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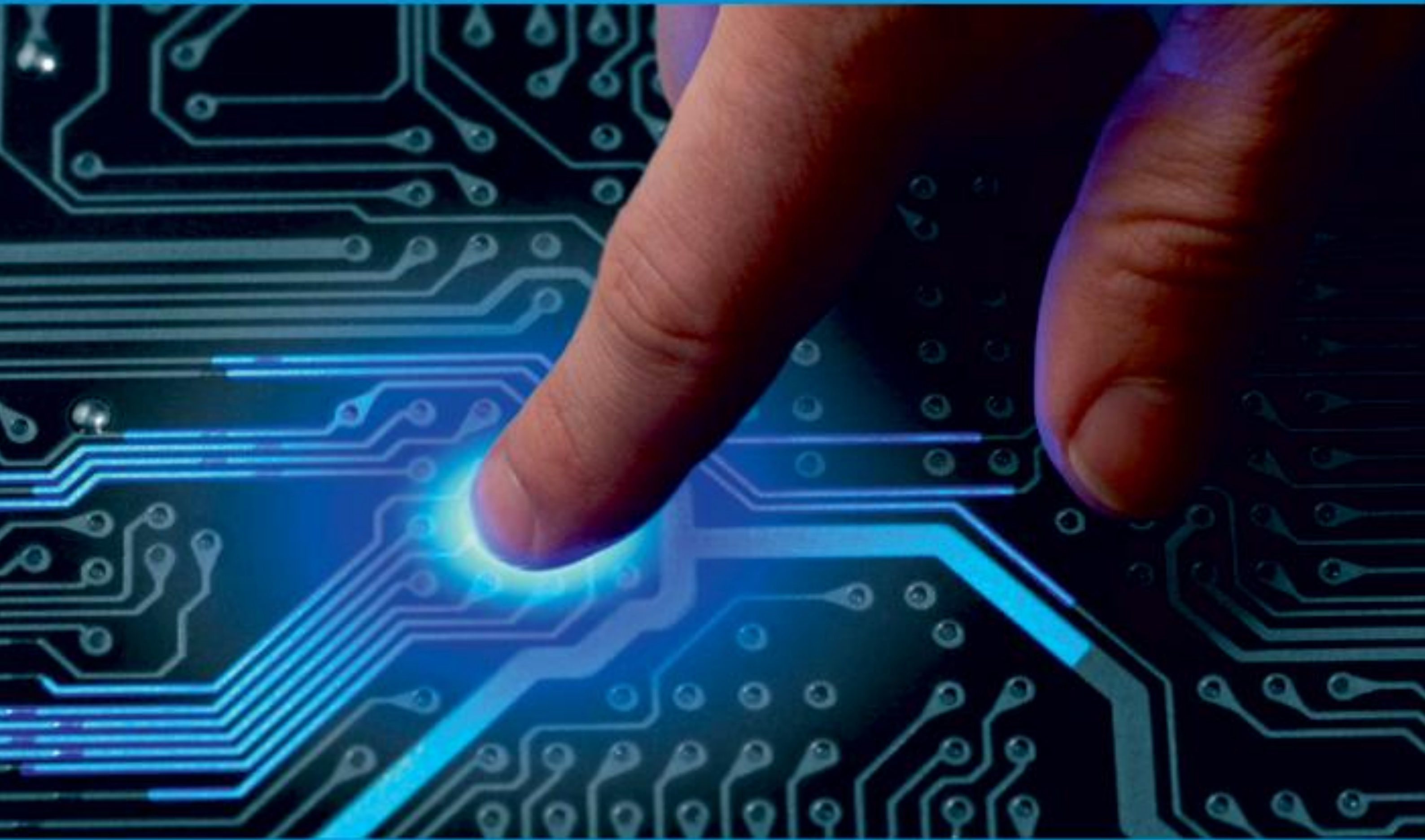

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Heart Rate Measurement Device Using Wireless System

Radhika K. Kulkarni[1]*, Sarita V. Verma[2]

PG Student, Department of Electronics and Telecommunication Engineering, Maharashtra Institute of Technology, Aurangabad, Maharashtra, India[1]

Professor, Department of Electronics and Telecommunication Engineering, Maharashtra Institute of Technology, Aurangabad, Maharashtra, India[2]

ABSTRACT: Monitoring heart rate is very important for athletes, patients as it determines the condition of the heart (just heart rate). There are many ways to measure heart rate and the most precise one is using an Electrocardiography, but the more easy way to monitor the heart rate is to use a Heartbeat Sensor. It comes in different shapes and sizes and allows an instant way to measure the heartbeat. Heartbeat Sensors are available in Wrist Watches (Smart Watches), Smart Phones, chest straps, etc. The heartbeat is measured in beats per minute or bpm, which indicates the number of times the heart is contracting or expanding in a minute. In this paper we have discussed how we monitor the heart beat by pulse oximetry technique, an innovative technique to measure the heart beat measurement.(OkeogheneEnalume 2017) This is achieved by pulse oximetry logic. We use this technique to get the pulse from body and to amplify the signal and display this data on the LCD.

KEYWORDS: Heart beat sensor, DHT 11-temperature and sweat measurement. Emergency switch, Adriano cloud IOT platform.

