Project report

“WEARABLE ECG MONITOR”

ABSTRACT

World Health Organization (WHO) research shows that the most of the people with heart disease die over a period of time. Therefore, this disease can’t be taken lightly. Hence, most health care equipment and monitoring systems are designed to keep track of the disease.

By analyzing or monitoring the ECG signal in the initial stages many deaths can be prevented. So we thought of working on this project.

But to monitor the ECG signal heavy and costly equipment is needed. To eliminate this need and to compress the size and make it available to the mass, it has to be wearable and cost effective. So we opted for the AD8232 sensor.

COMPONENTS REQUIRED

- AD8232 ECG sensor
- Li-Po Battery
- Smartphone-Android based
- PCB

What is ECG?

ECG is simply a recording of the heart’s activity. Due to the electrical nature of the heart’s contractions, one can record the change in voltage by placing electrodes on the skin and processing the signal. The plot of these voltages over time is called an electrocardiogram (ECG for short). ECGs are typically used to diagnose various forms of heart failure, or passively monitor patient stress.

While one part of the heart is contracting, the other portions are relaxing. In this way, the timing of electrical signals is very important in the heart, which makes an ECG a very powerful tool in measuring heart health.

ECG ANALYSIS

To record an actual ECG however, many logistical issues come into play such as the size of the signal, the amount of noise coming from the rest of the body, and the amount of noise coming from the environment. To compensate for this, we need a circuit that will be composed of 3 parts: a differential amplifier to increase the size of our signal, a low pass filter to eliminate high frequency signals noise, and a notch filter to remove 60 Hz noise that is always present in buildings supplied with AC power.

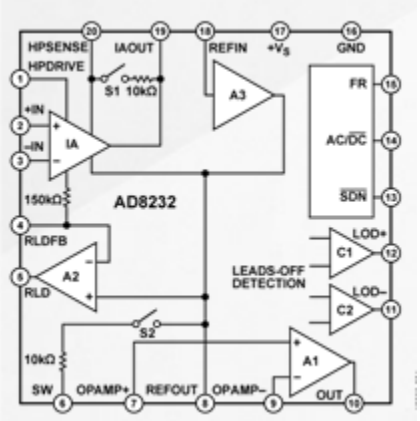
ECG can be analyzed by studying components of the waveform. These waveform components indicate cardiac electrical activity. The first upward of the ECG tracing is the P wave. It indicates atrial contraction. The QRS complex begins with Q, a small downward deflection, followed by a larger upwards deflection, a peak (R); and then a downwards S wave. This QRS complex indicates ventricular depolarization and contraction. Finally, the T wave, which is normally a smaller upwards waveform, representing ventricular re-polarization.

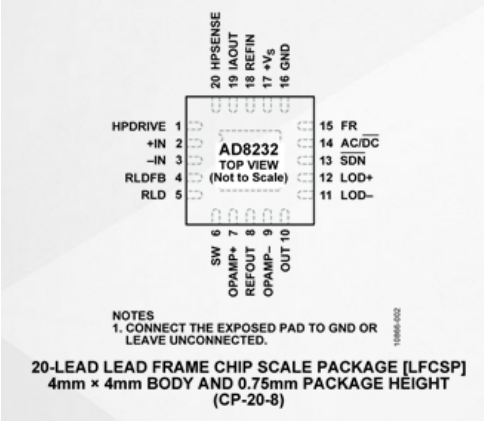
ABOUT THE SENSOR

The AD8232 is an integrated signal conditioning block for ECG and other biopotential measurement applications. It is designed to extract, amplify, and filter small biopotential signals in the presence of noisy conditions, such as those created by motion or remote electrode placement. The AD8232 module breaks

out nine connections from the IC that you can solder pins, wires, or other connectors to. SDN, 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 your own custom sensors. Additionally, there is an LED indicator light that will pulsate to the rhythm of a heart beat.

Schematic of the sensor





CIRCUIT connections

Connection of AD8232 with Arduino:

NODEMCU 3.3V --------- 3.3V pin

NODEMCU Analog 1 (A0) ------- Output

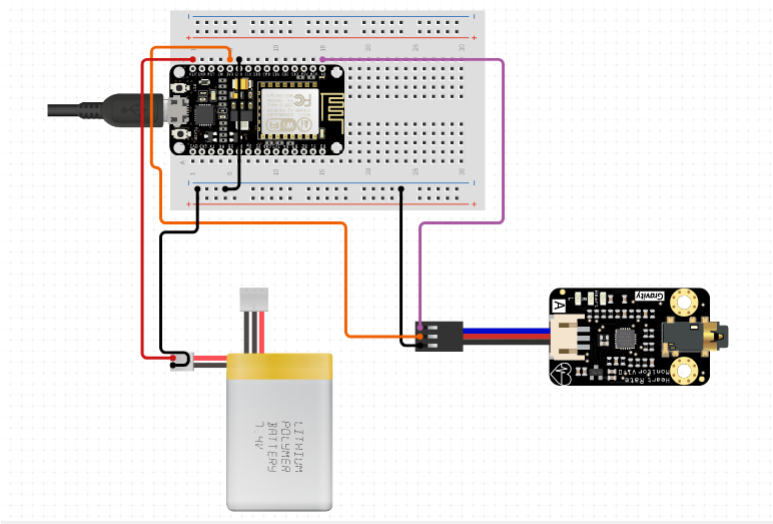
NODEMCU Gnd ---------- Gnd

AD8232 Pins to the body:

