International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 04 | April - 2023 Impact Factor: 8.176 ISSN: 2582-3930

Health Monitoring System Using Ardiuno UNO

Dr . B. Sankara Gomathi[1] ,Ms. L .Brintha [2], Ms. U .Dharshini [3] , Ms. N. Navarasna[4] ,

Mr . R .Rabin[5]

[1]Assistant professor, Department of Biomedical Engineering, Sri Shakthi Institute of Engineering and Technology, Tamilnadu, India.
[2,3,4,5]Second year students, Department of Biomedical Engineering, Sri Shakthi Institute of Engineering and Technology, Tamilnadu, India.

Abstract-The Internet of Things (IoT) is a replacement technology that connects dapper bias to the internet. IoT supports and encourages networks of fitness monitors with more frequently malfunctioning detectors inside or outside the mortal stable. The detectors determine the movements of the case as well as the knowledge of human physical and analytical characteristics. This paper intends to develop a network that provides stable blood quality and temperature using the blood quality examiner detectors LM35 and AD8232 separately. These detectors are combined and used along with the ESP8266 and Arduino UNO boards to enable wireless data transmission to the thing. Data visualisation is a result of the impact that Thing talk has had. Therefore, that account of data can be stored and accessed throughout the course of a month.

1.INTRODUCTION

Modern medicine provides a better global guardian for the case and analytical help to lessen the bias of stoic monitoring. An enhanced technique of fitness monitoring was made possible by using a microcontroller and biomedical detectors, such as temperature detectors and steady quality detectors, to cover the fitness state of the stoic fitness health on an unattached chip. The information will be streamlined on the page if there are any changes.

This notice can support situations where a new fitness challenge arises and helps to hold an applicable act in the event of movement. Holding the proper act at the proper moment is quite advantageous to the corporation in this scenario. Health is always put first in every technical advancement the human race produces. The importance of health care has increased, as evidenced by a recent corona virus outbreak that partially wrecked China's economy. In areas where the disease is prevalent, it is always preferable to monitor these people utilising remote health monitoring devices. An Internet of Things (IoT)-based health monitoring system is the current treatment for it. Health care workers are using these electronic devices to advance their work today.

IoT devices are widely used in the field of medicine. An IoT-based health monitoring system is the subject of the study presented in this paper. In particular, there are fewer doctors in rural areas of a country territory than there are in urban areas for COVID-19 patients, high blood pressure patients, hypertension patients, diabetic patients, etc. Rural areas lack easy access to medical equipment outside of government-run hospitals. In comparison to government hospitals, these clinics see a higher percentage of patients. On the basis of their reports, doctors will complete the remaining work. The IoT health-monitoring platform has made a substantial contribution to the advancement of modern medicine. And the technology we're talking about is an Internet of Things-based system for keeping tabs on patient health. In this health monitoring system, a sensor will track the patient's health status. It is smaller, more affordable, and faster. This technique allows for the measurement of the human body's temperature, heart rate, and oxygen saturation level. The application, logical, and physical layers are the three components that make up the system. It is a multiparameter monitoring device that will track oxygen saturation level, heart rate, and body temperature all at once.

2. LITERATURE SURVEY

2.1 IoT based health monitoring development and analysis

Mohammad Monirujjaman Khan et al.,2022 present the primary goal is to make things more affordable for average people. This study introduces an Internet of Things (IoT)-based solution that will streamline the use of a typically complex medical gadget at a low cost while you sit at home. All measures used to establish the patient's health parameters are subject to a 95 percent confidence interval with a 5

percent maximum relative error. The general public's employment of these devices as auxiliary aids in a particular circumstance may have a significant effect on their own life

2.2 IoT based health monitoring system

Mohit Yadav et al.., 2022 suggested the IoT-based health monitoring system in the article. This system's configuration enables remote patient monitoring and access by authorised users. Additionally, a lot of people are hospitalised in hospitals and other medical facilities, a lot of patients, and there is a chance to acquire emergency medical care, but there is no doctor available and the service is overburdened treatment.

