown in figure 2. Liquid crystals are used to produce the images that may be viewed on an LCD monitor. A lot thinner displays are available with LCD technology than with cathode ray tube (CRT) technology.

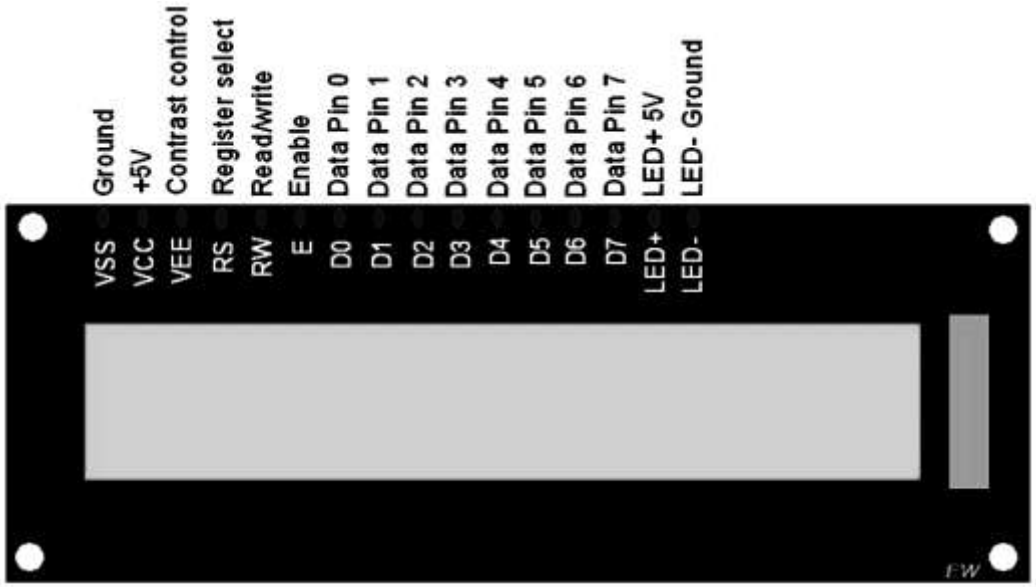

Figure 2 : LCD

3.3. MAX30100 Sensor

The MAX30100 is a sensor that can gauge both heart rate and pulse oxygen saturation. It has twin LEDs, photodetectors, enhanced optics, pulse oximetry, and heart rate signal detection, as well as low-noise analogue data processing. Software can be used to provide the MAX30100 with a relatively low standby current, enabling it to continue receiving AC power. Compatible with both 1.8V and 3.3V sources as shown in Figure 3.

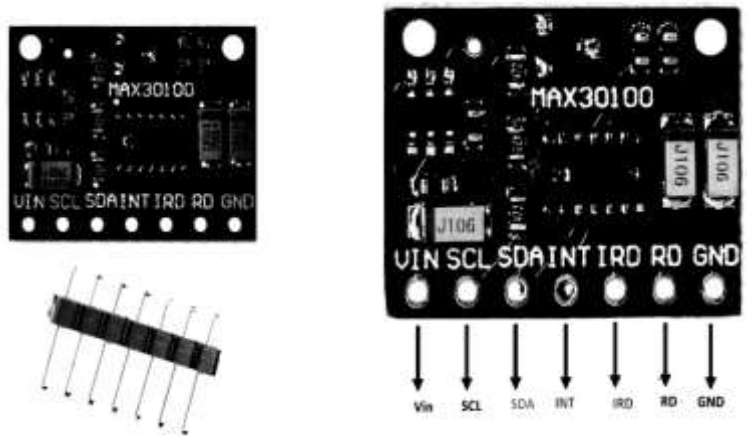

Figure 3 : MAX30100 SENSOR

3.4. BMP180 SENSOR

BMP180 sensor belongs to the BMP XXX series. They all have internal barometers that measure pressure. There is no difference between air pressure and the force that air exerts on an item, and the BMP180 sensor, which is intended for consumers, is reasonably precise. Because air is heavy, it exerts pressure that can be felt everywhere. A BMP180 sensor measures pressure and generates a digital output signal. Since temperature has an impact on pressure, temperature-corrected pressure data is necessary. The BM180 also incorporates a respectable temperature sensor to

account for this. The BMP180 has two modules. There are two modules available, one with 5 pins and the other with 4. Comparing the 5-pin module to the 4-pin module, the 5-pin module contains an extra +3.3V pin.

