Heart rate & Oxygen level monitor for babies

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INTRODUCTION

Sometimes, babies are born with the need to have their heart rate and oxygen levels monitored. We will do some research to try to create a prototype that can monitor these characteristics and send the values via Bluetooth to a mobile application. The aim is to create a device with electrodes and a ring sensor.

RESEARCH

Heart rate monitor : AD8232

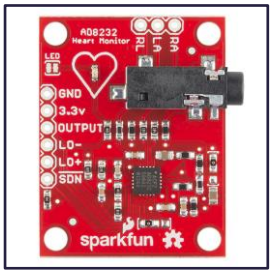


Figure 1 : AD8232 board

Information about this board is available on this website : AD8232 (Rev. D) (analog.com)

A tutorial to program this board with Arduino is available here : AD8232 Heart Rate Monitor Hookup Guide - SparkFun Learn

- This board is used to measure the electrical activity of the heart.
- 2-3 electrode configurations available
- Leads-off detection is available
- It is possible to use this board with Arduino IDE to show heart rate waveform

Figure 2: Example of a heart rate displayed thanks to this board *(https://cdn.sparkfun.com/r/500-500/assets/0/d/f/d/0/HeartRate_Normal.png)*

ℹ To use this electronic board, we need to connect a micro pro Arduino Board and a FTDI Basic board:

Figure 3 : FTDI Basic board

ECG front end : AD8232 Evaluation board

Figure 4 : AD8232 Evaluation Board

Datasheet of this board : AD8232 Datasheet and Product Info | Analog Devices & ad8232.pdf (analog.com)

Evaluation Board user guide : UG-514 (analog.com)

- Single lead ECG front end
- 2-3 electrodes configurations
- Remove additional noise
- Biopotential signal acquisition (This is the process of capturing electrical signals generated by living organisms. For example, we can record ECG, brain activity, muscle contractions or even eye movement)

Feather M0 – Development board

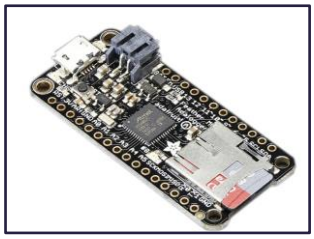


Figure 5 : Feather M0 board

Feather M0 Adafruit Pinout guide : 2796_pinout_v1_0 (rs-online.com)

Feather M0 Adafruit datasheet : Atmel | SMART SAM D21 Datasheet (rs-online.com)

Feather M0 Adafruit user guide : 0900766b81533fc5.pdf (rs-online.com)

- Development board
- MicroSD card holder included
- Lipoly battery (3.7V)
- It can be used with Arduino IDE

Heart rate & BLE : MAX86165EVKIT

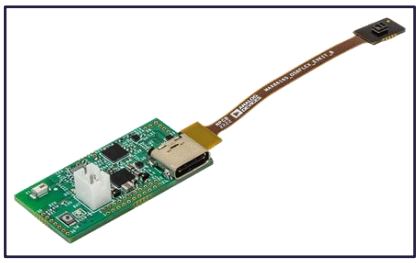


Figure 6 : Max86165EVKIT board

More information about this board : MAX86165EVKIT Evaluation Board | Analog Devices

Datasheet of this board : MAX86165 Evaluation System - Evaluates: MAX86165 (analog.com)

- Evaluation kit
- Heart rate detection
- LED driver with an IR emitter
- On board accelerometer
- Bluetooth Low Energy (LE)

ECG & PPG :AFE4950EVM

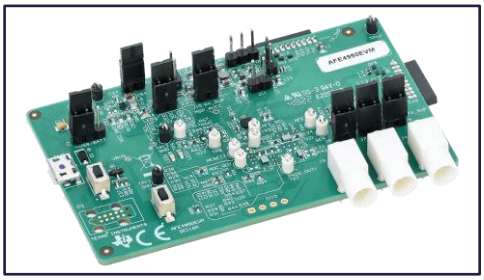


Figure 7 : AFE950EVM board

Figure 8 : electrodes and cable

More information about this board : AFE4950EVM Evaluation board | TI.com

Datasheet of the main component: afe4950.pdf (ti.com)

- Evaluation board
- HRM, ECG & PPG
- Pulse oximetry measurements

ECG, PPG & BLE : AS7058 EVALUATION KIT

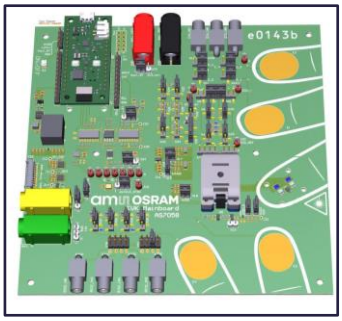


Figure 7 : AS7058 board

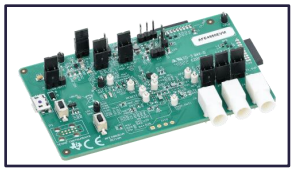
More information about this board : AS7058_EVALUATION_KIT_ams-OSRAM_USA_INC._| Development Boards, Kits, Programmers | DigiKey

Datasheet of the main component: AS7058_EVK_UG001052_1-00.pdf (ams-osram.com)

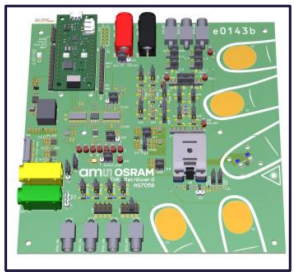
- Evaluation board
- ECG & PPG
- Bluetooth Low Energy Board

CONCLUSION

AS7058 board and AFE950EVM board are the best. In fact, ECG and PPG can be monitored with these boards.



AFE950EVM board would be the best for a baby because we can use electrodes. But, there is no Bluetooth module included on the board.



AS7058 board is good because there is a Bluetooth module. But, the way to collect data is not easy to use with babies. The solution could be to use wire and a new connector.