A
PROJECT
ON
IOT BASED ELECTRO CARDIOGRAPHY
USING ARDUINO UNO

Department of computer science and engineering

In

Wellfare institute of science technology and management,

Pingadi,

Submitted by:

<u>*Team leader:*</u>

P.V.N.BASKAR *(318129510048)*

<u>**Team members:**</u>

D.SUSRUTHA (318129510052)

B.ROHITHA (318129510003)

T.SAI PRASAD (318129510054)

K. LAKSHMI DEVI(318129510028)

Wellfare institute of science technology and management , pingadi , Affiliated by Andhra University , Visakhapatnam.

AIM : IOT BASED ELECTRO CARDIOGRAPHY(ECG)

The last decade has witnessed an increasing number of deaths caused by cardiovascular diseases (cvd). Which effects the blood vessels and the heart results in heart attack and heart strokes. By continuous heart rate monitoring and the ECG signal at the initial state the disease can be prevented.

REQUIREMENTS:-

HARDWARE:-
- ECG SENSOR(AD8232)
- BREAD BOARD
- ARDUINO UNO
- JUMPER WIRES
- SENSOR PADS

SOFTWARE:-
- ARDUINO UNO

ECG:-

An ECG is a paper or digital recording of the electrical signals in the heart. It is also called an electrocardiogram or an ECG. The ECG is used to determine heart rate, heart rhythm, and other information regarding the heart's condition. ECGs are used to help diagnose heart arrhythmias, heart attacks, pacemaker function, and heart failure.
ECG can be analyzed by studying components of the waveform. These waveform components indicate cardiac electrical activity.

AD8232:-

The AD8232 is a neat little chip used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram. Electrocardiography is used to help diagnose various heart conditions.

BRED BOARD:-

A breadboard is used to build and test circuits quickly before finalizing any circuit design. The breadboard has many holes into which circuit components like ICs and resistors can be inserted.

ARDUINO UNO:-

Arduino uno is a popular microcontroller development board based on 8-bit ATmega328P microcontroller. It consists of 14 digital pins, 6 analog inputs, a power jack, USB connection and ICSP header.

Pin Category	Pin Name	Details
power	Vin, 3.3V, 5V,GND	Voltage to arduino when using.

JUMPER WIRES:-

A jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test.

SENSOR PADS:-

The biomedical sensor pad is the small round shape disposable electrodes that Adhere to the human skin for measuring EEG, ECG and EMG levels. It consists of conductive and adhesive hydrogel with sensors coated with polymer Ag/AgCl. The presence of latex-free gel at the point of contact ensures high conductivity.

AD8232 ECG SENSOR:-

This electrical activity can be charted as an ECG or Electrocardiogram and output as an analog reading. ECG's can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as a OP-amp to help obtain a clear signal from the PR and QT intervals easily.

The AD8232 module breaks out nine connections from the IC that you can solder pins, wires or other connections to SPN, LO+, LO-, OUTPUT, 3.3V, GND provide essential pins for operating this monitor with an arduino or other development board. Also provided on this board are RA(Right Arm), LA(Left Arm), and RL(Right Leg) pins to attach and use you own custom sensors, there is an LED indicator light that will pulsate to the rhythm of a heart beat.
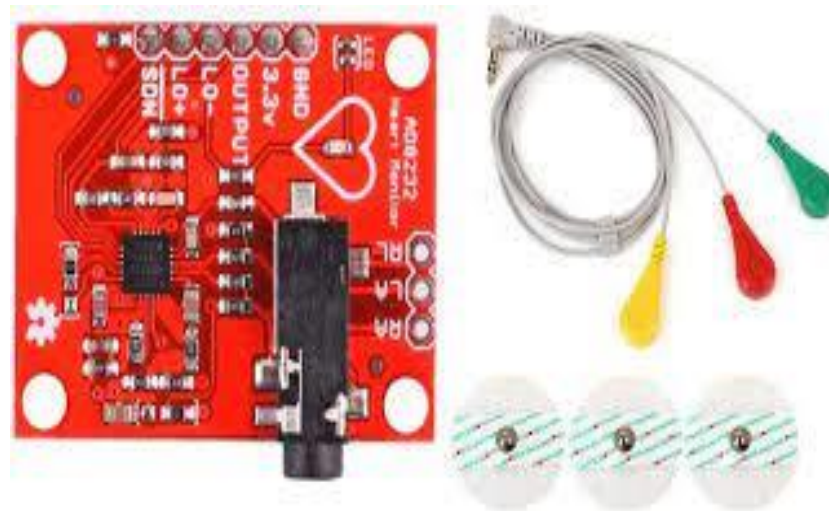
CONNECTIVITY:-

