Heart Rate Monitoring & Detection System

Amey Patil[1], Subodh Deshmukh[2], Ajay Mhatre[3], Prof. Rajeshri Aneesh[4]

[1,2,3,4]Department of Computer Engineering, Pillai HOC College of Engineering and Technology, Rasayani, Maharashtra, India

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Abstract - *In this project, will try to reduce the number of heart diseases, including increasing the risk of heart disease. Also, the system alerts for lower heartbeats. Thus, the heart rate is monitored for the concerned patient and an alert of heart attack is generated if the conditions seem suspicious. Initially lower and higher heart beat levels are set depending upon the age and activity levels of the concerned person. In our proposed system user's sensor that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The first setting will be taken from relatives in discussion with help of doctors. Graphical visualization tools have been used to display the various aspects of the patient's heart and to monitor the steadiness as per needed/demanded length of time.*

Key Words: **Heartbeat Sensor, Arduino UNO, LCD Display, Resistors, Capacitors, Transistors, Cables and Connectors, PCB and Breadboards, LED, Push Buttons.**

1. INTRODUCTION

We have more heart disease these days, including an increased risk of heart attacks. Our proposed system uses sensors that allow detection of a person's heart rate using heart rate detection even if the person is at home. The sensor connects to a microcontroller that allows you to check your heart rate readings and transmit them over the Internet. User can set high and low heart rate limit levels. After setting these limits, the system starts monitoring and as soon as the patient's heart rate exceeds a certain limit, the system sends an alert to the controller, which transmits it to the Internet and warns the doctors and users concerned. In addition, the system warns for lower heart beats. Whenever the user accesses the monitor, the system also displays the patient's live heart rate. Therefore, data subjects can monitor their heart rate and immediately receive a heart attack alert for the patient from anywhere and the person can be saved on time.

2. LITERATURE SURVEY

Title of Paper	Year	Sensors and Technology Used
IoT based Heart Attack Detection, Heart Rate and Temperature Monitor	2017	Heart rate Sensor, Arduino Uno
Heart rate monitoring and Heart attack detection using wearable Device	2016	Smart band, AVR microcontroller
Heartbeat Sensing and Heart Attack Detection using Internet of Thing	2017	GPS, GSM Controller
IOT Based Heart Attack Detection and Alert System	2017	Analog sensor, ECG leads
IoT on Heart attack detection and heart rate monitoring	2016	Big Data Analytics, temperature sensor

2.1 PROPOSED WORK

Some serious diseases and disorders e.g. Following the diagnosis of heart failure requires a close and continuous monitoring process to prevent secondary damage to secondary diseases or disorders. These types of patients are monitored, usually in hospitals or health centres. For example, cardiac arrhythmia in many people Things, often require long-term monitoring. However, patients can be issued very quickly as another patient on the waiting list needs to be hospitalized immediately.

2.2 EXISTING SYSTEM

Nowadays, heart rate monitoring is maintained in hospitals and used in many publics as well as private places etc. This is a compact device and can be taken anywhere easily. Heart rate devices can be combined with other devices such as microcontrollers, MATLAB software, and other appropriate hardware and software.

3. METHODOLOGY

The heart rate sensor circuit diagram includes a light detector and a bright red LED. If detected by the finger detector in the LED, the LED should be of super bright intensity so that the maximum light passes and spreads.
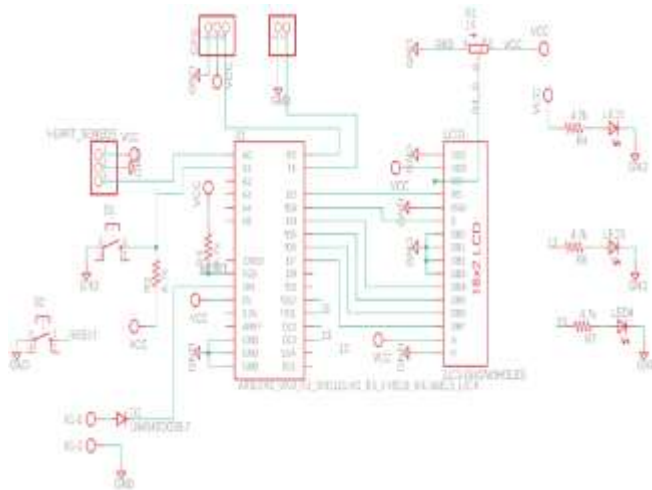

Fig. Heart rate Monitoring and Detection System

Now, when the heart pumps blood through the blood vessels, the finger becomes a little more translucent; For this reason, there is less light from the LED to the detector. As each heart pulse is generated, the detector signal becomes more diverse. Multiple detector signals are converted to electrical pulse. This electrical signal is amplified and triggered by an amplifier that outputs the + 5V logic level signal. The output signal is also guided by a blinking LED display at the heart rate.