IV. Methodology

People are totally ignorant of their circumstances when their oxygen levels are low. Most people don't have the time or money to go to a doctor for testing. Going to the hospital is challenging for elderly persons in wheelchairs and people with limited mobility. Patients can check their blood oxygen levels and make sure their cardiac rhythms are normal using the proposed system at home. We have created several devices, including the MAX30100 sensor, the BMP180 sensor, the WiFi module, and the LCD display. The MAX30100 sensor is used to detect heart rate and oxygen saturation in this instance. The BMP180 sensor measures both blood pressure and temperature. A microcontroller that has been programmed turns on the sensor and communicates with the LCD screen.

According to Figure 4, when the people touch the sensor, the sensor responds and displays the reading. The text that appears on the screen is based on the Arduino code. In addition, it transmits data to the server via an ESP8266 WiFi module. The suggested application receives data that has been stored in the cloud. It may view and store data using the app on your mobile device. The patient receives a message outlining the emergency.

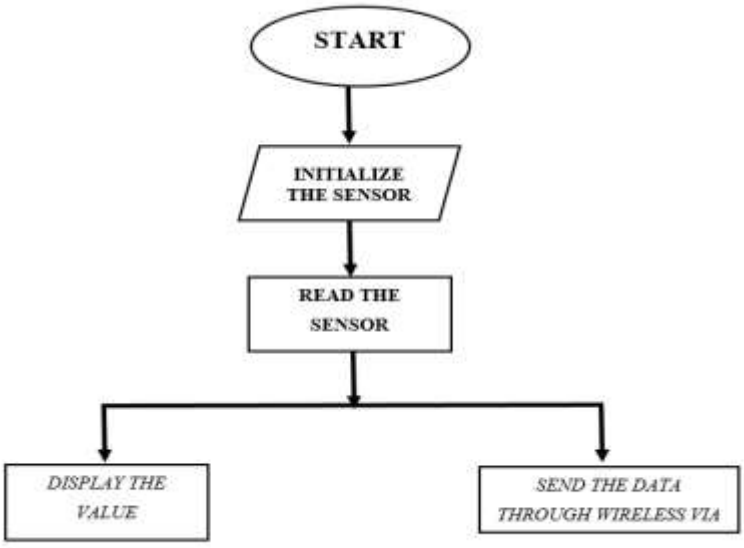

Figure 4 : Sensor Initialization

Figure.5 illustrates the block diagram of the suggested methodology. There are distinct sections in the arduino code and the wifi module. The Arduino UNO board is receiving power. The analogue pins on the Arduino board are used to connect the MAX30100 and BMP180 sensors. Input pins are supported by this analogue pin. There are 6 analogue pins on the Arduino board. After the finger has been positioned, the sensor will read the value. These numbers are shown on the LCD. In this instance, her WLAN module is used to transmit the data to the server (ESP8266 MODULE).

