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Sensing Heart beat and Body Temperature Digitally using Arduino

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Abstract **- The project is named as" DIGITALLY SENSE HEART RATE AND BODY TEMPERATURE USING ARDUINO". With the development of technology, in this project we can digitally sensing body temperature and heart rate using arduino. Mainly arduino is used because it can sense the environment by receiving input from variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language". LM35 is used for the sense body temperature. Body temperature is a basic parameter for monitoring and diagnosing human health. Heart beat sensor was used for sensing heart rate. This device will allow one to measure their mean arterial pressure (MAP) in about one minute a nd the accurate body temperature will be displayed on the Android. The system can be used to measure physiological parameters, such as Heart rate (Systolic and Diastolic), Pulse rate.**

Keywords:**--- Ardunio; Heart rate; body temperature.**

I. INTRODUCTION

The area of work of this project is based on Electronics Communication and Computer science. This project is basically done by Ardunio. Because Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators so Arduino is a main part of this project. Arduino coding is needed for sensing heart rate and body temperature by using arduino software. Through this project I'm introducing Software and hardware implementation.

II. SIGNIFICANCE

In this present scenario, it is not possible for a doctor to observe a patient's heart rate per minute and body temperature all the time. So I decided this project to make useful for everyone in this society. Again a doctor far away from the patient need to know heart rate and body temperature for initial treatment An embedded system which can measure the heart rate and body temperature and store the data for the doctor to know the condition of the patient can help for this purpose The device will allow one to measure their mean arterial pressure (MAP) in about one minute and the accurate body temperature will be displayed on the android

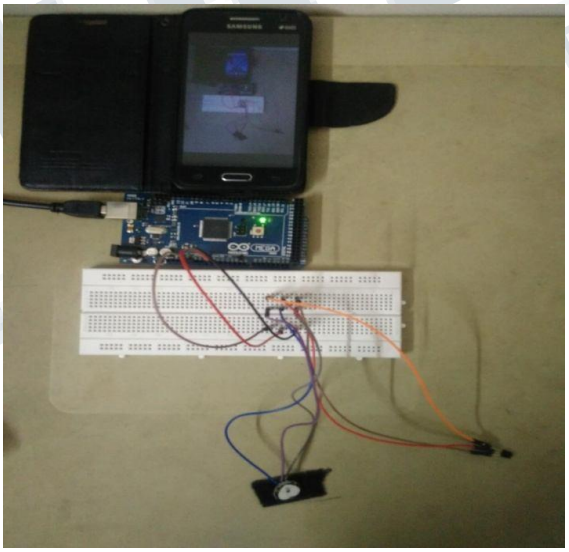

Fig. 1. Working of project

III. MATERIALS USED:

Arduinio ATMEGA2560: Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators.

Jumper Wire: wire is the component used to connect the entire component through the bread board. Wires are must for the connection in the bread board

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Bread board: This component is used because it will be the base of our device all the connections are being connected by this base.

LM35 temperature sensor: This component is selected because this is the only sensor which is used to measure the body temperature accurately.

Heart beat sensor: The sensor used to sense the heart rate in each and every seconds.

Android: The output of the results will be showed on the android screen.

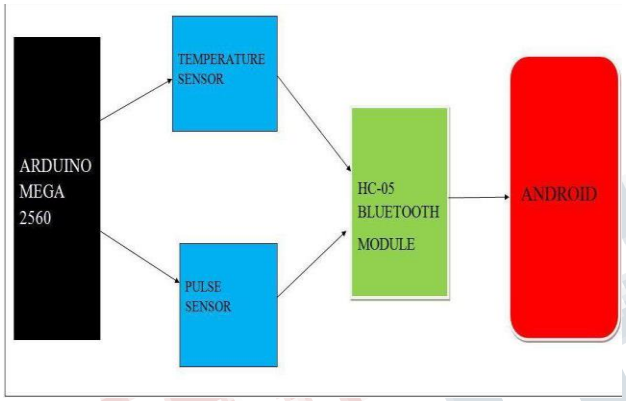

Fig. 2. Flow diagram of project

IV. SENSING MECHANISM

Heart beat sensing

Heart beat is sense by the heart beat pulse sensor in which We can measure the heart rate per minute

Fig. 3. Heart beat sensor

We wire the pulse sensor to the Arduino as following: S of pulse sensor -> A0 of Arduino '-'of pulse sensor ->GND of Arduino '+' of pulse sensor -> +5V of Arduino device has an advantage over linear temperature sensors calibrated in degrees Kelvin, because the user is not required to subtract a large constant voltage from its output to obtain convenient Fahrenheit scaling.

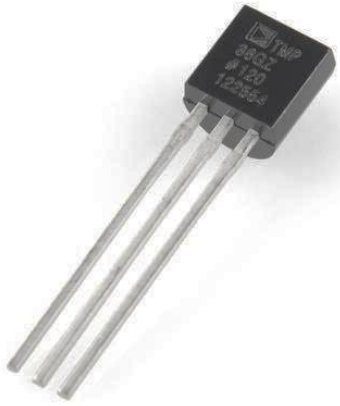

Fig. 4. LM35 temperature sensor

ARDUNIOmega2560

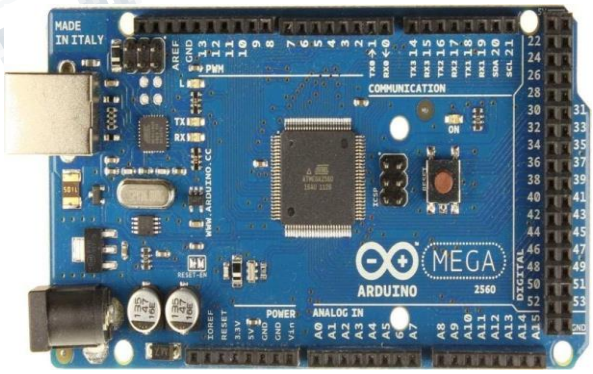

Fig. 5. Arduinomega2560

The Arduino Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

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V. PROCESSING DATA

Heart Rate Calculation:

