IOT-BASED HEART ATTACK DETECTION AND HEART RATE MONITOR AND TEMPERATURE MONITORING SYSTEM

Sadman Rafi
American International University-Bangladesh (AIUB)
Dhaka, Bangladesh
20-42708-1@student.aiub.edu

Mahdi Iftida Bin Khalid
American International University-Bangladesh (AIUB)
Dhaka, Bangladesh
18-38720-3@student.aiub.edu

Roman Khan
American International University-Bangladesh (AIUB)
Dhaka, Bangladesh
18-37962-2@student.aiub.edu

Pritha, ISRAT JAHAN. American International University- Bangladesh (AIUB)
Dhaka, Bangladesh
18-39023-3@student.aiub.edu

MD. FARHAN HOSSAIN
American International University-Bangladesh (AIUB)
Dhaka, Bangladesh
18-37774-2@student.aiub.edu

RAHIB BIN SAADAmerican International University- Bangladesh (AIUB)
Dhaka, Bangladesh
18-38736-3@student.aiub.edu

MEHEREIN AFROZ
American International University Bangladesh (AIUB)
Dhaka, Bangladesh
18-37689-1@student.aiub.edu

MD.ASIFUR RAHMAN
American International University-Bangladesh (AIUB)
Dhaka, Bangladesh
19-39618-1@student.aiub.edu

Abstract— Monitoring your heart rate is essential for keeping your heart healthy. People of different ages have different pulses; the checking system must be capable of handling this situation. In this project, we show that how we can detect the heart rate through the pulse sensor. When we touch the pulse sensor LED light will blink and measure our heartbeat and Temperature also. We measure the temperature with a Temperature sensor. And we will see our heart rate and temperature on the LCD Display on our Android smartphone by using Wi-Fi Module. The user has the option to establish a heartbeat restriction that is both high and low. When the patient's heart rate exceeds a predetermined threshold, the system sends a notification to the controller, which then broadcasts this over the internet.

Keywords—Heart rate sensor, Temperature Sensor, LCD Display, Monitor, Android smartphone, WIFI module, potentiometer, LED-1.

1. Introduction

Heart attacks are becoming a common cause of death for many people. Blocking the flow of blood to the heart might cause heart failure. We could not save the lives of many people because of the late discovery of the incident. We cannot save the lives of many people because someone often diagnoses heart attacks too late. Most individuals in our nation know little about health. And they experience catastrophes. We are all aware of how impoverished Bangladesh is. Therefore, if we create an app that can detect our pulse rate, individuals will be prevented from passing away too soon. It used to be quite rare for someone under the age of 40 to have a heart attack, but now those under 40 make up one in every five heart attack patients. Another unsettling data to highlight the problem is: A heart attack is more likely to occur in your 20s or early 30s. In this study, we use a Wi-Fi module and a blinking LED light to identify an IOT-based heart rate monitor. The normal heart rate for an adult in good health is 60 to 100 bpm (beats per minute Depending on one's fitness, the heart rate ranges from 40 to 60 beats per minute. A person is considered to have a higher heart rate, also known as tachyarrhythmia if their heart rate is over 100 beats per minute. It can reduce the heart's effectiveness by lowering the volume of blood pumped through the body, which can cause chest discomfort and dizziness.

I. Ease of Use

2.1Project Objectives

This cardiac detection and heart rate monitoring technology is the Internet of Things-based. In this application, an IOT-based Wi-Fi module is used to measure both the temperature and the pulse rate. We make use of a monitor LCD play. These are the main goals of our project.

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2.2A brief outline of the report

In this study, an IoT-based system for heart rate monitoring and anomaly detection is proposed. Most heart-related disorders nowadays need to be treated with ongoing and long-term monitoring. IoT is helpful in this area since it replaces traditional monitoring systems with a more effective scheme and makes vital information about the patient's condition accessible to the doctor from any location, over the internet. The real-time monitoring system allows the hospital's on-call nurses or doctors to monitor the patient's heart rate on the serial monitor. This is a common technology that enables doctors who need to monitor patients from a distance and keep track of them. This technology enables both heart rate monitoring and internet-based heart attack alerts. It may monitor the patients at the distant institution who are at home.

In this Internet of Things-based application, we first measure the temperature before detecting the heart. It has an LCD screen and LED light. With each heartbeat, an LED light blinks, and a connected Wi-Fi module allows us to view our heart rate on a mobile device. And that makes it quite simple to measure our body temperature and heart rate.