I. INTRODUCTION

Heart rate indicates the soundness of our heart and helps assessing the condition of cardiovascular system In clinical environment, heart rate is measured under controlled conditions like blood measurement, heart voice measurement, and Electrocardiogram (ECG) [4] but it can be measured in home environment also . Our heart pounds to pump oxygen-rich blood to our muscles and to carry cell waste products away from our muscles. The more we use our muscles, the harder our heart works to perform these tasks- means our heart must beat faster to deliver more blood. A heart rate monitor is simply a device that takes a sample of heartbeats and computes the Beats per Minute (bpm) so that the information can easily be used to track heart condition.

The average resting human heart rate is about 70 bpm for adult males and 75 bpm for adult females. Heart rate varies significantly between individuals based on fitness, age and genetics. Endure athletes often have very low resting heart rates. Heart rate can be measured by measuring one's pulse. Pulse measurement can be achieved by using specialized medical devices, or by merely pressing one's fingers against an artery (typically on the wrist or the neck). It is generally accepted that listening to heartbeats using a stethoscope, a process known as auscultation, is a more accurate method to measure the heart rate . There are many other methods to measure heart rates like Phonocardiogram (PCG), ECG, blood pressure wave form and pulse meters but these methods are clinical and expensive. There are other cost-effective methods that are implemented with sensors as proposed in and but they are susceptible to noise and movement of subject and artery.

A pulse oximeter is a particularly convenient non-invasive measurement instrument. A pulse oximeter measures the amount of oxygen in a patient’s blood by sensing the amount of light absorbed by the blood in capillaries under the skin. In a typical device, a sensing probe is attached to the patient’s finger with a spring-loaded clip or an adhesive band. On one side of the probe is a pair of Light- Emitting Diodes (LEDs), and on the other side is a photodiode. One of the LEDs produces red light, and the other produces infrared light. Pulse oximetry depends on the optical characteristics of hemoglobin, the blood protein that carries oxygen. When hemoglobin is more highly oxygenated, it becomes more transmissive to red light and more absorptive to infrared light. When hemoglobin contains little oxygen, it becomes relatively more transmissive to infrared, and more absorptive to red light. This property means that by measuring the ratio of red light to infrared light passing through the patient’s finger, the probe can produce a signal proportional to the

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amount of oxygen in the blood. In addition, the surge of blood on each heartbeat generates a signal representative of the patient's pulse rate.

II. PROBLEM STATEMENT

In the Patient Monitoring also needs to detect emergencies and inform medical personnel when they occur. Conventional Patient Monitoring monitors the physiological signals constantly but they are not provided to the medical personnel in real-time and In some hospital patient monitoring system not use, The problem found in such hospitals is that continuous monitoring of physiological parameters is done for ICU patients, but the monitors are local to the room in which the patient is admitted. Physician has to frequently visit the patient and asses his/her condition by analyzing the measured parameter such as temperature, blood pressure, pulse oximeter, E.C.G. and heart rate. In case of emergencies, the nurse intimates the Doctor through some means of communication like mobile phone. A growing selection of innovative electronic monitoring devices is available, but meaningful communication and decision supports are also needed for both patients and clinicians. There has to be a mechanism by which the physician at any instant of time and update himself of patient's health status and also take control action remotely if he desires. This can be a serious problem during emergencies because the patient's life may be in danger if immediate attention is not provided. Another problem with conventional Patient Monitoring is that most are bulky standalone machines. Some models are connected to networks but they are usually hard-wired.

III. LITERATURE SURVEY

Steven Lawrence Fernandesa et.al [1] In the last few years researchers have focused more on non-intrusive based frameworks to measure Heart Rate. This is because of the ease and lack of expense in utilization. RGB videos are used by most of the non-intrusive based systems as it is appropriate for experiments. However, there exists some challenges before they can be implemented in real time applications. Heart rate monitoring using RGB videos is inefficient in outdoor environment because light has significant impact on RGB videos. This approach introduces a heart rate measuring strategy using LAB color facial video. Here we have to note that blood circulation causes variation in facial skin color and heart rate can be extracted through these variations. Heart rate is subsequently measured and compared with a reference measurement. This technique has noteworthy potential for advancing telemedicine, health of a person and numerous applications where information is needed on a real time basis.

Johan Bhurny Bathilde1 et.al [2] Detection of atrial fibrillation is done by checking the variations in the period of the heart rate, if a patient has atrial fibrillation then the period between each heart beat will vary. A light-based sensor can be used to detect these variations in heart rate; this is done by using Photoplethysmography (PPG) sensor which is non-invasive. The sensor consists of a LED with a photodetector and is able to detect the variations in blood volume or blood flow in the body and directly correlates to heart rate. The detected signal needs to be amplified and filtered as the signal contains a lot of high frequency noise as well as low frequency motion artifacts. The benefits of compact low-cost Wi-Fi module can be harnessed to develop a wireless continuous heart rate monitoring system enhancing possibility of atrial fibrillation detection

AbdelakramHafid, Sara Benouar et.al [3] — Impedance Cardiography (ICG) is a non-invasive method for monitoring cardiac dynamics using Electrical Bioimpedance (EBI) measurements. Since its appearance more than 40 years ago, ICG has been used for assessing hemodynamic parameters. This paper present a measurement system based on two System on Chip (SoC) solutions and Raspberry PI, implementing both a full 3-lead ECG recorder and an impedance cardiographer, for educational and research development purposes. Raspberry PI is a platform supporting Do-It-Yourself project and education applications across the world. The recording were wirelessly transmitted through Bluetooth to a PC, where the waveforms were displayed, and hemodynamic parameters such as heart rate, stroke volume, ejection time and cardiac output were extracted from the ICG and ECG recordings. These results show how Raspberry PI can be used for quick prototyping using relatively widely available and affordable components, for supporting developers in research and engineering education. The design and development documents, will be available on www.BiosignalPI.com, for open access under a Non Commercial-Share A like 4.0 International License.