$sum = \sum_{i=1}^{30} FreqMeasure.read()$
$frequency = F\_CPU / (sum / 30)$
$BPM = frequency * 60$

Body Temperature Calculation

Voltage to Temperature conversion: Temperature in degree Celsius,
Temp = Output voltage * 0.48828125

Celsius degree to Fahrenheit degree conversion:
Tempf= (Temp*1.8) +32

VI. GENERAL ANALYSIS

Heart rate is measured by using two numbers. The first number is called systolic heart rate which measures the pressure in our blood vessels when your heart beats. The second number is called diastolic heart rate which measures the pressure in your blood vessels when your heart rests between beats. If the measurement reads 120 systolic and 80 diastolic, you would say "120/80 mmHg."A heart rate less than 120/80 mmHg is normal. A heart rate of 140/90 mmHg or more is too high. People with levels in between 120/80 and 140/90 have a condition called prehypertension, which means they are at high risk for high heart rate

Body temperature	
Normal:	The average normal temperature is 98.6°F (37°C). But "normal" varies from person to person.
Abnormal:	Oral, temporal artery temperature Fever: 100.4°F (38°C) to 103.9°F (39.9°C) High fever: 104°F (40°C) and higher
	Armpit (auxiliary) temperature Fever: 99.4°F (37.4°C) to 102.9°F (39.4°C) High fever: 103°F (39.5°C) and higher
	A rectal or ear temperature of less than 97°F (36.1°C) means a low body

Heart rate

Normal	Systolic rate is lesser than 120 mmHg and diastolic rate is lesser than 80mmHg
At risk (prehypertension)	Systolic rate is higher than 120–139 mmHg and diastolic rate is higher than 80–89 mmHg
High	Systolic rate is 140 mmHg or higher diastolic rate is 90 mmHg or higher

VII. WORKING

If we connect it to the Arduino we can measure the heart rate and body temperature like this.

FOR TEMPERATURE SENSOR:
The output of the measurement of the body temperature in Fahrenheit scale. It will show the accurate result of the temperature of the body. Body temperature is a measure of the body's ability to generate and get rid of heat.

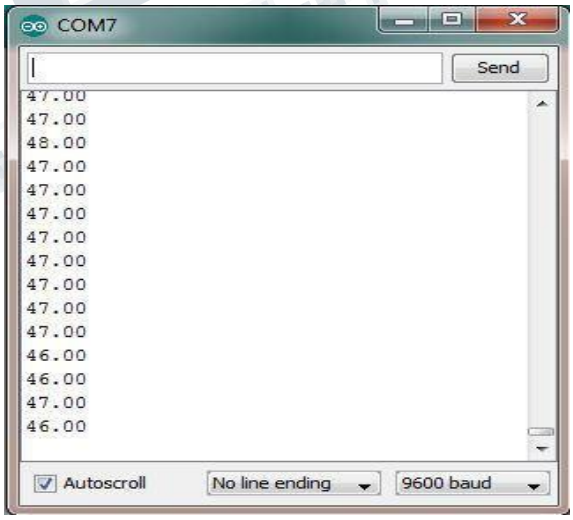

Fig. 6. Temperature sensoring monitoring

FOR HEART RATE SENSOR:
The output of the heart beat sensing by heart beat sensor measured in beats per minute (BPM). It will measure the pulse in every minute and displayed it on the android.

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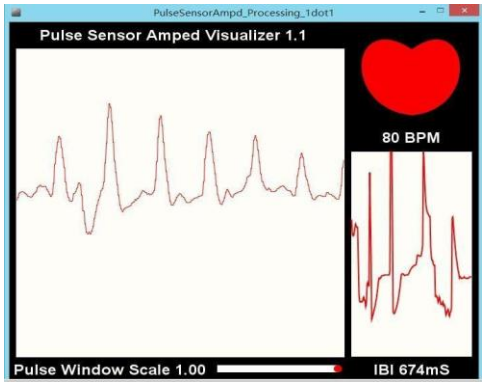

Fig. 7. Pulse sensoring monitoring

VIII. LIMITATIONS

- Heart rate indicates the soundness of our heart
- Heart rate helps assessing the condition of cardiovascular system
- It is not possible for a doctor to observe a patient's heart rate per minute and body temperature all the time
- Again a doctor far away from the patient need to know heart rate and body temperature for initial treatment
- An embedded system which can measure the heart rate and body temperature and store the data for the doctor to know the condition of the patient can help for this purpose

IX. CONCLUSION

Digitally sense body temperature and blood pressure using gardenia can show the accurate results will be displayed on the LCD monitor.This device will allow to measure continuously the mean arterial pressure (MAP) in about one minute and the accurate body temperature will be displayed on the LCD screen. Now I'm thinking to make an android application for sending the alerts and showing the results of body temperature and blood pressure continuously at a certain intervals of time.

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