

## Grove - Ear-clip Heart Rate Sensor



The Heart Rate Ear clip kit contains a ear clip and a receiver module. The heart rate measure kit can be used to monitor heart rate of patient and athlete. The result can be displayed on a screen via the serial port and can be saved for analysis. The entire system is a high sensitivity, low power consumption and portable.

### Features

- Low power consumption
- Convenient to use
- High sensitivity
- Fully RoHS compliant

### Tip

More details about Grove modules please refer to [Grove System](#)


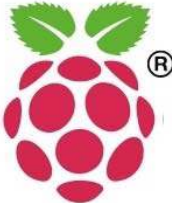



## Specifications

Item	Min	Typical	Max	Unit
Voltage	3.0	5.0	5.25	V
Work Current	6.5			mA
Length of ear clip wire	120			cm
Measures Range	≥30/min			-

## Application Ideas

- Heart rate monitor.

## Platforms Supported

Arduino	Raspberry Pi	BeagleBone	Wio	LinkIt ONE
				

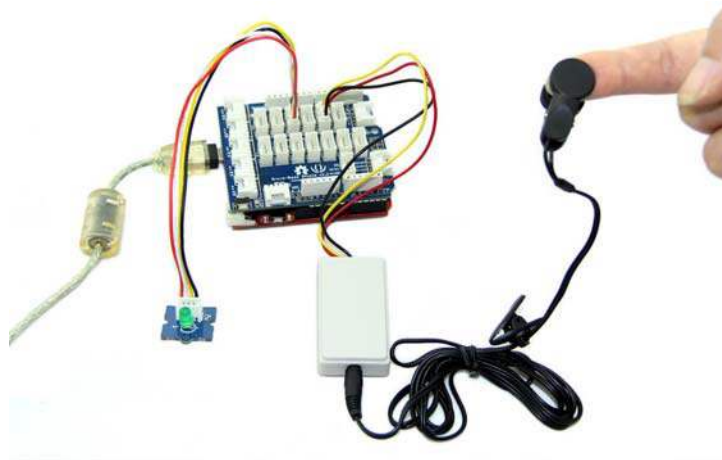
### Caution

The platforms mentioned above as supported is/are an indication of the module's software or theoretical compatibility. We only provide software library or code examples for Arduino platform in most cases. It is not possible to provide software library / demo code for all possible MCU platforms. Hence, users have to write their own software library.

## Usage

The following sketch demonstrates a simple application of using the Ear-clip Heart Rate Sensor to measure heart rate.

- Connect this module to the digital port D2 on [Grove-Base shield](#). And connect Grove-LED to Digital port 4.
- Plug the Base Shield into Arduino/Seeeduino.



