

Stress Detecting Heart Rate Monitor with Arduino
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April 2023

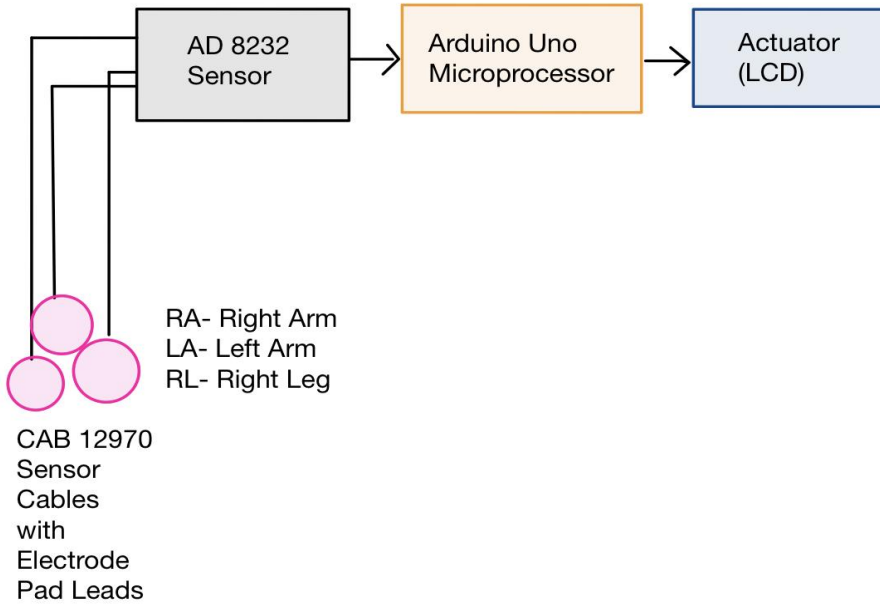
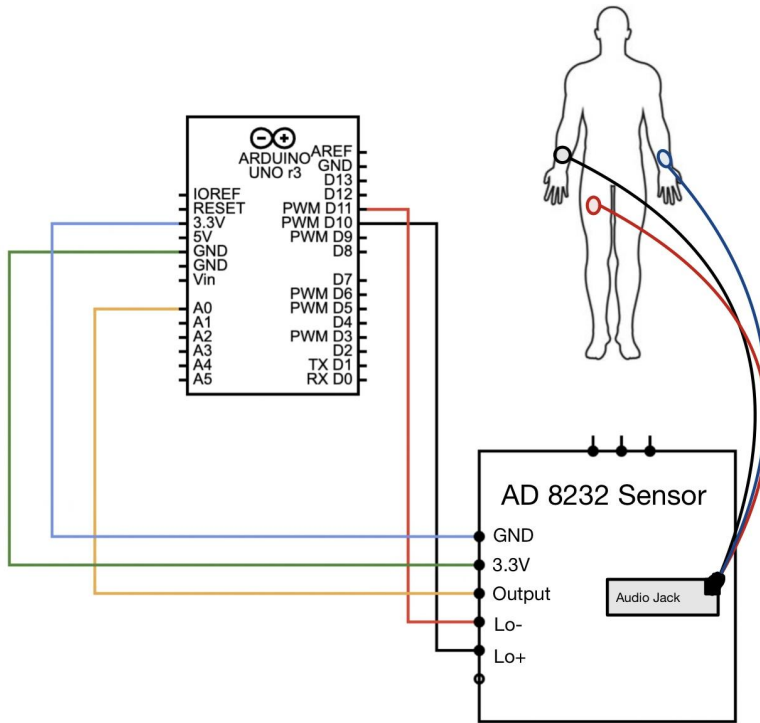
ABSTRACT

The goal of my project is to build a simple ECG, (electrocardiogram, also known as EKG) to measure the electrical signal of the heart. This involves an AD 8232 sensor, which when connected to the arduino microprocessor, will display the heartrate signal. The AD 8232 includes numerous op amps to filter and obtain a clear signal. This sensor allows for an analog to digital converter, so that I can display the analog signal in my own digital display. An EKG reading marks 4 different points on a heart beat signal, labeled as the P,Q,R, S, and T points. The distance between each point corresponds to the a time interval of a certain contraction within the heart. Cardiologists use these devices to determine abnormalities within these time intervals, as straying from normal rates can indicate risk or the presence of certain diseases. The RR time interval reflects the total time between the R and the following R peak. The R-R peak time, in milliseconds can be converted to beats per minute, a more common way of reading heart rate. The final device will have an LED display that will display the beats per minute of the heart. It will also alert the user of an elevated heart rate at a chosen threshold value.