3. Literature Review

Elderly patients should visit the doctor to discuss their test findings and health symptoms. Essential indications must be observed because they are the primary indicators of one's health. The body's temperature and pulse rate are two of these vital markers. The aim is to create a low-power, more dependable, unobtrusive, and necessary signs monitor that collects body data and transmits parameters. Patients, Human-Wellbeing observing units, a cloud for information management, and security are all included in the proposed Human-Wellbeing checking/watching system. With the use of a few equipment pieces, several sensors, and web-connected devices.

The system functionality is divided into three major modules; they are:

A. Sensing module

B. The Main module and

C. Interaction module.

The sensing module's temperature and pulse sensors should be able to take precise measurements and relay the information to the Arduino. I must send the values to the server via the Wi-Fi module, which is also a component of the sensing module, with no lag time or data loss. All the data transmitted by the Wi-Fi module must be stored on the server before being displayed on the web server. developed a system that detects the patient's body temperature and human heartbeat and communicates the information to the user or server end using a microcontroller at a reasonable cost. Use two distinct sensors that are managed by a microcontroller.
Use your fingers to measure human heartbeats; the units are in beats per minute (bpm) (beats per minute). These computer rates will be sent over a Wi-Fi module over the internet and stored on a server. I have displayed the computed human heartbeat rate using liquid crystal displays (LCD). Use the LM35 sensor to measure the human body temperature. By calculating the temperature of the human body and comparing it to blood pressure, you can determine whether a heart attack is occurring. They provide the measured data to the transmitter module, which transmits them to the server to reduce the usage of cables. The server-stored data will be provided for a doctor or professional to further analyze to give greater help.

project-related published journal papers within the year 2018 to 2022

Sr. No	Title of Papers	Year	Sensors and Technology Used
1	A Pulse Rate-Triggered Wearable Device for Critical Assistant	**2022**	alarm mount, pulse sensor, buzzer, Node MCU, Arduino Uno, Wi-Fi module
2	IoT- Based Smart Health Monitoring System for COVID-19	**2022**	inbuilt ADC, blood pressure sensor, contactless temperature sensor, and oximeter.
3	Development of Smart Healthcare Monitoring System in IoT Environment	**2020**	Heart Beat Sensor, Body Temperature Sensor (LM35), Room Temperature Sensor (DHT11), CO Sensor (MQ-9), CO2 Sensor (MQ-135)
4	Heart Rate Monitoring and Heart Attack Detection	**2019**	GSM MODEM, heart rate sensor, AT89C52 MCU, Arduino Uno
5	IoT-Based Heart Attack Detection and Alert System	**2028**	Analog sensor, wireless module, E CG leads, AVR microcontroller

4. Methodology and Modeling

4.1. Introduction

With the use of a sensor, this device can measure temperature and pulse. The doctor can set the threshold for each metric. When these parameters exceed their maximum value, the system sends a wireless notification to the server. The rapid development of electronic gadgets, such as smartphones and tablets, which may be used for physical or wireless communication, has made them a necessary part of daily life in the modern era of communication and technology. To determine the current heartbeat level and show it on the LCD panel, the system uses a heartbeat sensor. The transmitting circuit uses a microcontroller from the AVR family that is connected to an LCD screen and is powered by a 12V transformer. Like the sending circuit, the receiving circuit features a 12V transformer, an AVR family microcontroller, and an RF receiver. The receiver circuit also has an LED light and a buzzer that is used to warn the person watching the patient's heartbeat rate. The LED light and buzzer switch on as soon as the patient's heartbeat level deviates from

the typical heartbeat level established. We are implementing this technology throughout all hospital rooms. A single operator can watch all the patients while sitting in one area.

4.2. Working principle of the proposed project

The heart rate monitoring and heart attack detection system that will be built using the onboard Wi-Fi module is described in this project. The ability to transmit patient information to a doctor or other healthcare practitioner as well as in an emergency makes remote monitoring such a successful technique for delivering urgent treatment. The suggested heart rate monitoring system offers an effective monitoring system that uses IOT technologies to track the patient's heartbeat in real time and with no medical personnel at any location. The data value, performance, efficiency, accuracy, speed of system operation, and output outcomes are all increased by IoT technology. Data transmission, analytics, and visualization have all benefited from the usage of sensors, as has real-time processing. This suggested method involves seeing and analyzing patient behavior within the home; We can study patients in any circumstance with no limitations. Anyone may use the suggested system due to its simple handling and user-friendly operation.