- Copy and paste code below to a new Arduino sketch.

```

1 // Function: This program can be used to measure heart rate, the lowest pulse in the program be set
2 to 30.
3 // Use an external interrupt to measure it.
4 // Hardware: Grove - Ear-clip Heart Rate Sensor, Grove - Base Shield, Grove - LED
5 // Arduino IDE: Arduino-1.0
6 // Author: FrankieChu
7 // Date: Jan 22, 2013
8 // Version: v1.0
9 // by www.seeedstudio.com
10 #define LED 4//indicator, Grove - LED is connected with D4 of Arduino
11 boolean led_state = LOW;//state of LED, each time an external interrupt
12 //will change the state of LED
13 unsigned char counter;
14 unsigned long temp[21];
15 unsigned long sub;
16 bool data_effect=true;
17 unsigned int heart_rate;//the measurement result of heart rate
18
19 const int max_heartpluse_duty = 2000;//you can change it follow your system's request.
20 //2000 meams 2 seconds. System return error
21 //if the duty overtrip 2 second.
22 void setup()
23 {
24     pinMode(LED, OUTPUT);
25     Serial.begin(9600);
26     Serial.println("Please ready your chest belt.");
27     delay(5000);
28     arrayInit();
29     Serial.println("Heart rate test begin.");
30     attachInterrupt(0, interrupt, RISING);//set interrupt 0,digital port 2
31 }
32 void loop()
33 {
34     digitalWrite(LED, led_state);//Update the state of the indicator
35 }
36 /*Function: calculate the heart rate*/
37 void sum()
38 {
39     if(data_effect)

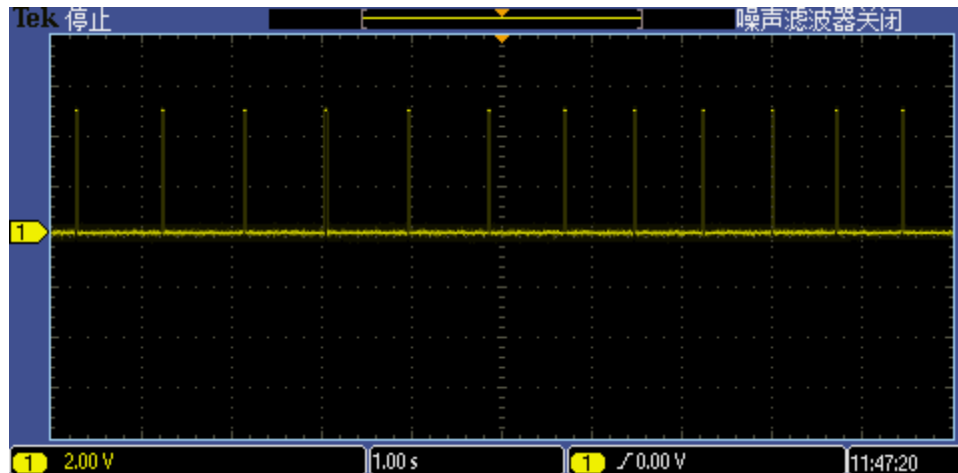
```

```

40  {
41    heart_rate=1200000/(temp[20]-temp[0]);//60*20*1000/20_total_time
42    Serial.print("Heart_rate_is:\t");
43    Serial.println(heart_rate);
44  }
45  data_effect=1;//sign bit
46 }
47 /*Function: Interrupt service routine.Get the signal from the external interrupt*/
48 void interrupt()
49 {
50   temp[counter]=millis();
51   Serial.println(counter,DEC);
52   Serial.println(temp[counter]);
53   switch(counter)
54   {
55     case 0:
56       sub=temp[counter]-temp[20];
57       Serial.println(sub);
58       break;
59     default:
60       sub=temp[counter]-temp[counter-1];
61       Serial.println(sub);
62       break;
63   }
64   if(sub>max_heartpluse_duty)//set 2 seconds as max heart pluse duty
65   {
66     data_effect=0;//sign bit
67     counter=0;
68     Serial.println("Heart rate measure error,test will restart" );
69     arrayInit();
70   }
71   if (counter==20&&data_effect)
72   {
73     counter=0;
74     sum();
75   }
76   else if(counter!=20&&data_effect)
77     counter++;
78   else
79   {
80     counter=0;
81     data_effect=1;
82   }
83 }
84 }
85 /*Function: Initialization for the array(temp)*/
86 void arrayInit()
87 {
88   for(unsigned char i=0;i < 20;i ++)
89   {
90     temp[i]=0;
91   }
92   temp[20]=millis();
93 }

```

- Upload the code.
- Make sure the sensor contacts your ear skin. This is the signal when we are measuring the heart rate:



```
COM5
Send
17
31166
1113
18
32206
1040
19
33278
1072
20
34433
1155
Heart_rate_is: 53
0
35236
803
Autoscroll No line ending 9600 baud
```

In the first of the figures, which is a waveform diagram of the detected heartbeat, a high pulse comes when beating.

## Note

If the serial monitor return an error message, please change the position of the sensor.

## Resources

- [Grove - Ear-clip Heart Rate Sensor Demo code](#)
- [PPG Sensor System](#)

## Projects

**Transportation data visualization with Google Map** : We use the Wio LTE cat.1 to monitor transportation GPS and other info. For cold chain, we can monitor the GPS location together with temperature and humidity. For the bicycling, we can monitor the GPS location together with the hear rate.

## Tech Support

Please submit any technical issue into our [forum](#) or drop mail to [techsupport@seeed.cc](mailto:techsupport@seeed.cc).