I LIST OF PARTS

- Arduino Uno
- AD8232 ECG sensor
- CAB-12970- Sensor Cable - Electrode Pads (3 connector)
- Electrodes (biomedical grade)
- LCD Display
- Breadboard

II CIRCUIT DIAGRAM



III IMPLEMENTATION

Week 1: Building circuit, ensuring everything works properly and all necessary components are obtained. Writing setup code to transfer interpret reading in Arduino IDE. Learning how to read peaks.

Week 2: Writing code to analyze the heart rate on the serial monitor and calculate RR time interval. Determine how to convert from time interval to BPM.

Week 3: Implementing code to convert the users RR time to BMP. Work on connecting to LCD display.

Week 4: Coding alert on LCD display. Troubleshooting, testing circuit on myself during different time periods to test whether LCD display can properly display an alert when the users heart rate is elevated.

IV SPECS

AD 8232 Circuit Diagram

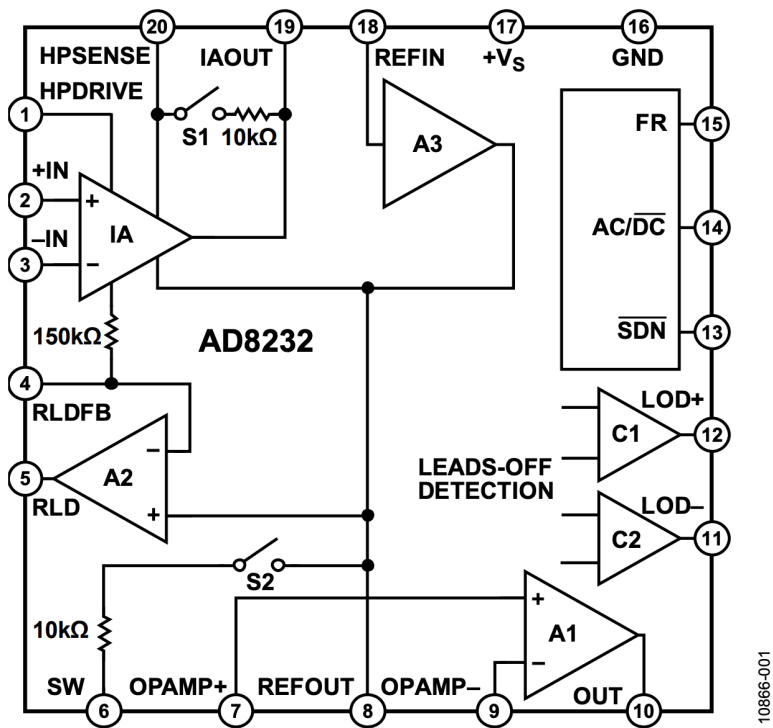


Figure 2: Analog Devices. “Single-Lead, Heart Rate Monitor Front End. AD8232 Sensor”.

IV INTERPRETATIONS

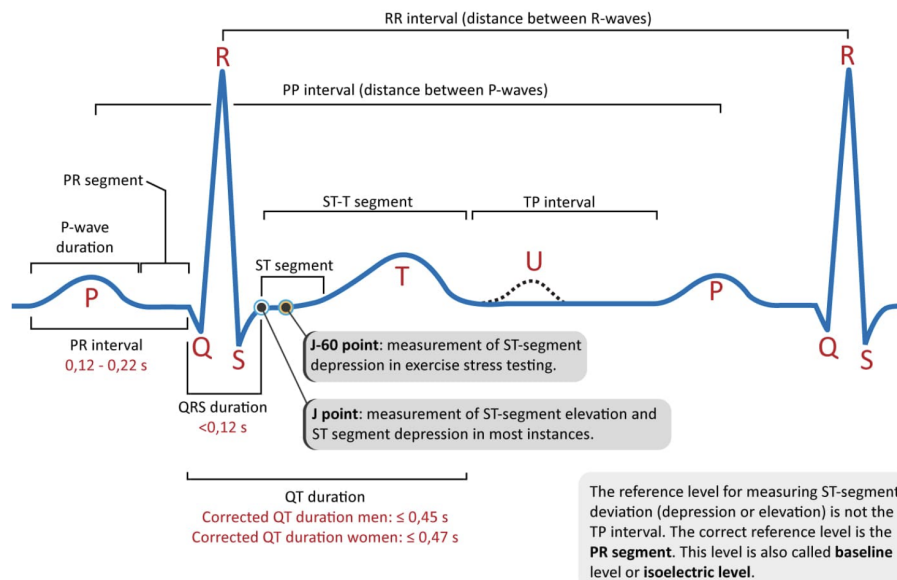


Figure 2: Interpretation of the ECG Wave (ecgwaves.com)

VI APPENDIX

1. <https://learn.sparkfun.com/tutorials/ad8232-heart-rate-monitor-hookup-guide/all>
2. <https://ecgwaves.com/topic/ecg-normal-p-wave-qrs-complex-st-segment-t-wave-j-point/>
3. <https://www.analog.com/media/en/technical-documentation/data-sheets/ad8232.pdf>