Ningning Xiao a et.al [4] Aiming at the shortcomings of traditional health monitoring equipment, such as large size, not easy to carry, this paper proposes a wearable heart rate monitoring intelligent sports bracelet monitoring system based on the Internet of things, which is used to monitor the user's changes in the human heart rate during sports. Through the Internet of things technology, ZigBee wireless sensor, Bluetooth and other communication technologies, data will be transmitted to personal terminal PC or only mobile phone for realtime monitoring, storage and analysis. The

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Internet of things communication network technology is used to transmit the data to the monitoring terminal platform. After the processing and analysis of the data, the abnormal data will be given an alarm in time to realize the monitoring of the heart rate health status of mobile personnel in the process of movement.

Muhammad Mhajna, MsC et.al [5] Access to prenatal care can be challenging due to physician shortages 71 and rural geography. The multiple prenatal visits performed to collect basic fetal 72 measurements leads to significant patient burden as well. The standard of care tools for 73 fetal monitoring, external fetal heart rate monitoring with cardiotocography, as used 74 today, must be applied by a medical professional in a healthcare setting. Novel tools to 75 enable a remote and self-administered fetal monitoring solution would significantly 76 alleviate some of the current barriers to care.

Fengyu Wang et.al [6] —Heart Rate Variability (HRV), which measures the fluctuation of heartbeat intervals, has been considered as an important indicator for general health evaluation. The exact time of heartbeats is estimated by finding the peak location of the heartbeat signal while the Inter-Beat Intervals (IBIs) can be further derived for evaluating the HRV metrics of each target. We evaluate the system performance and the impact of different settings including the distance between human and the device, user orientation, incidental angle and blockage. Experimental results show that mmHRV can measure the HRV accurately with a median IBI estimation error of 28ms (w.r.t. 96.16% accuracy). In addition, the Root-Mean-Square-Error (RMSE) measured in the Non-Line-of-Sight (NLOS) scenarios is 31.71ms based on the experiments with 11 participants. The performance of the multi-user scenario is slightly degraded compared with the single-user case, however, the median error of the 3-user case is within 52ms for all 3 tested locations.

Utkarsha P.et.al [7]This paper describes an approach to design a cheap, accurate and reliable device which can easily measure the heart rate of a human body. In this project heart rate signal can be found using the fingertip sensor .After getting the signal, it is amplified, because the signal amplitude is very low. This is done using amplifier circuit. Then the amplified signal is counted by the counter using microcontroller. Finally, the signal is transmitted by the RF transmitter. After transmitting the heart beat signal, it is received by the RF receiver. Then this signal will be displayed on 16 X 2 LCD.

HasmahMansor, et.al [8] This paper presents a design of portable heart rate monitoring system which is part of a project called Home-smart Clinic. Home-smart Clinic is developed in order to connect medical personnel and patients remotely. Remote health monitoring system is beneficial to the patients and society where the implementation of such system will save hospital bill, waiting time and reduce traffics in the hospital. The prime objective of this paper is to design and develop heart rate measurement device for which real time data could be observed by the doctor via internet. History data could also be acquired; therefore the doctor can interpret the trend of the data to identify the conditions of the patients. In the proposed health monitoring system, heart rate and body temperature wireless sensors were developed, however this paper only focus on heart rate monitoring system. The main components involved in this project are pulse sensor, microcontroller (Arduino with Ethernet shield), and wireless communication device (Xbee). The portable heart rate measurement device was tested to a group of voluntary students. Results showed that the real-time heart rate reading successfully monitored locally (at home) and remotely (at doctor's computer).

IV. PROPOSED SYSTEM

If small Patient Monitoring could be connected to a network wirelessly, patients would be able to move around freely while their physiological signals are monitored. Thus, medical personnel could be informed about a patient's critical condition regardless of their whereabouts and they could be treated promptly if an emergency occurs. Furthermore, portable devices can be integrated into the Healthcare environment and used to develop novel applications. Thus, we developed a portable embedded device that can monitor the condition of patients in real time using four biomedical sensor network such sensor is pulse oximeter (SPO2), thermometer, respiration, blood pressure (BP), heart rate and electrocardiogram (ECG) and provide various physiological signals via wireless communication so that the physiological signals may be monitored remotely Based on the graphic display (android Smartphone) and web, using Web Server and Database subsystem we can take physiological signals data any where in the word at any time and this device detect emergencies and inform medical personnel when they occur. Thus, medical personnel could be informed about a patient's critical condition regardless of their whereabouts and they could be treated promptly if an emergency occurs.

