HEART ATTACK DETECTION AND CONVULSIONS MONITORING USING IOT

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ABSTRACT:

These days we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system users sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet.The user may set the high as well as low levels of heart beat limit.After setting these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can be saved on time And also construct an convulsions patient health monitoring to intimate to IOT and LCD.

Keyword : Arduino Ide, Esp8266 Wifi Module, SPO2 Sensor (MAX30100), Accelerometer Sensor

INTRODUCTION:

The heart is one of the most important organs in the human body. In today's scenario, health problems related to heart are very common. This paper proposes a heart rate monitoring and abnormality detection system using IoT. The hardware consists of NodeMCU, spo2 sensor, and LCD display. Real-time monitoring of the heartbeat is made possible through the Thing Speak platform. Spo2 heart rate sensor, accelerometer, Wi-Fi Module, and Arduino are used as major components in modeling a heart rate monitoring system. Combining IoT with this through a heart rate application is used to obtain the alert message in thingspeak given, a heart attack occurs. The pulse sensor is used along with a temperature sensor for heart rate monitoring and heart attack detection.The proposed system consists of the Spo2 heart rate sensor, accelerometer, Wi-Fi Module, and Arduino microcontroller. The heartbeat signals are collected from the fingertip. The designed system is enabled with a provision to contact a clinician in a remote location during an emergency situation. Abnormal signals can be monitored using a remote monitoring system, and the data can be transmitted automatically through thinspeak server Real-Time Monitoring is one of the most important features of IoT.

BLOCK DIAGRAM:

COMPONENTS:

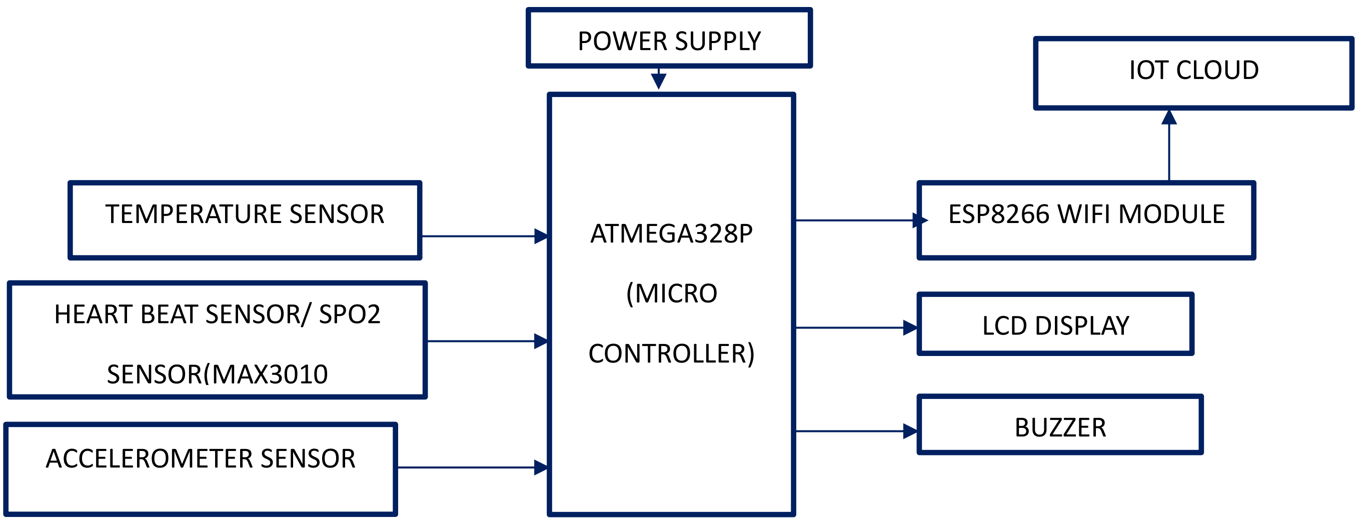
POWER SUPPLY :

Transformer

The transformer contains two huge copper coils, one between the two terminals of the input power supply and other between the two terminals of the output. Here we use a step-down transformer which means it will convert high voltage to low voltage. The number of turns of the coil inside will determine the voltage supported at input and output both.

