



# Grove - Ear-clip Heart Rate Sensor

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Version : 1.0

Wiki: [http://www.seeedstudio.com/wiki/Grove - Heart rate ear clip kit](http://www.seeedstudio.com/wiki/Grove_-_Heart_rate_ear_clip_kit)

Bazaar: <http://www.seeedstudio.com/depot/Grove-Earclip-Heart-Rate-Sensor-p-1116.html>

## Document Revision History

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Revision	Date	Author	Description
1.0	Sep 21, 2015	Victor.He	Create file

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### *Disclaimer*

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## 1. Introduction

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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.



## 2. Features

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

### 3. Specifications

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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			-

## 4. Application Ideas

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- Heart rate monitor.

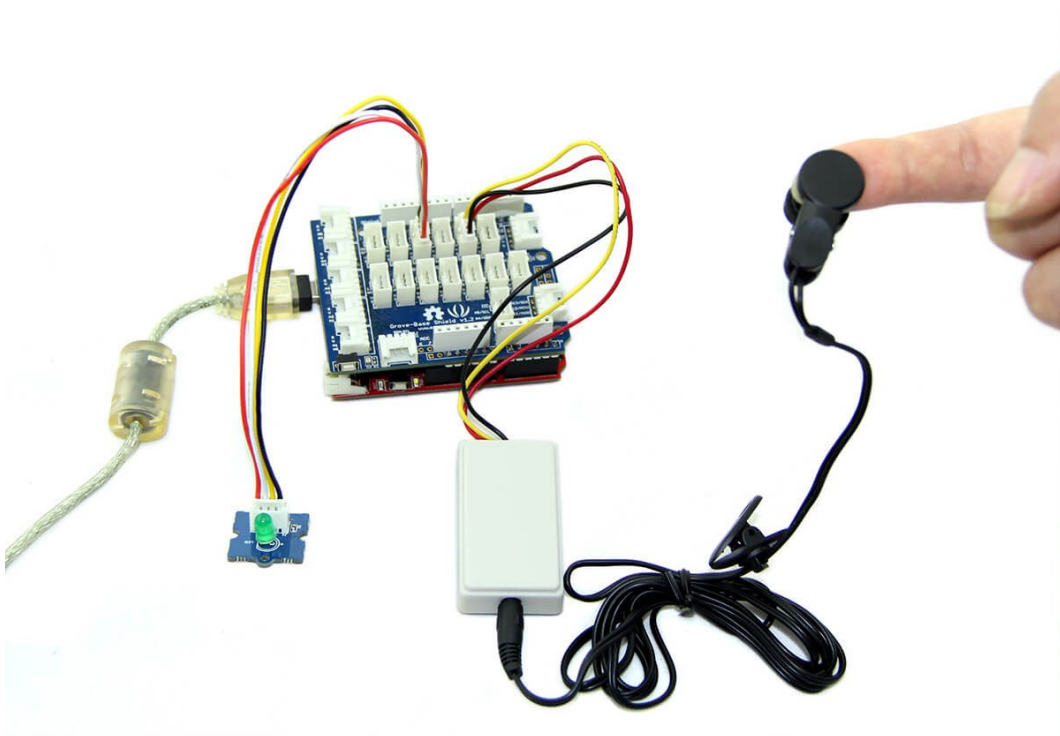


## 5. Usage

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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.

```
// Function: This program can be used to measure heart rate, the lowest pulse in the program be set to 30.
//      Use an external interrupt to measure it.
// Hardware: Grove - Ear-clip Heart Rate Sensor, Grove - Base Shield, Grove - LED
// Arduino IDE: Arduino-1.0
// Author: FrankieChu
// Date: Jan 22, 2013
// Version: v1.0
// by www.seeedstudio.com
#define LED 4//indicator, Grove - LED is connected with D4 of Arduino
boolean led_state = LOW;//state of LED, each time an external interrupt
```

```

//will change the state of LED
unsigned char counter;
unsigned long temp[21];
unsigned long sub;
bool data_effect=true;
unsigned int heart_rate;//the measurement result of heart rate

const int max_heartpluse_duty = 2000;//you can change it follow your
system's request.
//2000 meams 2 seconds. System return error
//if the duty overtrip 2 second.
void setup()
{
  pinMode(LED, OUTPUT);
  Serial.begin(9600);
  Serial.println("Please ready your chest belt.");
  delay(5000);
  arrayInit();
  Serial.println("Heart rate test begin.");
  attachInterrupt(0, interrupt, RISING);//set interrupt 0,digital port
  2
}
void loop()
{
  digitalWrite(LED, led_state);//Update the state of the indicator
}
/*Function: calculate the heart rate*/
void sum()
{
  if(data_effect)
  {
    heart_rate=1200000/(temp[20]-temp[0]);//60*20*1000/20_total_time
    Serial.print("Heart_rate_is:\t");
    Serial.println(heart_rate);
  }
  data_effect=1;//sign bit
}
/*Function: Interrupt service routine.Get the sigal from the external
interrupt*/
void interrupt()
{
  temp[counter]=millis();
  Serial.println(counter,DEC);
  Serial.println(temp[counter]);
}