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V. SYSTEM DESIGN

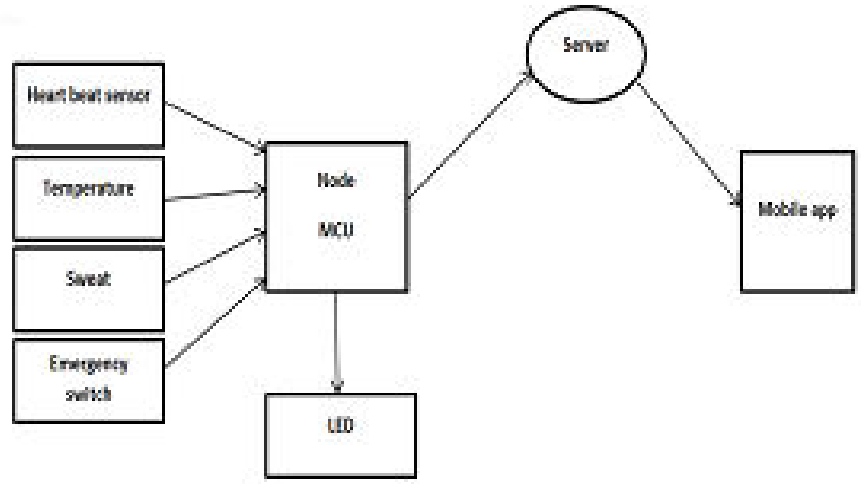

Fig1.Block diagram of a system

A. Heart beat sensor:

Heartbeat Sensor is an electronic device that is used to measure the heart rate i.e. speed of the heartbeat. Monitoring body temperature, heart rate and blood pressure are the basic things that we do in order to keep us healthy.

Monitoring heart rate is very important for athletes, patients as it determines the condition of the heart (just heart rate).There are many ways to measure heart rate and the mostprecise one is using an ElectrocardiographyBut the more easy way to monitor the heart rate is to use a Heartbeat Sensor. It comes in different shapes and sizes an allows an instant way to measure the heartbeat.

Heartbeat Sensors are available in Wrist Watches (Smart Watches), Smart Phones, chest straps, etc. The heartbeat is measured in beats per minute or bpm, which indicates the number of times the heart is contracting or expanding in a minute. A person’s heartbeat is the sound of the valves in his/her’s heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heartbeat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse.

B.Two Ways to Measure a Heartbeat

Manual Way: Heartbeat can be checked manually by checking one’s pulses at two locations- wrist (the radial pulse) and the neck (carotid pulse). The procedure is to place the two fingers (index and middle finger) on the wrist (or neck below the windpipe) and count the number of pulses for 30 seconds and then multiplying that number by 2 to get the heartbeat rate. However, pressure should be applied minimum and also fingers should be moved up and down till the pulse is felt.Using a sensor: Heart Beat can be measured based on optical power variation as light is scattered or absorbed during its path through the blood as the heartbeat changes.

c..DHT11

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin (no analog input pins needed). It's fairly simple to use but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, so when using our library, sensor readings can be up to 2 seconds old.

It used for the measurement of the temperature and the sweat of the human body.

DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.

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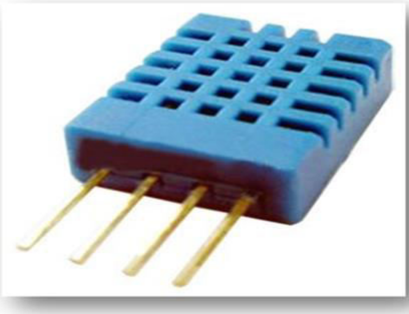

Fig 2.DHT11 Temprature and humidity sensor.

D.Working of a Heartbeat Sensor

The basic heartbeat sensor consists of a light-emitting diode and a detector like a light detecting resistor or a photodiode. The heartbeat pulses cause a variation in the flow of blood to different regions of the body. When tissue is illuminated with the light source, i.e. light emitted by the led, it either reflects (a finger tissue) or transmits the light (earlobe). Some of the light is absorbed by the blood and the transmitted or the reflected light is received by the light detector. The amount of light absorbed depends on the blood volume in that tissue. The detector output is in the form of the electrical signal and is proportional to the heartbeat rate.The module uses an infrared led (IR) and a photo transistor to detect the pulse of the finger and whenever a pulse is detected, red led flashes. There will be led on the light side of the finger and a photo transistor on the other side of the finger. Photo transistor is used to obtain the flux emitted. The resistance of the photo resistor will change when the pulses will change.

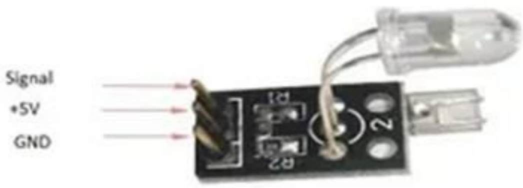

Fig.3Heat pulse sensor Pin Out

E. PIN DECRIPTION

The heart beat sensor module has three pins
1.Signal: This will be connected to the analog pin of the Arduino
2.5V: This will be connected to the 5V pin of the Arduino
3.GND: This will be connected to the ground of the Arduino
A simple Heartbeat Sensor consists of a sensor and a control circuit. The sensor part of the Heartbeat Sensor consists of an IR LED and a Photo Diode placed in a clip.
The Control Circuit consists of an Op-Amp IC and few other components that help in connecting the signal to a Microcontroller. The working of the Heartbeat Sensor can be understood better if we take a look at its circuit diagram.