RECTIFIER:

Now comes the rectifier part. This converts the AC voltage output of the transformer to a DC voltage. It just reverses the polarity of one half of the period of the AC signal. This will make both parts have the same polarity. Here we use a full wave bridge rectifier to convert the AC signal to DC.



REGULATOR:

The filtering significantly smoothens the output, but even after that small ripples remain. If we use this directly to charge our phones, the constant fluctuation in the voltage may damage the device. It is very important to have a steady output voltage with minimal fluctuations. This is where the regulator stage kicks in. Here we have used a simple zener diode based regulator. The tendency of a zener diode is to have a fixed voltage between its two terminals when reversed biased. So when input voltage changes, the current through the zener diode also changes inversely so that is constant. This regulator is quite simple to create, but its is that it wastes a lot of power. So, the cell phone chargers typically use IC voltage regulators, such as IC 7805, IC 7806, IC 7812 etc.

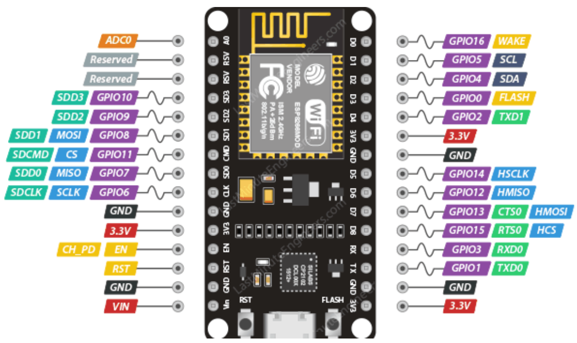
ARDUINO UNO :

Perhaps the most popular board in the Arduino line-up is the Arduino UNO. There are other boards like the Arduino Nano and the Arduino Mega, but UNO has been the go-to board for quick prototyping, Arduino Projects and DIY Projects.

FIG : ARDUINO UNO

Arduino UNO is based on ATmega328P Microcontroller, an 8-bit AVR Architecture based MCU from ATMEL. Arduino UNO comes in two variants: one consists of a 28-pin DIP Microcontroller while the other consists of 32 lead Quad Flat Package Microcontroller.

NODE MCU ESP 8266 :



The Node MCU board simplifies all this. First, since it is based on ESP-12E Module, there are a lot of GPIO Pins. Second, there is an on-board 3.3V regulator (remember, the ESP8266EX SoC works on 3.3V and not on 5V). Another beautiful thing about Node MCU is its inclusion of on-board USB to UART Controller, which is CP2102 IC in my case. An interesting thing about this CP2102 IC is that the GPIO 0 and RST pins of the ESP8266 SoC are controlled by the DTR (Data Terminal Ready) and RTS (Request to Send) pins of the CP2102 IC.

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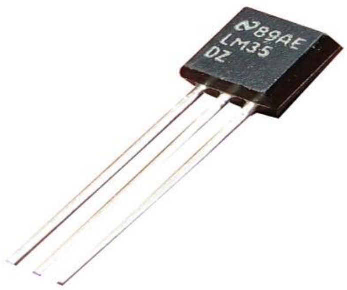
LM35 TEMPERATURE SENSOR:



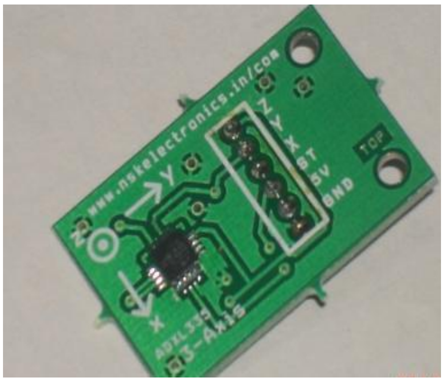
The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

SPO2 SENSOR :

MAX30100 is an integrated pulse oximeter and heart-rate monitor sensor solution. It's an optical sensor that derives its readings from emitting two wavelengths of light from two LEDs – a red and an infrared one – then measuring the absorbance of pulsing blood through a photodetector. MAX30100 operates on a supply in the range of 1.8 to 3.3V.It can be used in wearable devices, fitness assistant devices, medical monitoring devices, etc.