2.3 Iot based remote health monitoring system employing smart sensor for asthma patient during COVID-19 pandemic

Nafisa Shamim Rafa et al..,2022 this study demonstrates how the creation of a remote health and environment monitoring system, specifically for asthma patients who are at an elevated risk of COVID-19, can address the present issues in the healthcare system. The suggested system is made up of a number of sensors that gather information on the user's heart rate, body temperature, ambient temperature, humidity, and air quality. This information is then processed by an Arduino microcontroller. A smartphone app is incorporated with it. The created prototype is transportable and simple for everyone to use.

2.4 Research and development of An IoT based remote asthma patient monitoring system

Monirujjaman Khan et al.., 2021 proposed the study to develop a monitoring system that will enable medical professionals to keep an eye on asthmatic patients from a distance. Through the use of several sensors and an application, the suggested system will enable patients to detect oxygen saturation (SpO2), heart rate, body temperature, humidity, volatile gases, room temperature, and electrocardiogram (ECG). An ESP8266 microcontroller that is compatible with the Arduino Integrated Development Environment (IDE) was used by the system to create the numerous sensors.

2.5 Internet of things based real time vital physiological parameter monitoring system for remote asthma patient

Khairul Islam et al.., 2022 design an IoT-based gadget that uses an ESP8266 microcontroller and various sensors to measure heart rate, room temperature, humidity, air quality, nose temperature, and oxygen saturation (SpO2). The proposed system in this study makes use of an ESP8266 microcontroller, a DHT11 temperature and humidity sensor, a MAX30100 pulse and SpO2 sensor, a MQ-135 air quality sensor, and an LM-35 temperature sensor.

2.6 Wearable sensors for remote health care monitoring system

Narendra Kumar et al..,2012 In this study, physiological data from patients was gathered using medical sensors and sent to an Intelligent Personal Digital Assistant (IPDA). In addition to offering patients with high-quality care, this study emphasises the critical role that body sensor networks play in medicine in reducing the need for carers and promoting independent living among the elderly and chronically ill. The topic of wearable and implanted body sensor networks still faces substantial obstacles and unresolved issues, which are examined and explored in this paper along with some suggested solutions.

2.7 IoT based patient health monitoring system

Swapnil Patil et al.., 2020The goal of this project is to develop an intelligent smart health monitoring system utilising an ATmega328P and several sensors. The system's goal is to create a device with sensors that can measure the human body's graphical depiction along with heartbeat, blood pressure, glucose level, and oxygen level. Sensors will transmit the appropriate data to the ATmega328P after sensing. The ATmega328P will then analyse the data and send it to the internet or an IoT cloud to be processed. The patient's data will be delivered over the internet to the hospital where they are working together.

2.8 IoT based health monitoring system

Ali Hussai,et al..,2020 This research paper presents a portable physiological monitoring system that can continuously monitor the patient's heart rate, room temperature, and other essential environmental data. They suggested a continuous monitoring and control tool to monitor patient condition and save patient data on a server using Wi-Fi Module-based remote communication. A suggested Internet of Things (IoT) system for remote health monitoring allows authorised users to access data stored on any IoT platform, and depending on the values obtained, distant medical professionals can diagnose ailments.

2.9 Review of IoT based health monitoring system

Soumya Potnis et al..,2019 This review paper aims to summarise numerous bodily health indices utilising sensors suggested by various writers. More potent IOT applications have been created in recent years, and a variety of chances have also been made available. For researchers, developing a health monitoring system has proved difficult. IOT systems have a significant role to play in reducing patients' health-related issues.