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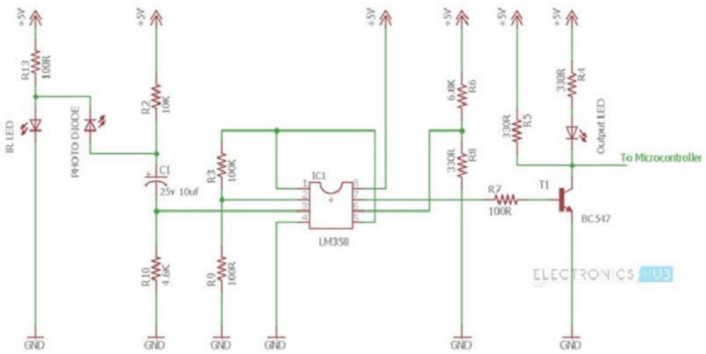

Fig. 4.circuit of a finger type heart beat sensor

The above circuit shows the finger type heartbeat sensor, which works by detecting the pulses. Every heartbeat will alter the amount of blood in the finger and the light from the IR LED passing through the finger and thus detected by the Photo Diode will also vary.The output of the photo diode is given to the non – inverting input of the first op – amp through a capacitor, which blocks the DC Components of the signal. The first op – amp cats as a non – inverting amplifier with an amplification factor of 1001.The output of the first op – amp is given as one of the inputs to the second op – amp, which acts as a comparator. The output of the second op – amp triggers a transistor, from which, the signal is given to a Microcontroller like Arduino.
The Op – amp used in this circuit is LM358. It has two op – amps on the same chip. Also, the transistor used is a BC547. An LED, which is connected to transistor, will blink when the pulse is detected.

F.NODE MCU

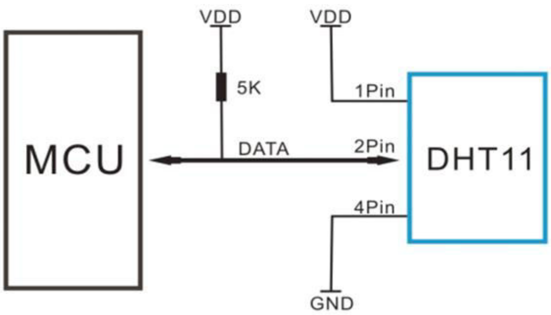

Fig5. NODE MCU

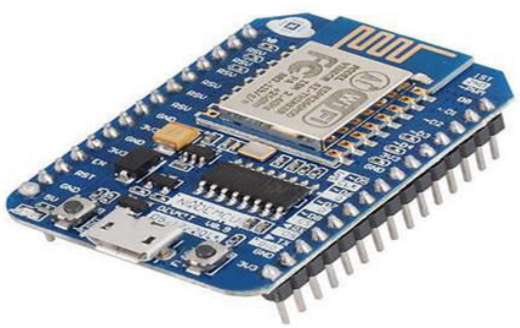

Fig6.Node MCU Development Board/kit v0.9 (Version1)

Node MCU is an open-source LUA based firmware developed for the ESP8266 wifi chip. By exploring functionality with the ESP8266 chip, Node MCU firmware comes with the ESP8266 Development board/kit i.e. Node MCU Development board.Both the firmware and prototyping board designs are open source.[8]The firmware uses

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the Lua scripting language. The firmware is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson[9] and SPIFFS.[10] Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna. The choice of the DIP format allows for easy prototyping on breadboards. The design was initially based on the ESP-12 module of the ESP8266, which is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications

VI. IMPLEMENTATION

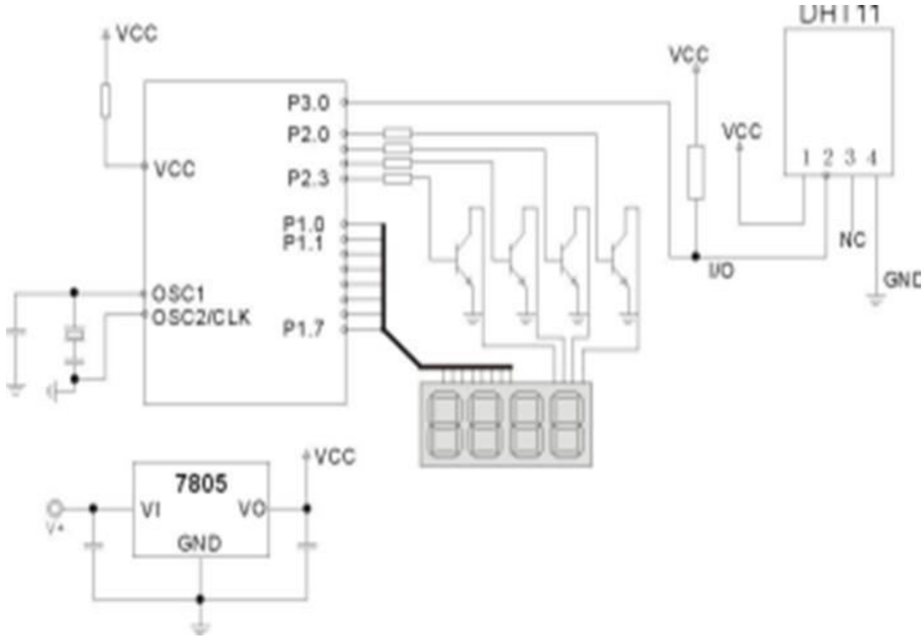

Fig7. Typical circuit diagram of a model.

I.DECRIPTION OF CIRCUIT

Connecting the typical application circuit shown above the microprocessor and DHT11, DATA pull-up and microprocessor I/O port.

1. A typical application circuit recommended cable length shorter than 20 meters with a 5.1K pull-up resistor when greater than 20 meters when the pull-up resistor to reduce the actual situation. 2. When using a 3.3V voltage supply cable length must not be greater than 100cm. Otherwise it will lead to lack of line drop sensor supply, causing measurement bias.

3. Temperature and humidity values are read out every last measurement result, want to get real-time data, to be read twice in a row, but not recommended repeatedly read sensors, each sensor reading interval of more than 5 seconds to obtain accurate data.