MAX30100 operates from 1.8V and 3.3V power supplies and can be powered down through software with negligible standby current, permitting the power supply to remain connected at all times.

ACCELEROMETER :



Breakout board for the 3 axis ADXL335 from Analog Devices. This is the latest in a long, proven line of analog sensors - The ADXL335 is a triple axis MEMS accelerometer with extremely low noise and power consumption - only 320uA! The sensor has a full sensing range of +/-3g.

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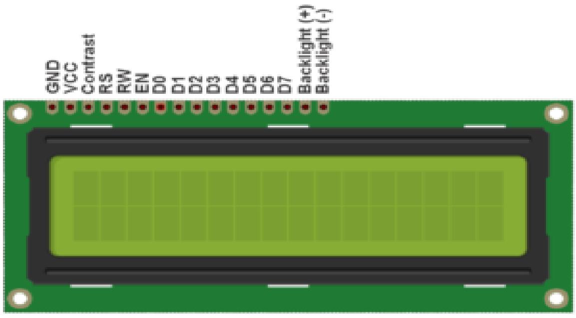
Board comes fully assembled and tested with external components installed.

LCD:



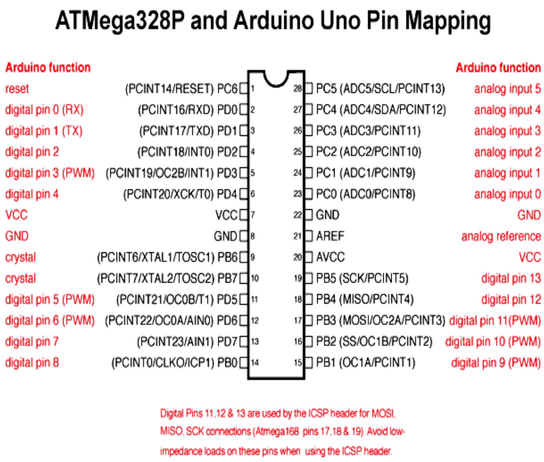
LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed

on the LCD.

ATMEGA328P:

ATmega-328 has 2KB Static Random Access Memory (SRAM). ATmega328/328P is a 28-Pin AVR Microcontroller, manufactured by Microchip, follows RISC Architecture and has a flash-type program memory of 32KB. ATMEGA328/328P. Perhaps the most common implementation of this chip is on the popular Arduinodevelopment platform, namely the Arduino Uno, Arduino Pro Mini and Arduino Nano models.



BUZZER:

This is a small 12mm round speaker that operates around the audible 2kHz range. You can use these speakers to create simple music or user interfaces. Each speaker is PTH solderable and requires an operating voltage of 3.5-5V with a mean current of 35mA max.

These speakers also have a typical sound output of 95 dBA and a coil resistance of 42 ±6.3 ohms.

THINKSPEAK SERVER :

ThingSpeak is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute MATLAB® code in ThingSpeak you can perform online analysis and processing of the data as it comes in. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics. Internet of Things (IoT) describes an emerging trend where a large number of embedded devices (things) are connected to the Internet. These connected devices communicate with people and other things and often provide sensor data to cloud storage and cloud computing resources where the data is processed and analyzed to gain important insights. Cheap cloud computing power and increased device connectivity is enabling this trend.

WORKING PRINCIPLE :

Arduino UNO microcontroller measures the sensor data and display in the LCD.Incase of Abnormal data, the values are sent to thingspeak server via WIFI nodemcu.The temperature sensor LM35 is used to measure the temperature of the human body.