2.10 Using wearable sensors for remote healthcare monitoring system

Ademola Philip Abidoye et al.., 2011 In this study, physiological data from patients was gathered using medical sensors and transmitted to an Intelligent Personal Digital Assistant (IPDA) through the ZigBee/IEEE802.15.4 standard and a medical server via 3G connections. To optimise bandwidth utilisation and boost the transmission rate of physiologically important signals, priority scheduling and data compression were added to the system. By using less energy when transmitting, it also increases the lifespan of a hand-held personal server**.**

3.HARDWARE DESCRIPTION

The Components used in this project are

- Arduino UNO
- ESP 8266 NODE MCU
- Jumper wires
- Bread board
- Temperature Sensor
- Heart rate sensor
- LCD display

3.1 Arduino UNO

The Arduino Uno is a microcontroller chamber grounded on the ATmega328. It has 14 digital intake/affair legs(of which 6 can be applied as PWM labors), 6 analog intake, a 16 MHz ceramic resonator, a USB affinity, a grip logger, an ICSP title, and a reset key. It contains everything demanded to advocate the microcontroller; only catenate it to a computer with a USB string or grip it with an AC-to-DC appendage or array to master bolted. The Uno differs from all Antedating tables in that it does not apply the FTDI USB-string driver chip. Rather, it features the Atmega16U2 programmed as a USB-to-periodical co. With the aid of this it is workable to conduct with the PC or computer. "Uno" means one in Italian and is termed to tag the upcoming release of Arduino 1.0. Arduino club has inbuilt ADC thus there is no lack to interface accidental ADC to catenate with detector ,since last of the detector gives their affair in analog cast. This club is also bare for programming it does not bear any accidental programmer or burner to blaze the agenda in microcontroller. Since it has 32KB burst mind , the stoner’s agenda can live delivered and can so live qualified corresponding to the demand. Fig. 5 Arduino Uno Board C. Software Then the temperature and blood pulse grade are scaled applying the writing detectors. The tasted data are presented as intake to the Arduino uno microcontroller. If the values are above the threshold then alert message is given to the relatives of the patients. If the valuations measured from the detectors are below the brink value, they are displayed in the LCD. Being bring out is an independent mesh boon at lets to calm and keep detectors data in the pall and evolve internet of effects operations . being pass mesh grace provides apps that allow to assay and fantasize the data. Detector data can be also be imaged using the periodical plotter of the Arduino.

3.2 Beat grade Sensor

The beat detector is ready for use and approved for Arduino. The detector's cap, which resembles a blood stain, makes contact with our stable's similar surface. a worldwide opening situation on the front hand where the LED illuminates from the back. An ambient glow detector, which resembles a quadrate shape, is accessible under the LED. The detector observes and reads the quantum of light detector response, and when the LED illuminates on a fingertip or other surface, it reveals the degree of blood palpitation.

3.3 Temperature detector LM35

Temperature sensors come in a wide variety of forms. Non-contact temperature sensors measure an object's temperature without making direct touch with it, whereas contact temperature sensors must make contact with the physical object being monitored. Infrared (IR) sensors are frequently used as non-contact temperature sensors. They detect an object's IR energy from a distance and transmit a signal to a specially calibrated electronic circuit to get the temperature of the object. Temperature sensors are tools that measure temperature and sense coolness and heat, converting the information into an electrical output. A temperature sensor is also known as a straightforward device that monitors how cold or hot something is and then translates that measurement into a readable quantity. To detect the temperature of boreholes, dirt, massive concrete dams, or structures, specialised temperature sensors are employed. The voltage across the diode's terminals is how temperature sensors function. The voltage between the terminals of the transistor 9's base and emitter in a diode then decreases. Additionally, there are temperature sensors that operate under the premise that variations in temperature lead to changes in stress.

The LM35 is an analogue direct temperature detector. Every oC increase or decrease in temperature causes a 10mV variation in the affair voltage. It can operate with a 5V or 3.3V power supply with ease, and the standby current is less than 60uA.

3.4 ESP8266-01

The truemoment Operating network(RTOS) and Wi-Fi mound permit the processing grip to live accessible for stoner operation programming and elaboration. It is absorbed with a 32-atom Tensilica processor, average digital supplemental interfaces, antenna whips, grip amplifier, tropical blare admit amplifier, pollutants and power operation modules. All of them are carried in one slim pack ESP8266 achieves tropical grip consumption with a compound of several personal technologies. The grip delivering armature features three modes of assignment: working mode, deadness mode and bottomless deadness mode. This allows battery powered arrangements to trip lengthy ARDUINO UNO POWER SUPPLY TEMP SENSOR HEART RATE SENSOR LCD THINK SPEAK OUTPUT ESP8266 is able of performing constantly in artificial surroundings, due to its fat operating temperature range.

