



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

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

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Under the supervision of Seeed Technology Inc., this manual has been compiled and published which covered the latest product description and specification. The content of this manual is subject to change without notice.

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1. Introduction

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

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

3. 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			-

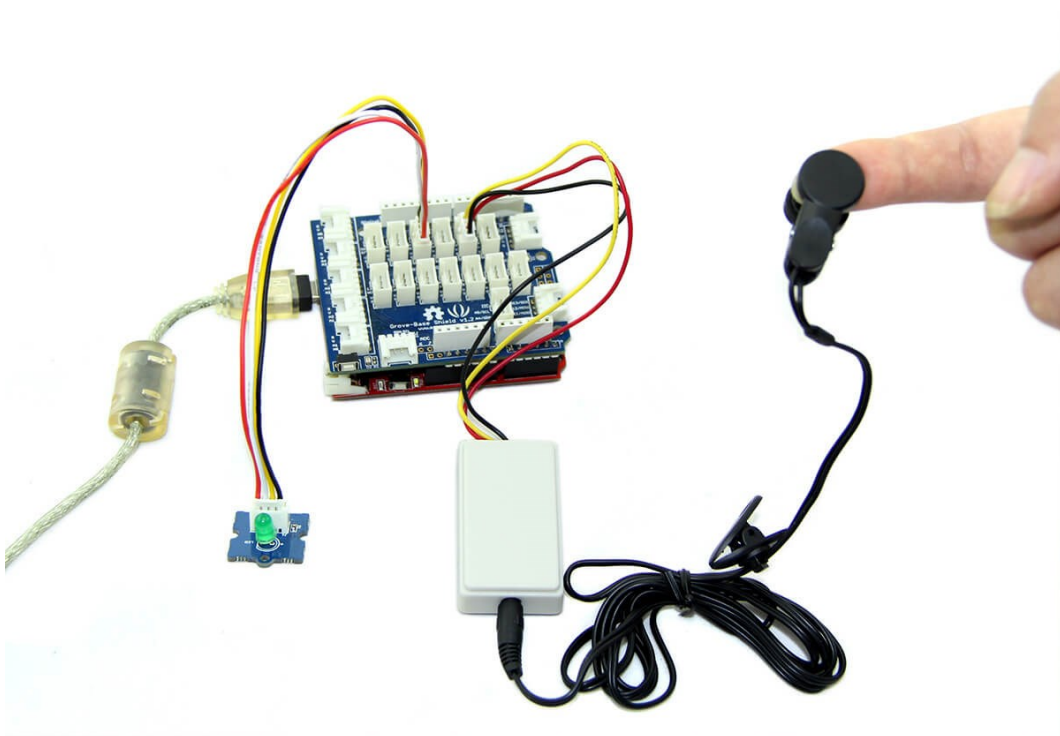
4. Application Ideas

- Heart rate monitor.

5. 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.

```
// 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]);
}

```

```

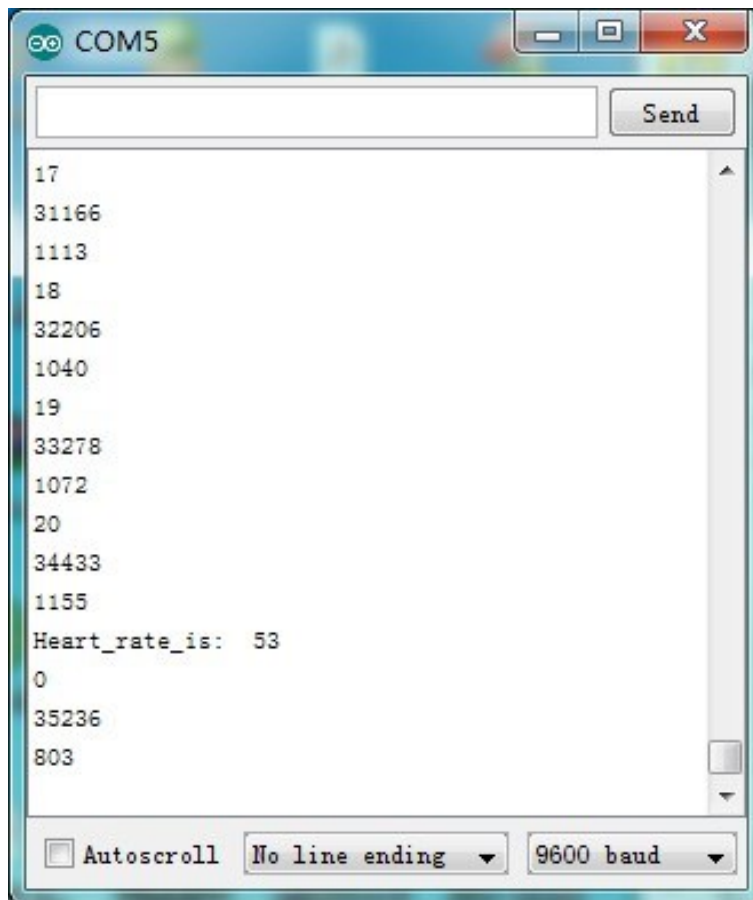
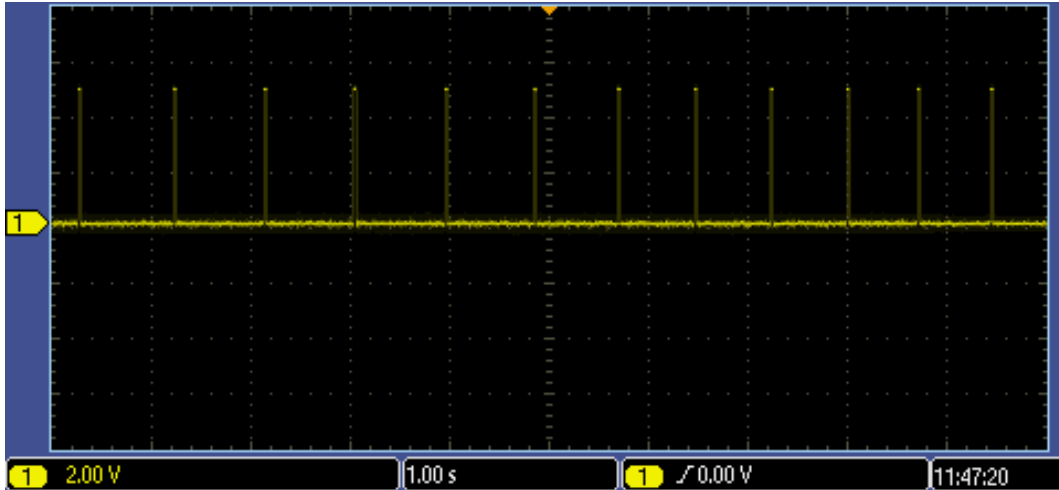
switch (counter)
{
case 0:
    sub=temp[counter]-temp[20];
    Serial.println(sub);
    break;
default:
    sub=temp[counter]-temp[counter-1];
    Serial.println(sub);
    break;
}
if(sub>max_heartpluse_duty)//set 2 seconds as max heart pluse duty
{
    data_effect=0;//sign bit
    counter=0;
    Serial.println("Heart 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

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

7. Support

If you have questions or other better design ideas, you can go to our [forum](#) or [wish](#) to discuss.

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