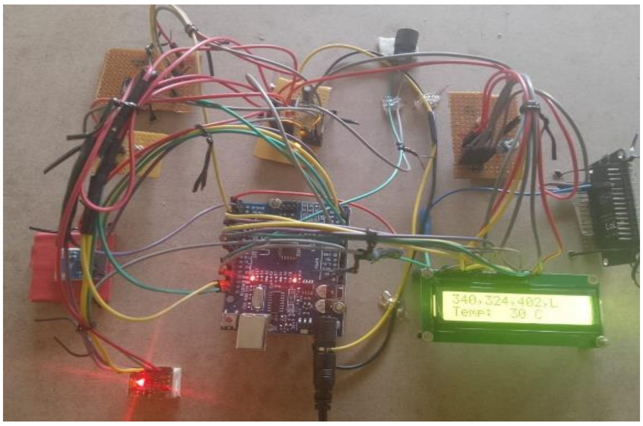
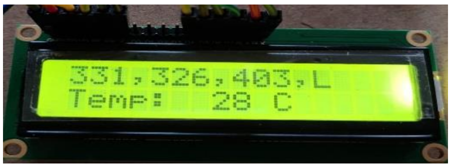


Fig:final implementation

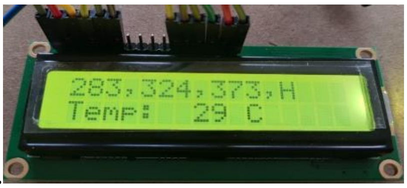
CONCLUSION:

Here we proposed a prototype hardware for heart attack and FIX monitoring for Patients.The body temperature, heartrate and SPO2 and convulsions detection data are monitored and alert produced at patient side and data are send to thing speak server. By this project the patient health can be monitored continuously to avoid emergency situation. The system can also be designed to provide timely medical services in an emergency.

FINAL OUTPUT :



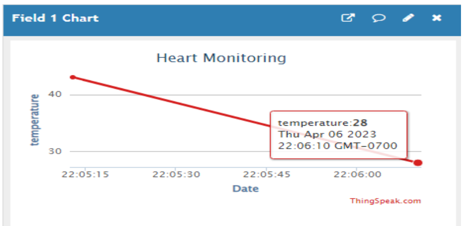
LCD Displays: 331,326,403,L – No movement in accelerometer and Temperature is 28 degree Celsius.



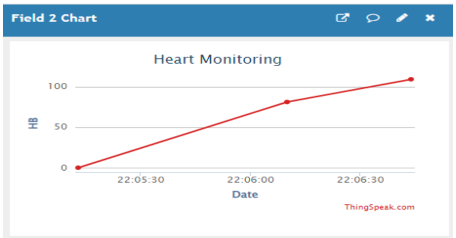
LCD Displays: 331,326,403,H – Movement in accelerometer.

BPM value : 32 is low. And spo2 value= 94%. To sent BPM value in thingspeak server to alert. Buzzer is on.

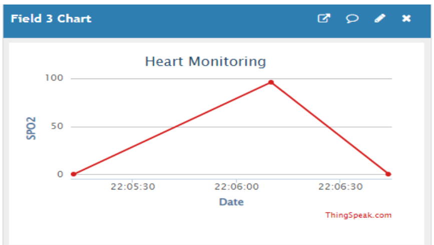
BPM value is normal. And spo2 value=93%.Buzzer is off.



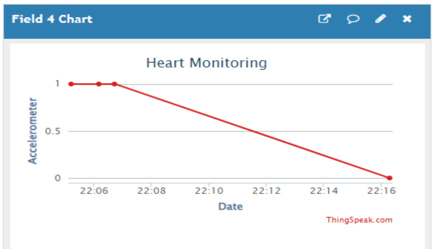
Temperature value in Thingspeak Server



Heart beat value in Thingspeak Server



SPO2 value in Thingspeak Server



Accelrometer value in Thingspeak Server

FIG: Prediction Result

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