```

```

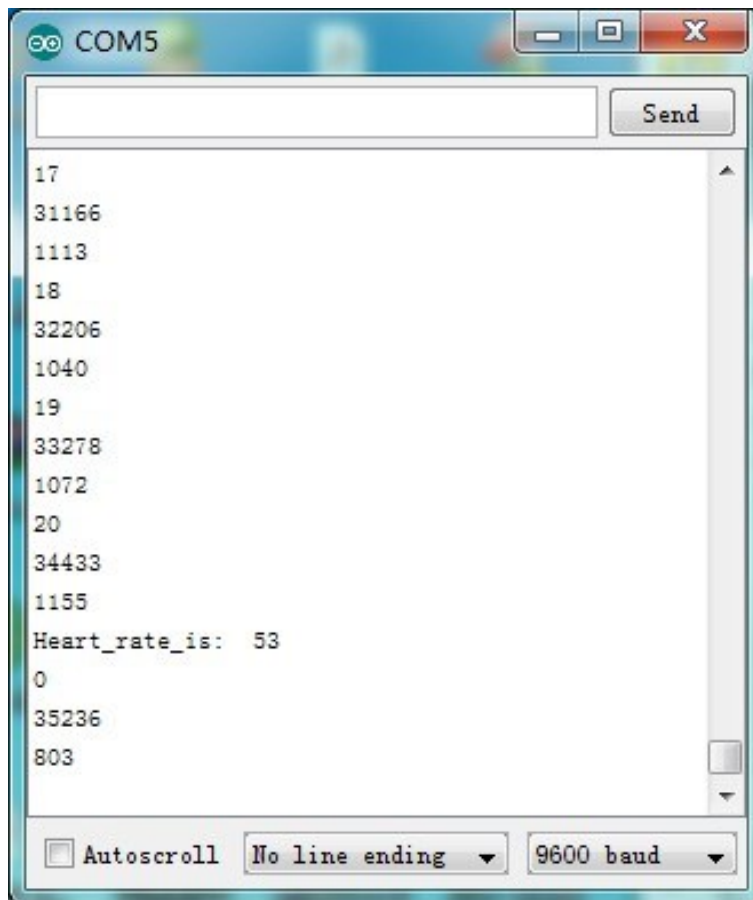
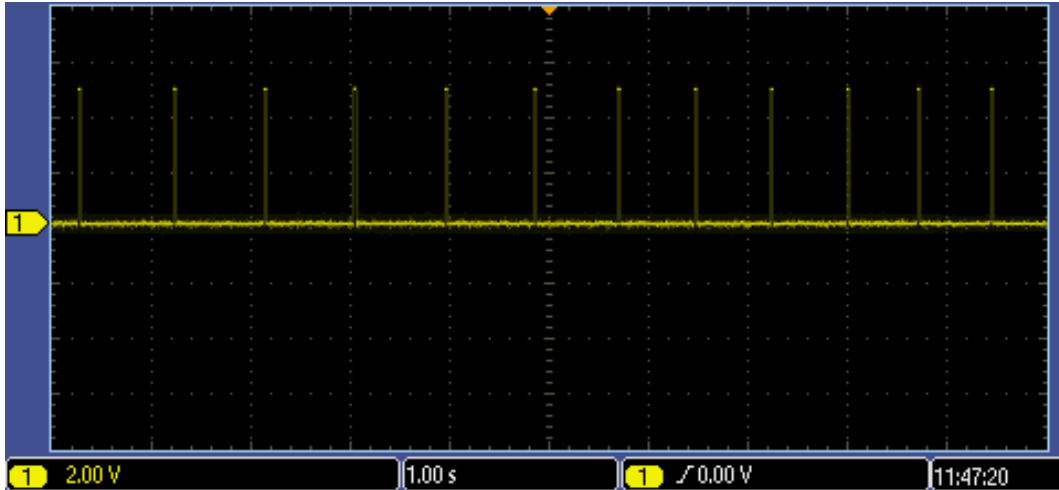
switch (counter)
{
case 0:
    sub=temp[counter]-temp[20];
    Serial.println(sub);
    break;
default:
    sub=temp[counter]-temp[counter-1];
    Serial.println(sub);
    break;
}
if(sub>max_heartpluse_duty)//set 2 seconds as max heart pluse duty
{
    data_effect=0;//sign bit
    counter=0;
    Serial.println("Heart rate measure error,test will restart!" );
    arrayInit();
}
if (counter==20&&data_effect)
{
    counter=0;
    sum();
}
else if(counter!=20&&data_effect)
counter++;
else
{
    counter=0;
    data_effect=1;
}
}
/*Function: Initialization for the array(temp)*/
void arrayInit()
{
    for(unsigned char i=0;i < 20;i ++)
    {
        temp[i]=0;
    }
    temp[20]=millis();
}

```

- Upload the code, please click here if you do not know how to upload.

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

In the left 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.



## 6. Resources

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