RA - Input 1 – To the Right Arm

LA - Input 2 – To the Left Arm

RL - Input 3 – To the Right Leg



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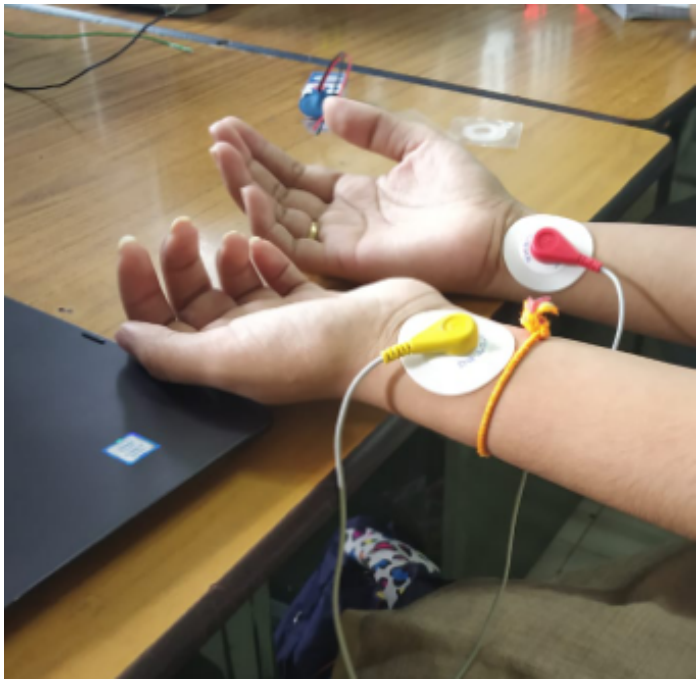

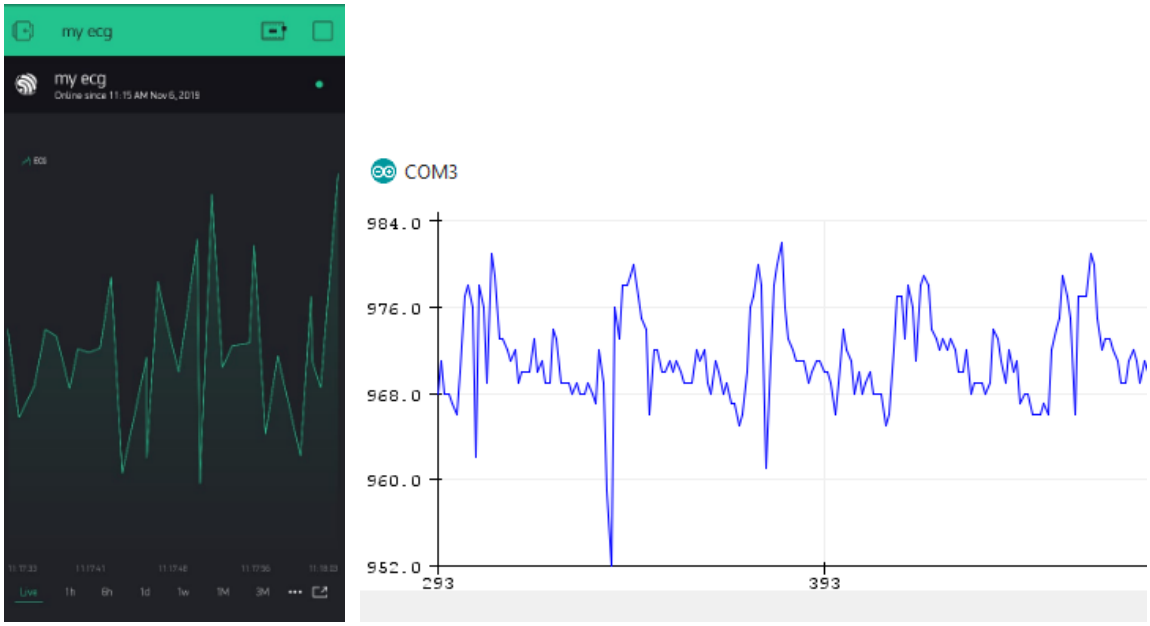

CODE

```
#define BLYNK_PRINT Serial    // Comment this out to disable prints and save space#include <SPI.h>

#include <ESP8266WiFi.h>

#include <BlynkSimpleEsp8266.h>

//#include <SimpleTimer.h>

char auth[] = "gb2NKtSau1PJLw9h7GioIYzrm-Ru65gb"; //Enter the Auth code which was send by Blink

char ssid[] = "Padmaja Kishore";

char pass[] = "qwop1290";

#define alcpin A0

SimpleTimer timer;

void sendSensor(){
```

```
  float a = analogRead(alcpin);
  Blynk.virtualWrite(V5, a);
  Serial.println(a);
}void setup()
{
  Serial.begin(9600); // See the connection status in Serial Monitor
  Blynk.begin(auth, ssid, pass);
  timer.setInterval(1000L, sendSensor);
}
void loop()
{
  Blynk.run(); // Initiates Blynk
  timer.run(); // Initiates SimpleTimer
}
```

REFERENCES

https://www.analog.com/media/en/technical-documentation/data-sheets/AD8232.pdf

https://www.instructables.com/id/ECG-Monitoring-System-by-Using-Arduino-or-AD8232/

https://www.youtube.com/watch?v=0yO3gqeoMJg&feature=youtu.be

https://www.how2electronics.com/ecg-monitoring-with-ad8232-ecg-sensor-arduino/