II Performance parameter

Resolution	16Bit
Repeatability	±1%RH
Accurancy	25℃ ±5%RH
Interchangeability	Fully interchangeable
Response time	1/e (63%)25℃ 6s 1m/s Air 6s
Hysteresis	<±0.3%RH

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Long –term stability	<±0.5%RH/yr
Repeatability:	±1℃
Accuracy	25℃ ±2℃
Response time	1/e (63%) 10S
VDD supply	3.3 ~ 5.5V DC
DATA	serial data, single-bus
. GND grounding	power negative .

A pulse oximeter measures the amount of oxygen in a patient's blood by sensing the amount of light absorbed by the blood in capillaries under the skin. In a typical device, a sensing probe is attached to the patient's finger with a spring-loaded clip or an adhesive band. On one side of the probe is a pair of Light- Emitting Diodes (LEDs), and on the other side is a photodiode. One of the LEDs produces red light, and the other produces infrared light. Pulse oximetry depends on the optical characteristics of hemoglobin, the blood protein that carries oxygen. When hemoglobin is more highly oxygenated, it becomes more transmissive to red light and more absorptive to infrared light. When hemoglobin contains little oxygen, it becomes relatively more trans missive to infrared, and more absorptive to red light. This property means that by measuring the ratio of red light to infrared light passing through the patient's finger, the probe can produce a signal proportional to the amount of oxygen in the blood. In addition, the surge of blood on each heartbeat generates a signal representative of the patient's pulse rate(Dwivedi 2014). Since the output of the photodiode is a low amplitude current, some signal conditioning must be applied before it can be used. Operational amplifier is an ideal choice for use in a resistor-feedback trans impedance amplifier configuration. This configuration is also used convvse communications link to a dator, in the car

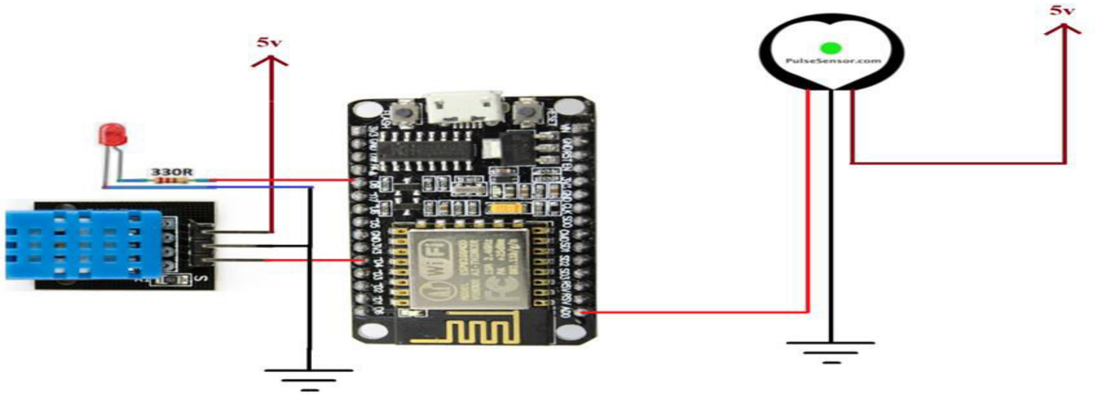

Fig8. System model

I. Pulse detection

A pulse (heartbeat) detector in heart rate monitors consist of the two parts: a pulse sensing unit and a heart rate displaying unit . Our device uses two red LEDs and a photo-sensor to measure ones heart rate through the change of blood reflectivity on the index finger. The power transmitted by the LEDs is matched with the photo sensor in such a way that the resistance will vary within the range of the photo sensor after attenuations through the index finger. Since attenuations vary depending on the person using the device, our specifications assume that the attenuation is, 80 percent, on average, of the light transmitted. A resistance network is used with the sensor to transform the changes in resistance to the changes in voltage. The voltage created varies between 0 and 10 mV with respect to each heart pulse. Fig. 1

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shows a clip sensor which consists of two high intensity LEDs that illuminate the tissue and a Light Detective Resistor (LDR) whose resistance changes according to the amount of light transmitted from the tissue.

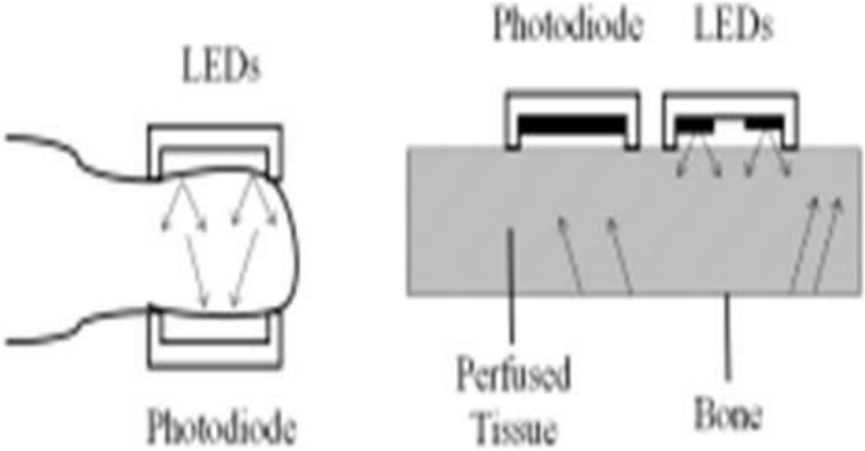

Fig.9 . Finger positioning on the HRM device

IISignal Extraction

We used a band pass filter to remove any interference caused by ambient light and level detection distortions. The filter used will have a cutoff frequency of 2.5 Hz to allow a maximum heart rate of 125 bpm to be measured by the device with accuracy. This roll off provides an attenuation of 60Hz, by 23.5dB. The pulse has a –14 dB Signal to Noise Ratio (SNR) before it passes through the filter. The pass-band kofrequencies are amplified by a factor of 40 dB with a small signal amplifier. We used DC blocking to prevent immeasurable pulses caused by a high DC offset from ambient light.