#POWER:-

Vin:-

Input Voltage to Arduino when using an external power source.

5v:-

Regulated power supply used to power microcontroller and other components on board.

Ground pin:-

There are several ground pins in cooperated on the board.

PWM:-

The board contains 6 PWM pins. PWM stands for Pulse Width Modulation, using this process. We can control the speed of the servo motor, DC motor, and brightness of the LED.

Digital I/O Pins:-

There are 14 digital (0-13) I/O pins available on the board that can be connected with external electronic components.

Analogue Pins:-

There are 6 analogue pins integrated on the board. These pins can read the analogue sensor and can convert it into a digital signal.

AREF:-

It is an analogue reference pin used to sent an external reference voltage.

Reset Button:-

This button will reset the code loaded into the board. This button is useful when the board hangs up , pressing this button will take the entire board into an initial state.

USB Interface:-

This interface is used to connect the board with the computer and to upload the arduino sketch (arduino program is called arduino sketch).

DC Power jack:-

This is used to power up the board with a power supply.

Power LED:-

This is a power LED that lights up when the board is connected with the power source.

Micro SD Card:-

The UNO board supports a micro SD card that allows the board.

3.3V:-

This pin is used to supply 3.3V power to your projects.

5.5V:-

This pin is used to supply 5V power to your projects.

Voltage Regulator:-

The voltage regulator controls the voltage that goes in to the board.

#Pinout Configuration :-

1.Enable/Key :-

  This pin is used to toggle between Data Model.

2. Vcc:-

Powers the module connect to +5V supply voltage.

3. Ground:-

Ground pin of module, connect to system ground.

4. TX-transmitter :-

Transmitter Serial Data. Everything received via Bluetooth will be given out by this pin as serial data.

5. RX-Reciever:-

Receive Serial Data. Every serial data given to this pin will be broadcasted via Bluetooth.

6. State:-

The state pin is connected to on board LED, it can be used as a feedback to check if Bluetooth is working properly.

7.LED:-

Indicated the status of module

- Blink once in two seconds : module has entered command mode
- Repeated Blinking : waiting for connection in data mode
- Blink twice in one second : connection successful in data mode

8. Button:-

Used to control the key / enable pin to toggle between data and command mode.

Board Label	Pin Function	Arduino Connection
GND	Ground	GND
3.3v	3.3v Power Supply	3.3v
OUTPUT	Output Signal	A0
LO-	Leads-off Detect -	11
LO+	Leads-off Detect +	10
SDN	Shutdown	Not used