3.5 LCD

represents a liquid crystal display. It is a particular type of electronic display module used in a wide array of circuits and devices, including mobile phones, calculators, computers, TVs, and other electronics. These displays are mostly preferred for seven segments and multi-segment light-emitting diodes. The main advantages of adopting this module are its low cost, ease of programming, animations, and unlimited display options for unique characters and even animations.

The pinout for a 162 LCD is listed below.

- Pin 1 (Ground/Source Pin) connects the microcontroller's GND terminal to the display's GND pin or to a power source.
- Pin 2 (VCC/Source Pin): This is the display's voltage supply pin, which is utilised to link the power source's supply pin.
- Pin3 (V0/VEE/Control Pin): Used to connect a switchable POT that can supply 0 to 5V, this pin controls the display's difference.
- Pin 4 (Register Select/Control Pin) switches between the command and data registers. It is used to connect a microcontroller unit pin and receives either 0 or 1 (where 0 corresponds to the data mode and 1 to the command mode).
- Pin 5 (Read/Write/Control Pin), which is attached to a microcontroller unit pin to receive either 0 or 1, toggles the display between reads and writes.
- Pin 6 (Enable/Control Pin) is connected to the microcontroller unit and is always held high in order to carry out the Read/Write process. Pins 7 through 14 (Data Pins): You can transfer data to the display using these pins. Two-wire configurations, such as the 4-wire and 8-wire modes, are used to connect these pins. In 4-wire mode, the microcontroller unit, such as 0 to 3, only has four pins linked, whereas in 8-wire mode, the microcontroller unit, such as 0 to 7, has eight pins connected.
- Pin 15 (the LED's positive pin) is connected to +5V.
- Pin 16 (the LED's negative pin) is connected to GND.

3.6 JUMPER WIRES

It is possible to short-circuit and jump to the electrical circuit by connecting a jumper wire to the circuit. In this project, jumper wires are used.

● **MALE-MALE** configuration

● **MALE-FEMALE** configuration

● **FEMALE- FEMALE** configuration

3.7 BREAD BOARD

A breadboard, often known as a protoboard, is a construction platform for electronics experimentation. The solderless breadboard is reusable because soldering is not necessary. This makes it simple to utilise for developing temporary prototypes and conducting circuit design experiments. Earlier breadboard models lacked this characteristic. It is difficult to reuse a prototyping circuit board like a stripboard (veroboard), which is used to create one-off or semi-permanent soldered prototypes

4 . SOFTWARE DESCRIPTION

4.1. ARDUINO DEVELOPMENT ENVIRONMENT

Write, compile, and upload code to practically all Arduino Modules using the Arduino IDE, an open-source programme created by Arduino.cc.

• Because it is official Arduino software, code compilation is so simple that even the average individual with no prior technical expertise can get started learning.

• It runs on the Java Platform and is compatible with all operating systems, including MAC, Windows, and Linux. The Java Platform has built-in functions and commands that are essential for debugging, modifying, and compiling the code.

• A variety of Arduino modules are available, including the Uno, Mega, Leonardo, Micro, and many others.

Several Arduino modules are available, including the Uno, Mega, Leonardo, Micro, and many others.

• After being developed on the IDE platform, the main code, often referred to as a sketch, will eventually produce a Hex File that is transmitted and uploaded into the controller on the board.

• The IDE environment primarily consists of two fundamental components: the Editor and the Compiler. The Editor is used to write the necessary code, and the Compiler is used to compile and upload the code into the provided Arduino Module.

Both C and C++ are supported in this environment.

• There are primarily three parts to the IDE environment.