4.2.1. Process of Work

The suggested method excels in identifying heart attacks by using the internet of things-based heart rate monitoring. Our approach makes use of an Arduino board, a pulse sensor, and a Wi-Fi module. Following the system setup, the pulse sensor will detect heart rate measurements and will show the person's heartbeat on an LCD screen. The Wi-Fi module will broadcast the data over the internet. The system has a predetermined point that may compare a person's heartbeat against to determine whether they are healthy. Following the establishment of these restrictions, the system will keep track of the patient's heart rate. As soon as the heart rate crosses a predetermined threshold, the system will send an alarm message. As a part of this project, we are putting an Android application model into action that will track a patient's heartbeat, monitor it, and alert users to the possibility of a heart attack.

4.3. Description of the components

A. The Arduino Uno
A board for microcontrollers is called Arduino Uno. It has an ATmega328 basis. In addition, there are six PWM outputs among the 14 digital input and output pins. We use RX and TX pins for serial communication between an Arduino board, a computer, or other devices. It operates at a 5V voltage. For storing code, the AT mega 328 contains 32KB of flash memory. The ICSP (in-circuit serial programming) header will enable us to upload software to our microcontroller unit using an external programmer.

The heart rate sensor for Arduino is a plug-and-play device. Anyone may use it if they only want to include real-time heart rate data in their initiatives. When a finger is placed on the sensor, it shows the flow of blood via the finger and produces a numerical output of the heartbeat.

C. Node MCU ESP 8266
The ESP8266 is a very affordable system on a chip that is built into every Node Microcontroller Unit (Node MCU), an open-source system for hardware and software expansion. We used Node MCU in our system to transport data received from Arduino over the internet.

D. **ESPB266 Wi-Fi Module**
A self-contained SOC with an integrated TCP/IP protocol stack, the ESP8266 Wi-Fi Module enables any microcontroller to connect to your Wi-Fi network.

E. Bread Board
A breadboard is a tiny plastic board used to contain wired-together electrical components such as transistors, resistors, and chips.

F. LM35 Temperature sensor
The LM35 is a three-terminal analog type temperature sensor whose output voltage changes with temperature changes. Here, we will look at how to connect an Arduino to a temperature sensor to show output on an LCD. It can gauge temperatures starting at between -55 and +150 degrees Celsius. With every degree Celsius increase in temperature, the LM35's output voltage rises by 10mV. A 5V source is required to run the LM35.

G. 10K Ohm Variable Potentiometer
Potentiometer 10K This variable or adjustable resistor has three terminals and is PCB mountable. As the preset is turned, the voltage between the terminals changes. We use variable resistors in circuits to change the voltage as needed.

H. Jumper wire
A jumper wire is an electric cable used to link distant printed circuit board electric circuits. It is possible to short-circuit and jump to the electrical circuit by connecting a jumper wire to the circuit.

4.4. Implementation:

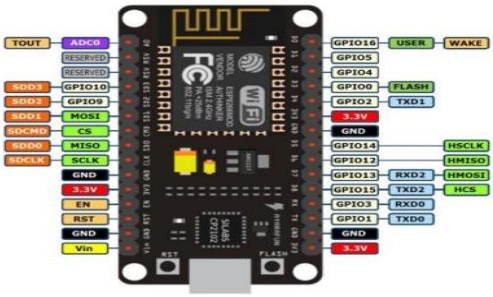
A. The Arduino Uno

Figure.4.4. A. Arduino Uno board

B. Pulse Sensor

Figure.4.4. B Pulse Sensor with Arduino

C. Node MCU ESP 8266



D. LM35 Temperature sensor

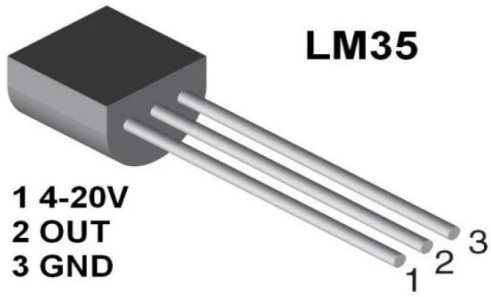


Figure.4.4. D. LM35 Temperature sensor

E. 10K Ohm Variable Potentiometer

Figure.4.4. E.10K Ohm Variable Potentiometer

4.5. Experimental setup

In this work, a human heartbeat rate monitoring and control system employing a heart pulse sensor and Internet of Things-based technology is designed and put into practice. This sensor picks up heartbeats from people. It detects and interprets the heartbeats as data signals. The microcontroller processes the read data before sending it through Wi-Fi to the internet server platform for additional analytics and visualization. With the date and time, the data was recorded, and the data is processed and stored in real-time.

The input, output, and processing components make up the system architecture that is being suggested. The user's fingers, a heart-rate sensor, a power source, and a user interface unit are the input devices. The liquid crystal display (LCD) and the Wi-Fi Module unit are the output units. The processing unit, often known as the monitoring and control unit, is the microcontroller.