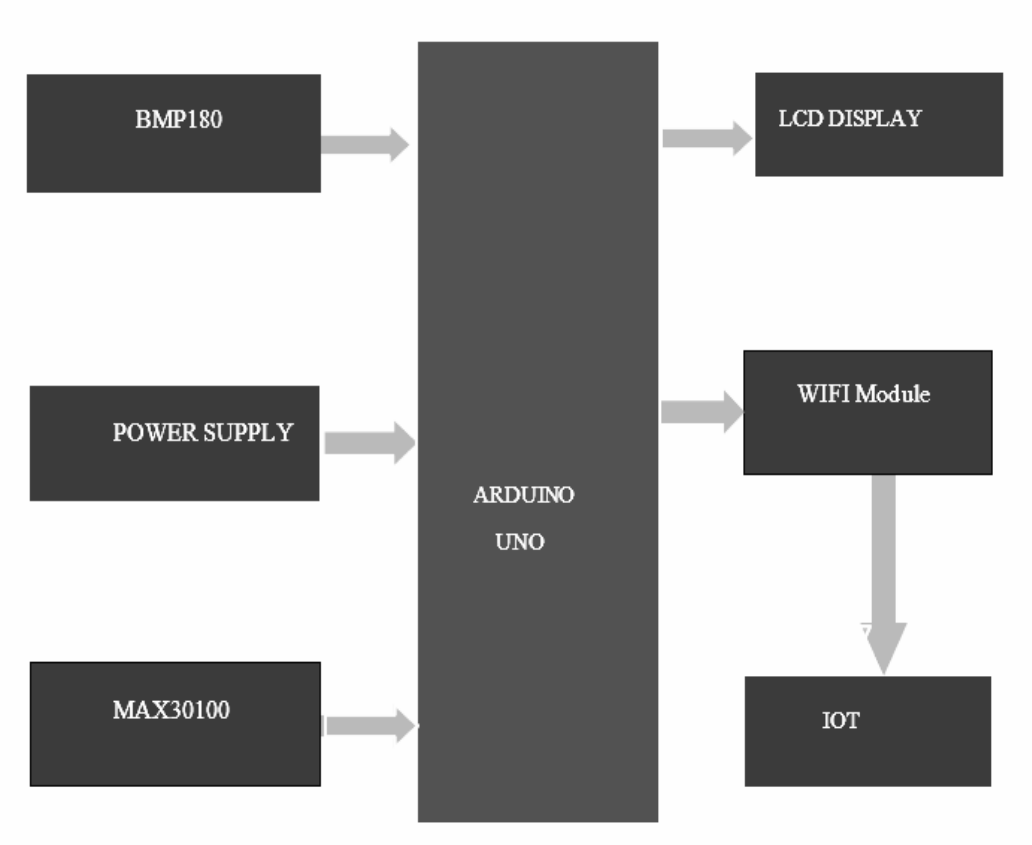

Figure 5 : Block Diagram

V. Results and Discussion

In this proposal, Arduino to analyze blood pressure, temperature and oxygen saturation level is used. It can display and store data in an application using an IoT-based healthcare tracking system. Doctors can identify patients' heart problems through this program. The data is transferred to the server using the wifi module. The Arduino UNO board is provided as a power source as shown in figure 6. The analog pin on the Arduino board is where the MAX30100 and BMP180 sensors are connected. An input pin for this analog device is used. The sensors read the values as soon as the finger is positioned. The values will be displayed on the LCD screen as illustrated in figure 6. In this case, the data is transferred to the server using the wifi module (ESP8266 MODULE) and Figure 7 indicates the mail notification for the health monitoring system.

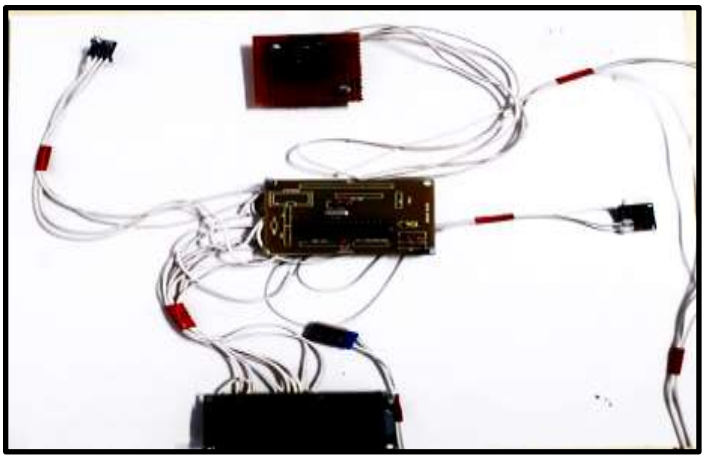

Figure 6 : Hardware Implementation

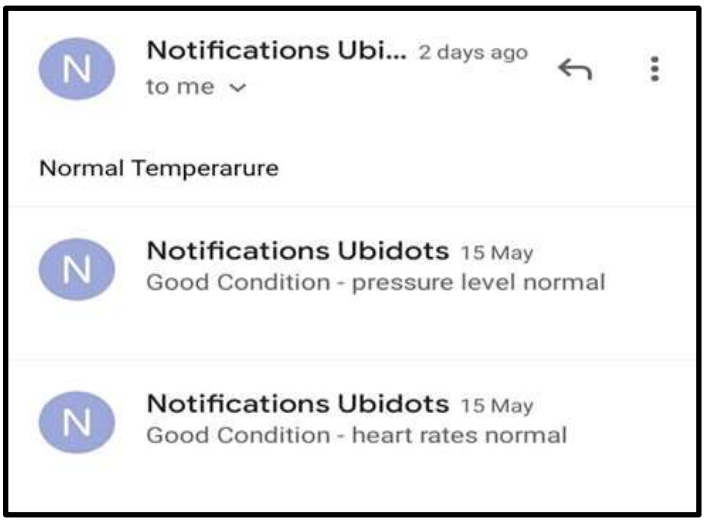

Figure 7 : Mail Notification

VI. Conclusion

In this study, IoT-based health monitoring systems are examined. Using an Arduino UNO, a sensor was used to calculate the heart rate and temperature of the patient, and update the database. It is now possible for doctors to access data using IoT. Patients' blood pressure, heart rates, oxygen levels, and heart rates are monitored by the device using specific sensors. By utilizing our solutions, doctors can save their patients from significant life loss by taking action at the right time.

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