PROCEDURE:-

After perfectly connecting the ECG sensor to bread board then we attach sensor pads to the ECG sensor. It is recommended to snap the sensor pads on the leads before application to the body. The closer to the heart the pads are, the better the measurement. Now it collects the reading of the heart rate of a person from the sensor pads.
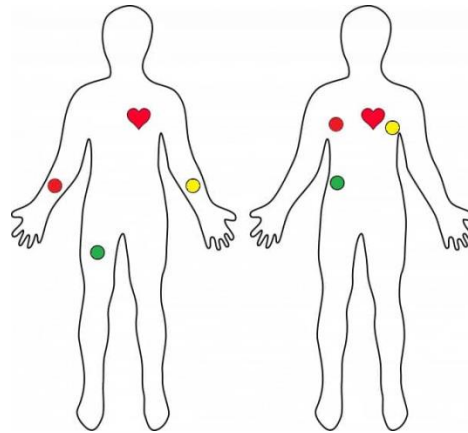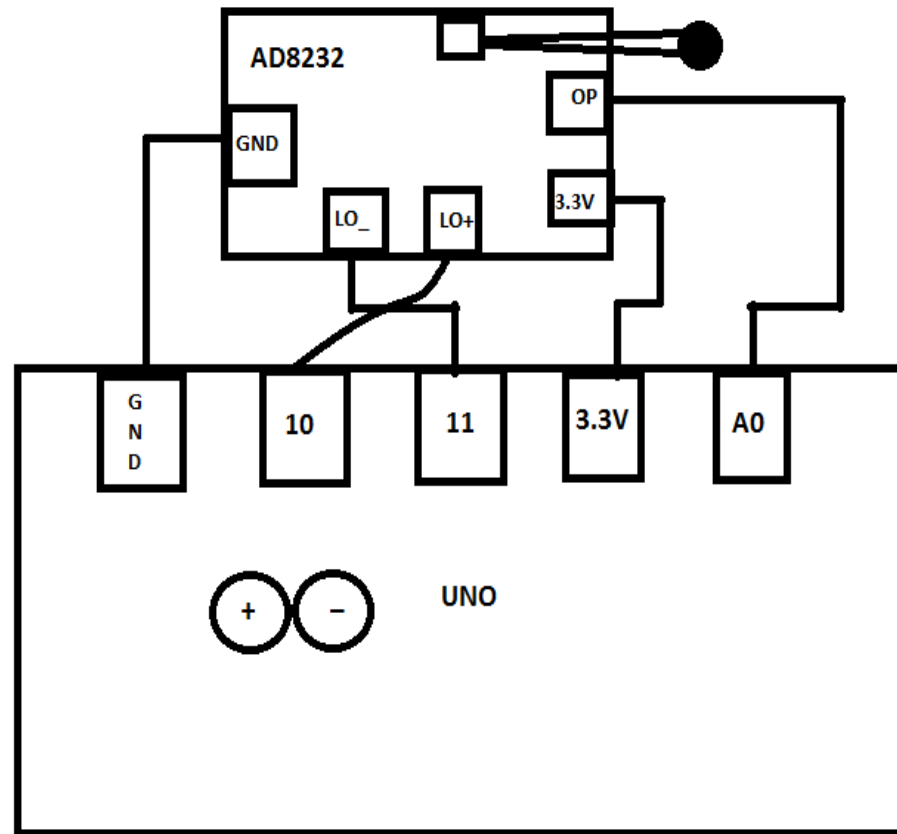

