E-Health Care Monitoring System

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Abstract ---- The E-health monitoring system is one amongst the main developments within the field of life science. An automatic wireless health monitoring system is employed to live patient's temperature, pressure, pulse etc. which are accustomed evaluate the health condition of the patient. Providing the collected information to the doctor and making proper decision on the information collected also notifying the patient is that the challenging task within the IOT. During this project, an IoT based E-health care monitoring system is proposed which is Non-Invasive in nature. Arduino is employed here to gather the desired parameters and evaluate the information obtained from the sensor devices. The system with Arduino also gives the notifications to patients regarding the measurement of the parameters mentioned within the proposed system. IoT with the mix of Arduino brings new light to the employment of Internet of Things in Health care Monitoring system. Arduino Uno board collects data from the sensors and transfer wirelessly to IoT website. The proposed E-health care system is evaluated for sure parameters like temperature, pressure and pulse, and also the decisions will be made supported the information obtained from IoT website.

Index terms—Non-invasive, Health monitoring, E-HealthCare, Pulse rate senor, Temperature Sensor, Heartbeat Sensor, Arduino.

1. INTRODUCTION

Health monitoring is the major problem in today's world. Due to lack of proper health monitoring, patient suffer from serious health issues.[1] Health Monitoring is becoming critical and in-affordable. More than 50 percent death occur in patient who are not continuously monitored. Heart attack, High blood pressure, high blood glucose are parameters affecting the health of people. There are lots of devices available now days to monitor the health of patient over internet. But the treatment is impaired, because the diagnosis is Invasive and Non-Continuous[2].

In this project, we are designing a Non-Invasive Health Monitoring System which will be affordable and easy to use. It will make a use of IoT which will record the person's heartbeat rate, body temperature and pulse rate and also send an email/SMS alert whenever those readings go beyond critical values. Pulse rate and body temperature readings are recorded over .ThingSpeak and Google sheets so that patient health can be monitored from E-Healthcare Monitoring System anywhere in the world over internet. Health experts are taking advantage of these smart devices to keep an eye on their patients [3].

1.1 What is health monitoring system?

The patient health monitoring system is one of the major developments in the medical area. An automatic wireless health monitoring system is used to measure patient's body temperature and heartbeat by using embedded technology. The sensors used in the system helps to monitor the condition of the patient.

1.2 What is Non-Invasive Patient Health Monitoring System?

Non-Invasive Patient Health Monitoring System does not
involve the introduction of instruments into the body. They are increasingly helping people to better monitor their health status both at an activity/fitness level for self-health tracking and at a medical level providing more data to clinicians with a potential for earlier diagnostic and guidance of treatment.

1.3 Why Non-Invasive?
Everyone has had an experience, most of them unpleasant, involving sharp objects and blood. The main advantage of non-invasive methods is the relief from pain and discomfort due to frequent finger pricks.

2. Description of the system

The system uses Arduino UNO microcontroller board based on ATmega328P. It is powered using USB or a external power supply between 7-12 volts.LM35 is an analog linear temperature sensor. Its output is proportional to the temperature (in degree Celsius).The Pulse Sensor is a plug-and-play heart-rate sensor for Arduino. The Pulse Sensor is clipped to fingertip and plugged in Arduino, it is then ready to read heart rate The pulse sensor will record pulses in bpm. Also, it has an Arduino demo code that makes it easy to use.The blood pressure has been calculated by considering on and of clock pulses of the output from sensor. The max value is obtained by dividing the ON clock pulses by 10. Similarly the min value is obtained by dividing the OFF clock pulses by 10.

3 HARDWARE DETAILS

3.1 Pulse Sensor:

The Pulse Sensor is a plug-and-play heart-rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game and mobile developers who want to easily incorporate live heart-rate data into their projects. The essence is an integrated optical amplifying circuit and noise eliminating circuit sensor. Clip the Pulse Sensor to your earlobe or fingertip and plug it into your Arduino, you can ready to read heart rate. Also, it has an Arduino demo code that makes it easy to use. The pulse sensor has three pins: VCC, GND and Analog Pin.
There is also a LED in the center of this sensor module which helps in detecting the heartbeat. Below the LED, there is a noise elimination circuitry which is supposed to keep away the noise from affecting the readings.

3.2 LM35 Temperature Sensor :

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The any external calibration or trimming to provide typical accuracies of C at room temperature and Cover a full 55C to 150C temperature range.

3.3 ESP 8266

The ESP8266 is a very user friendly and low cost device to provide internet connectivity to your projects. The module can work both as a Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making Internet of Things as easy as possible. It can also fetch data from internet using API's hence your project could access any information that is available in the internet, th us making it smarter. Another exciting feature of this module is tha t it can be programmed using the Arduino IDE which makes it a lot more user friendly. The ESP8266 module works with 3.3V only, anything more than 3.7V would kill the module hence be cautions with your circuits.

4. SOFTWARE DETAILS

4.1 Arduino IDE:
The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures.

Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board.

4.2 ThingSpeak

ThingSpeak server is an open data platform and API for the Internet of Things that enables you to collect, store, analyse, visualize, and act on data from sensors. Introduction to ThingSpeak[4]. ThingSpeak is an open data platform for the Internet of Things. Your device or application can communicate with ThingSpeak using a restful API, and you can either keep your data private, or make it public. In addition, use ThingSpeak to analyse and act on your data.

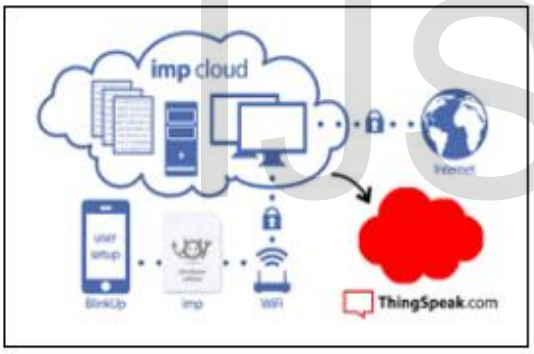

Fig 1 ThingSpeak App

5. RESULT

The output was given by the device according to the conditions set in Arduino. If the normal BPM value is set up to 100. If the BPM count is less than 100 the device will show the BPM a ell as temperature value of the person, but if the BPM exceed the normal value which is 100, the device will only show the BPM count. The output of the device is shown as below:

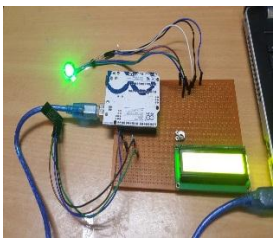

Fig 2 Hardware results and Real Time Reading

6. CONCLUSION

The prototype designed functioned the way it as expected to with reasonable accuracy. The initial goal was to obtain the proper functioning of the device and to get some data to process no matter the accuracy of the result. Then the results were processed to obtain the required accuracy after the proper working of the device. The obtained values were compared with the values measured from commercial devices. The values were nearly accurate.

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