III. Pulse Amplification

The extracted signal is analyzed by an amplifier to provide a pulse of high amplitude to be fed into the microcontroller input. The amplifier detects the peak of each pulse and creates a corresponding pulse of high amplitude. This stage of the design requires that the amplified and filtered heart pulse signal have a SNR of 20 dB to obtain a clean pulse of high amplitude. The time between each successive rising of high amplitude pulse edge is interpreted by the microcontroller as the period between each heart pulse. To detect signal amplification an LM358 is used and the heart signal is amplified twice after passing through band pass filter (Fig. 2). Finally, we get the amplified output that the microcontroller uses it as its input and calculates the heart rate.

VII. RESULT AND DISCUSSION

a.Performance analysis

The input for Node MCU Heart beats measurement are very accurate output on our mobile device and also gives the output of the sweat measurement is very accurate. When we press the emergency switch the output of the Node MCU is LED is on. This is all information goes to the server correctly and the we gives the correct output on our mobile phone. We gives accurate pulses of heart beat on our mobile phone. In this system Ardino IOT Cloud platform is used and therefore we gate accurate measurement of the heart rate. We get output of this project on the mobile phone screen. Output is seen on screen of the phone is out temperature, sweat and the

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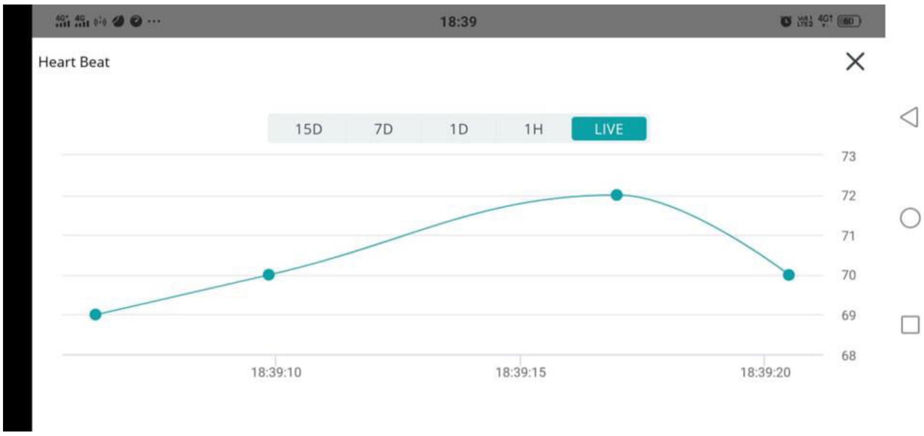
In above fig we see the accurate temperature measurement of the human body. These means our result get 99.8% accurate.



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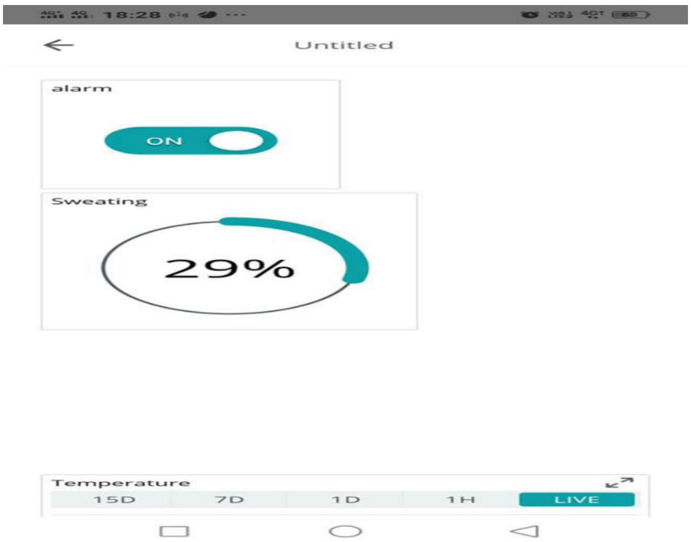
In above fig we see the accurate Heart beat measurement of the human body. These means our result get 99.8% accurate. We gives this output on our mobile phone.



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In above fig we see the accurate sweating measurement of the human body. These means our result get 99.8% accurate. It is very important to measures our body temperature, sweating and heart rate to check regularly for our healthy body.