Output Pane

• Text Editor

• Menu Bar

• Programmes created with the Arduino Software (IDE) are referred to as sketches. The text editor is used to create these sketches, which are then saved with the file extension.

• The editor offers functions for text replacement and text searching.

• The console shows text generated by the Arduino Software (IDE), together with additional information and detailed error messages. You may create, open, and save sketches, validate and submit programmes, view the serial monitor, and more using the toolbar buttons.

setup () is a programme startup function that is used to initialise settings.

Until the board turns off, the function loop () is called again. The top bar is referred to as the Menu Bar and offers the following five options.

• File - You can create a new window or reopen an existing one to write the code. The number of additional categories into which the file option is divided are displayed in the following table.

• When you click the upload button, the Output Pane will display the code compilation as you go to the preference area and verify the compilation section.

• Edit - Used to copy and paste the code with additional font modifications.

• Sketch - For programming and compilation

Tools are primarily employed in testing projects. A bootloader is burned to the new microcontroller using the Programmer part of this panel.

• Help - If you are unsure about the software, full online assistance is provided, from getting started to troubleshooting. Collections of Collections

• Interaction (1235)

Device control (994); Data processing (313); Data storage (154);

Sensors (1152), Other (467), and Display (483)

Input/Output Signals (429)

Libraries

• Communication (1235)

• Data Processing (313)

• Data Storage (154)

• Device Control (994)

• Display (483)

• Other (467)

• Sensors (1152)

• Signal Input/Output (429)

4.2. EMBEDDED C LANGUAGE

Most of the syntax and semantics found in standard C are used by embedded C, including the main() function, variable definitions, datatype declarations, conditional statements (if, switch case), loops (while, for), functions, arrays and strings, structures and unions, bit operations, macros, etc.

• It is employed in fields like automotive, industrial automation, consumer, aerospace, and medical applications for programming microcontrollers and processors. Because it is a low-level language with direct access to the hardware, it is appropriate for creating applications that must communicate with the hardware directly. Because of its reduced memory footprint than other languages, it is perfect for usage in memory-constrained applications. Additionally, reliable and effective software can be produced using embedded C.

5. METHODOLOGY

• Design: Designing the system is the initial step in creating an IoT wearable-based health monitoring system. Determining the overall system architecture, hardware elements, and data processing algorithms are all included in this. This design has taken reliability and safety into account.

• Sensor Selection: The IoT-based health monitoring system's next step is to choose the sensors that will be employed. This entails taking into account elements including accuracy, precision, sensitivity, cost, and system design compatibility.

• Signal Processing: To gain useful data regarding the glucose levels, the signals from the sensors must be processed and analysed after they have been chosen. Algorithms for signal conditioning, filtering, and feature extraction are frequently used in this procedure.

• Data Storage and Analysis: The processed data must subsequently be kept in a safe database and subjected to appropriate algorithms, such as beer lambert's law and fizzy algorithms, etc. Artificial neural networks or other machine learning techniques may be used in this study to find patterns and connections between the data and the pressure level.

• User Interface: The creation of a user interface, which enables people to access and analyse the data, is the last phase. This might include mobile applications, websites, or other user-friendly interfaces.

A pressure sensor is an electronic device that detects, regulates, or monitors pressure, and converts perceived physical data into an electronic signal.

The ESP Module, an Internet of Things module based on a microcontroller, is based on the ESP32 platform and has many of the same fantastic features as our IoT Module.A pulse wave is produced when the volume of a blood artery changes as the heart pumps blood.