Red: RA (Right Arm)
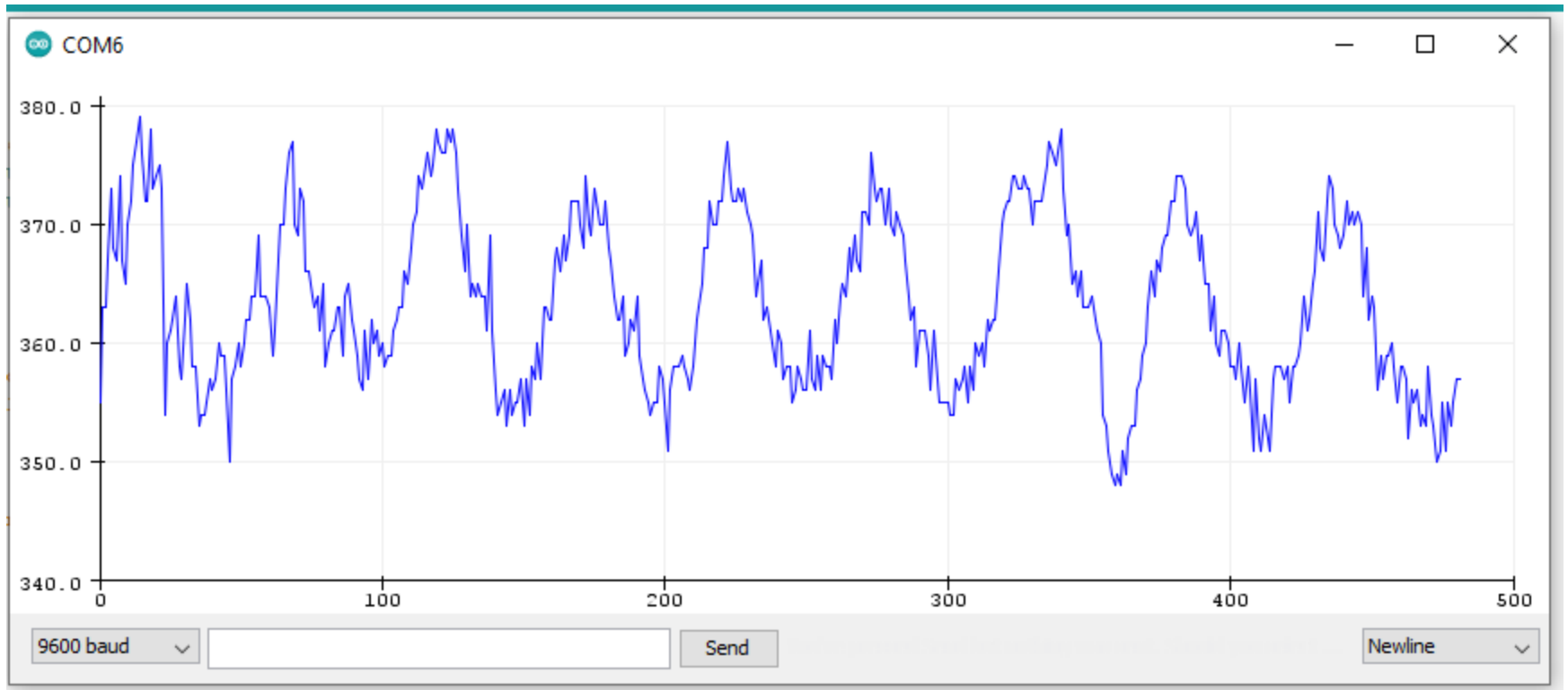Yellow: LA (Left Arm)
Green: COM(Right Leg)

BLOCK DIAGRAM:-

AD8232

OP

GND

LO_

LO+

3.3V

G N D

10

11

3.3V

A0

+   —

UNO

ARDUINO UNO CODE:-

```
void setup()
{
   pinMode(10, INPUT);
   pinMode(11, INPUT);
   Serial.begin(9600);
}
void loop()
{
   if((digitalRead(10)== 1)||(digitalRead(11) == 1))
{
   Serial.println("ECG MONITOR IS NOT CONNECTED");
delay(100) ;
}
 else
{
      Serial.println(analogRead(A0));
   }
 delay(100);
}
```

OUTPUT:-

ECG can be analyzed by studying components of the waveform. These waveform components indicate cardiac electrical activity.

CONCLUSION:-

In this project I conclude that we will interface AD8232 ECG sensor with Arduino and observe the ECG signal on a serial porter or processing IDE. Which can be easily used in hospital, house and ambulance. By analyzing or monitoring the heart the ECG signal at the initial stage can uncover the cause of chest pain, chest fluttering, Evaluate shortness of breath, chest tightness, and other heart-related symptoms. Check for abnormally fast or slow heart rates. Determine the overall health of your heart. With the help of ECG sensor we can detect those complications and this disease can be prevented.