The ATmega32p microprocessor manages the system, while embedded we use C for programming. Embedded C programs are used to program and operate the sensor and other devices. The heart pulse sensor detects the heartbeat. The analog to digital converter (ADC), which converts the sensor's detected data into a digital signal, receives it. The microcontroller receives the digital signal after conversion.

According to the embedded C language instructions, the microcontroller responds to the signal. The LCD panel receives the processed data and displays it for the user's information. The data is further broadcast in real-time to the Wi-Fi module and the website for additional analytics and visualization. Someone updates synchronously the state of the human cardiac rate in real-time in the processed and visible data. Figure 4.5 shows how the suggested system architecture is laid out.

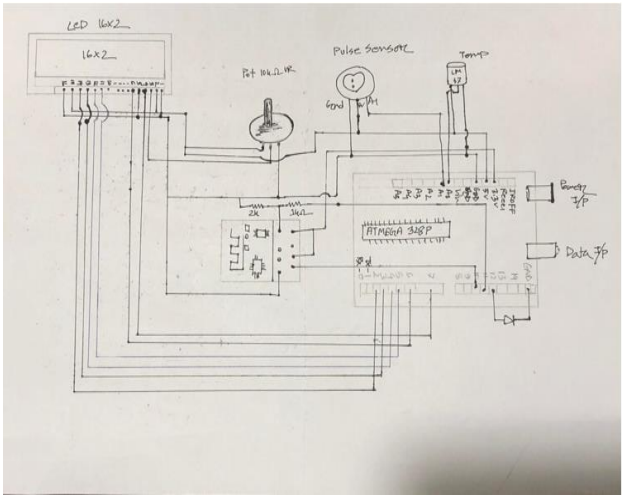


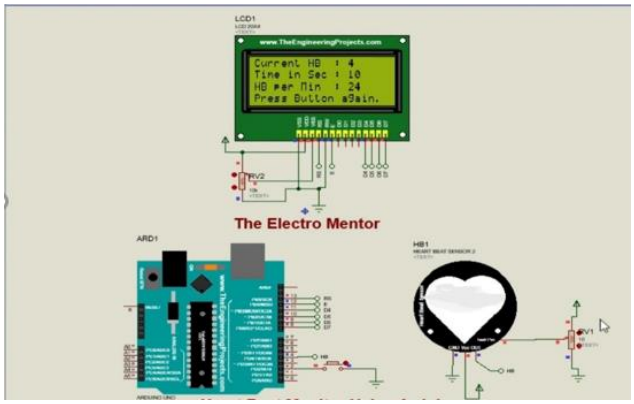
Figure.4.5. Illustrates the proposed system architecture.

5. Cost Analysis

Component name	Prize (BDT)
Arduino Uno R3	1140*1=1140
ESP8266 ESP-0l WIFI Wireless Transceiver Send Receive LWIP AP+ STA M70	200*1=200
LM35 Temperature Sensor	95*1=95
10K Ohm Potentiometer	20*1=20
Heart Rate Pulse Sensor Module For Arduino	399*1=399
Jumper Wire Single Medium – Jumper WIRE Type: Male to Female	3*15=45
Blue LED 5MM (Pack of 5)	5*5=25
16X2 Serial LCD Module Display For Arduino Assembled	395*1=395
Kilo Ohm ¼ W Resistors- Pack of 5	5*4=20
TOTAL	**2340 TK**

6. Results

6.1. Simulation



6.2. Experimental result

6.3 Comparison

Age	Gender	BPM	TEMPERATURE
21	MALE	92	97F
35	MALE	84	98F
26	FEMALE	90	101F
32	FEMALE	54	103F

6.4 Limitations

We had an extremely limited amount of time to implement all aspects of our system for the project showcase. Some of our equipment, including one of our sensors, had an IC issue and suffered damage. We had little time to fix such mistakes.

7. Conclusion and future endeavors

This system develops a real-time heart rate monitoring and heart attack detection system using the Internet of Things. The suggested design, which is helpful to patients of all ages, provides real-time heart health monitoring. It also ensures the confidentiality and security of the patient's data. Using the MQTT and IFTTT protocols, we implement the proposed design as a real-time monitoring system that aids in giving the patient immediate medical attention. It included an alarm system and location tracking in the design as additional elements. To provide security, privacy, and low latency, a local server is also used. We encountered a few small issues during system construction, such as certain devices not functioning or not having enough time to expand our range of pulses. We hope that we can fix these mistakes and develop a system that would be utilized in many urban and rural locations, which would benefit society and result in more lives being saved

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