6. DESIGN AND IMPLEMENTATION

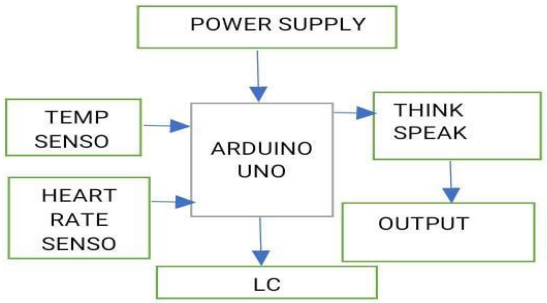

Fig 1 BLOCK DIAGRAM

6.1 Interfacing heart rate sensor and temperature sensor ,LCD display with Arduino UNO

- Connect the Arduino UNO to the power supply
- The Heart rate sensor is connected to the pins of gnd VCC and A1.
- The temperature sensor is connected to gnd ,5V and A0.
- The 12C LCD data lines are connected to the pins A4 and A5.
- Program the Arduino board to receive the input from sensors and display.
- Program the Arduino board to display in the LCD display.
- Once the components are interfaced properly,test the complete system by measuring the pulse rate and temoerature value.

7. RESULT

The outcome is presented on the LCD while we hold our finger on the temperature and pulse sensor, which senses the person's temperature and pulse.

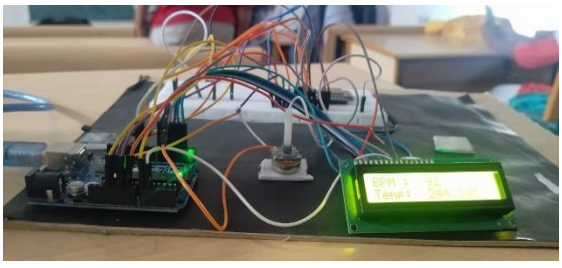

Fig 2 OUTPUT

8. CONCLUSION

This project presents a straightforward, low-cost health monitoring device for patients at risk of heart attack, unexpected accidents, and emergency situations. Because of its capacity to perform multiple tasks at once and low power requirements, ATmega328P is chosen for this application. Additionally, this system is simple to install in every ambulance, and the database can accommodate a large amount of data that is collected. Furthermore, this information has great value. Additionally, we studied embedded C programme for simulation, which has various issues. The workload for the doctor is lessened, and the outcomes are precise.

9. REFERENCE

1. Mohammad Monirujjaman Khan, Turki M. Alanazi, Amani Abdulrahman Albraikan, and Faris A. Almalki : "IoT based health monitoring development and analysis";2022
2. Mohit Yadav, Aditya Vardhan, Amarjeet Singh Chauhan, Sanjay Saini: "IoT based health monitoring system"; 2022
3. Nafisa Shamim Rafa,Basma Binte Azmal,Abdur Rab Dhruba,**Mohammad Monirujjaman Khan**,Turki M. Alanazi,Faris A. Almalki,and Othman AlOmeir : " Iot based remote health monitoring system employing smart sensor for asthma patient during COVID-19 pandemic" : 2022
4. Safayat Reza Anan,Md. Azizul Hossain,Md. Zubayer Milky,Mohammad Monirujjaman Khan**,**Mehedi Masud,and Sultan Aljahdali : " Research and development of An IoT based remote asthma patient monitoring system" ; 2021
5. Khairul Islam,Farabi Alam,Abid Ibna Zahid,Mohammad Monirujjaman Khan,and Muhammad InamAbbasi : "Internet of things based real time vital physiological parameter monitoring system for remote asthma patient" ;2022
6. Narendra Kumar3 , Alok Aggrawal2 and Nidhi Gupta1 C.M.J. University, Shillong1,3 , JIIT, NOIDA" wearable sensors for remote health care monitoring system" ;2012
7. S.M.Sabbir Ahamed,Ashiqur Rahman Emu, "Heart beat sensor for system for remote health monitoring" ;2021
8. Swapnil Patil ,Prachi Patil,Mugdha Salvi,Gaurav parab"IoT based patient health monitoring system" ;2020
9. Ali Hussain ,Prajoona Vaisalan,Ahamed Tariq"IoT based health monitoring system" ; 2020
10. Soumya Potnis ,Akkasaligar,Shambhavi Tollur "Review of IoT based health monitoring system" ;2019
11. Ademola Philip Abidoye,Nureni Ayofe Azeez,Ademola Olusola Adesina,Kehinde K.Agble,Henry O.Nyongesa "Using wearable sensors for remote healthcare monitoring system