Electrocardiogram (bpm)	HRM device (bpm)	Error Rate (%)
76	78	2.56
78	78	0
76	72	5.56
82	84	2.38
83	84	1.19
85	90	5.56
77	84	8.83
79	84	5.95
89	96	7.29
88	90	2.22

TABLE: - ACCURACY COMPARISON WITH AN ECG.

3.1 COMPONENTS: -

1. Arduino UNO: -

Arduino uno, it is a microcontroller board. It is based on ATmega328. Moreover, there are 14 digital input and output pins of which six can be usage as PWM outputs. RX and TX pins are utilized for communication between Arduino board, computer or additional devices for serial communication. It has operating voltage of 5V. The AT mega 328 has 32KB of flash memory for storing code. The ICSP (in-circuit serial programming) header will permit us to use an outside programmer to upload software to our microcontroller unit

2. Heartbeat Sensor Module with Probe (finger based): -

Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. It works on the principle of light modulation by blood flow through finger at each pulse

3. GSM Module: -

SIM800 is a complete Quad-band GSM/GPRS solution in a SMT type
which can be embedded in the customer applications. SIM800 support Quad-band 850/900/1800/1900MHz, it can transmit Voice, SMS and data information with low power consumption. With tiny size of 24*24*3mm, it can fit into slim and compact demands of customer design. Featuring Bluetooth and Embedded AT, it allows total cost savings and fast time-to-market for customer applications.

4. GPS Module: -
A USB GPS Module built using the MT3329 chipset from MediaTek Inc. This GPS module comes with a patch antenna and has good sensitivity wand tracking capability. It can track 66 channels. Its outputs data in standard NMEA format at an update rate of 1 second at 9600 bps. The module comes with USB and Serial TTL Interface.

5. 330Ω Resistor (Optional – for LCD backlight)

6. Push Button

7. Connecting Wires

8. LCD 16*2

4. RESULTS AND ANALYSIS

After setting up the system, check all connections. When the system is ready, load the source code. After loading the code, place your index finger on the heart rate sensor. The heart rate sensor will start monitoring your pulse rate. The LCD screen is used to display the calculated heart rate.
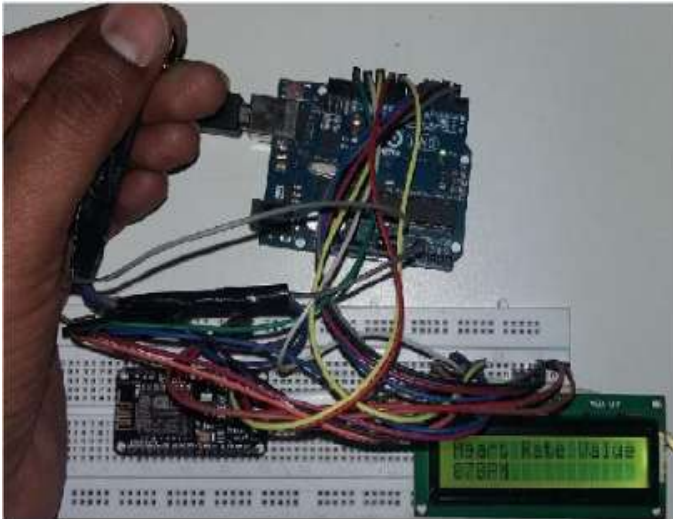

Fig. Pulse rate display on LCD Screen Figure

The system configured the maximum heart beat range. Once the system starts measuring your human heart rate, if it exceeds the set limit, the system will send you a heart rate warning. In addition, the system warns of a lower heart rate.

Fig. Heart alert message display on LCD Screen

Fig. Counting Pulse rate

The sensor reading will be uploaded to the server where the data will be stored. The readings will be constantly updated providing the extension to constantly see the patient

5. CONCLUSION

In this Project we have attempted to propose a paper on detecting heart attack by monitoring the heartbeat of person. The heart beat sensor connected to the microcontroller detects people's heart beats and transmits them over the Internet using the Wi-Fi module. The system allows you to set heart rate limits. After setting these limits, the person can start monitoring their heart rate and whenever the person's heart rate exceeds a certain set point, they can receive a warning about the high heart rate and also about the possibility of a heart attack. In addition, the system warns you to reduce heart beats.

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