B.Hardware interface

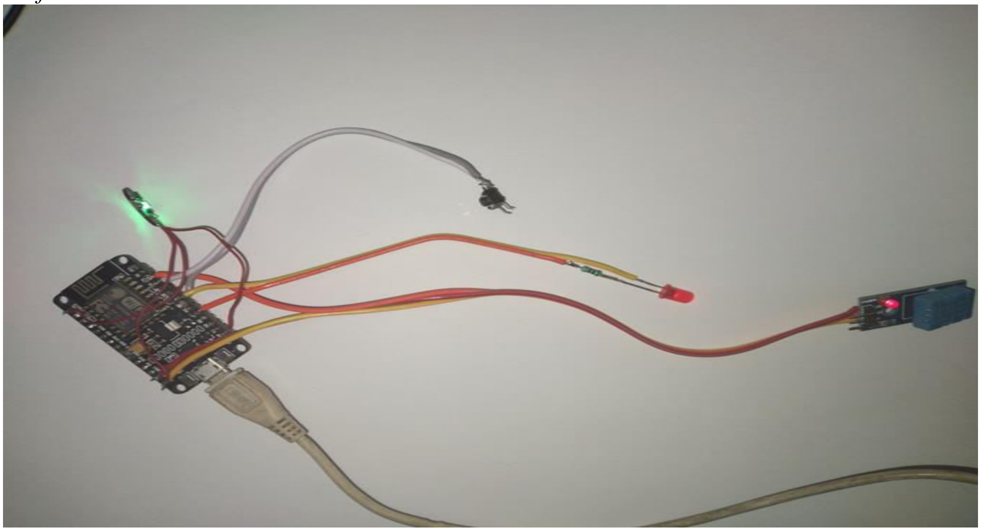

Fig.10. Hardware interface

C.Ardunio IOT Cloud

Ardunio IOT Cloud is an application that helps makers build connected objects in a quick, easy and secure way. You can connect multiple devices to each other and allow them to exchange real-time data. You can also monitor them from anywhere using a simple user interface.Adriano IoT Cloud is fully integrated in the Arduino Create ecosystem, you will be able to generate a template code in Adriano IoT Cloud and then edit and upload it to your board using the Ardunio Web Editor.

The IoT project developed here is built on Arduino UNO. The Arduino is one of the earliest and most popular prototyping boards. So It is assumed that the reader has gone through the project how to get started with the arduino and Interface LCD with arduino . The Arduino is interfaced with ESP8266 Wi-Fi modem to connect with an internet router and access the cloud server. The Arduino is interfaced with LM-35 temperature sensor to sense the surrounding temperature and a pulse sensor to read pulse rate. The measured pulse rate and temperature are displayed on a character LCD interfaced to the Arduino and are passed to the cloud platform by transmitting data to a Wi-Fi access point. With this simple yet effective device, the health status of a critically ill patient can be constantly monitored. It can be used to keep track of the health of aged people who frequently have heart or blood pressure issues. The health-related data i.e. pulse rate and temperature are periodically updated and logged to the ThingSpeak platform. That data can be further utilized to keep the medical history of the patient. The Freeboard.io is used as Dashboard to graphically represent the recorded data.

The Arduino Sketch running over the device implements the various functionalities of the project like reading sensor data, converting them into strings, passing them to the IoT platform, and displaying measured pulse rate and temperature on character LCD. The Sketch is written, compiled, and loaded using the Arduino IDE. The IoT platform used is ThingSpeak and Freeboard.io is used to build the IoT Dashboard.

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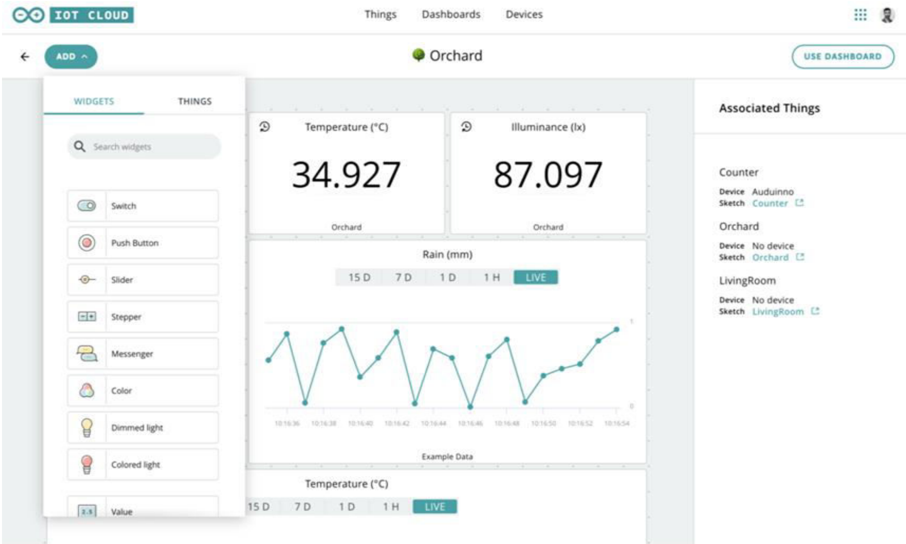

Fig11.User interface with IOT CLOUD

VIII. CONCLUSION

An IoT-based human heartbeat rate monitoring and control system is developed. This system uses the capability of a heart pulse sensor for data acquisition. A humans heartbeat is captured as data signals and processed by the microcontroller. The processed data are transmitted to the IoT platform for further analytics and visualization. Experimental results obtained were found to be accurate as the system was able to sense and read the heartbeat rate of its user and transmits the sensed data via Bluetooth to the Android mobile app(Blynk) . From the results obtained, it was found that the heartbeat rate of low if >40 and <60, medium if >60 and <100, high if >100 and <150. Furthermore, this research paper presents an approach that is flexible, reliable, and confidential for a heartbeat rate monitoring and control system using sensor network andIoT technology. The implemented device can be deployed to the medical field to assist the medical practitioners to efficiently and reliably do their work without difficulties.

IX. FUTURE SCOPE

Heart rate measurement is very useful in our future to measures the heart rates of our body and we get accurate result on our mobile phones. EEG, ECG and other health parameters can also be monitored. • Continuous monitoring and future diagnosis can be performed via the same system (TELEMEDICINE). • More than a single patient at different places can be monitored using single system.

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