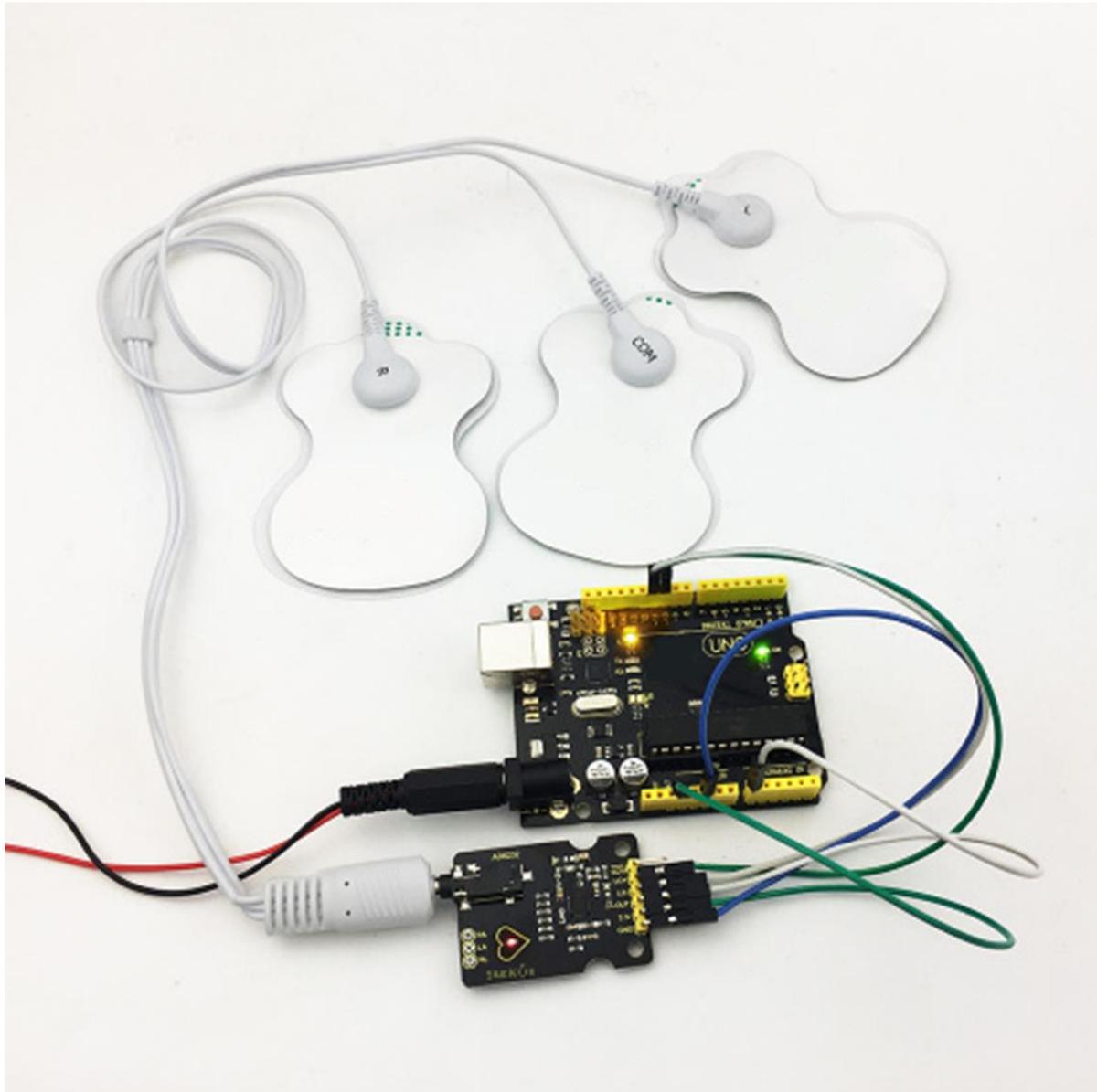


geekÜs

Heart Measurement Monitor Sensor Module

GK-HEART-AD8232

NOT A MEDICAL DEVICE



Technical Manual

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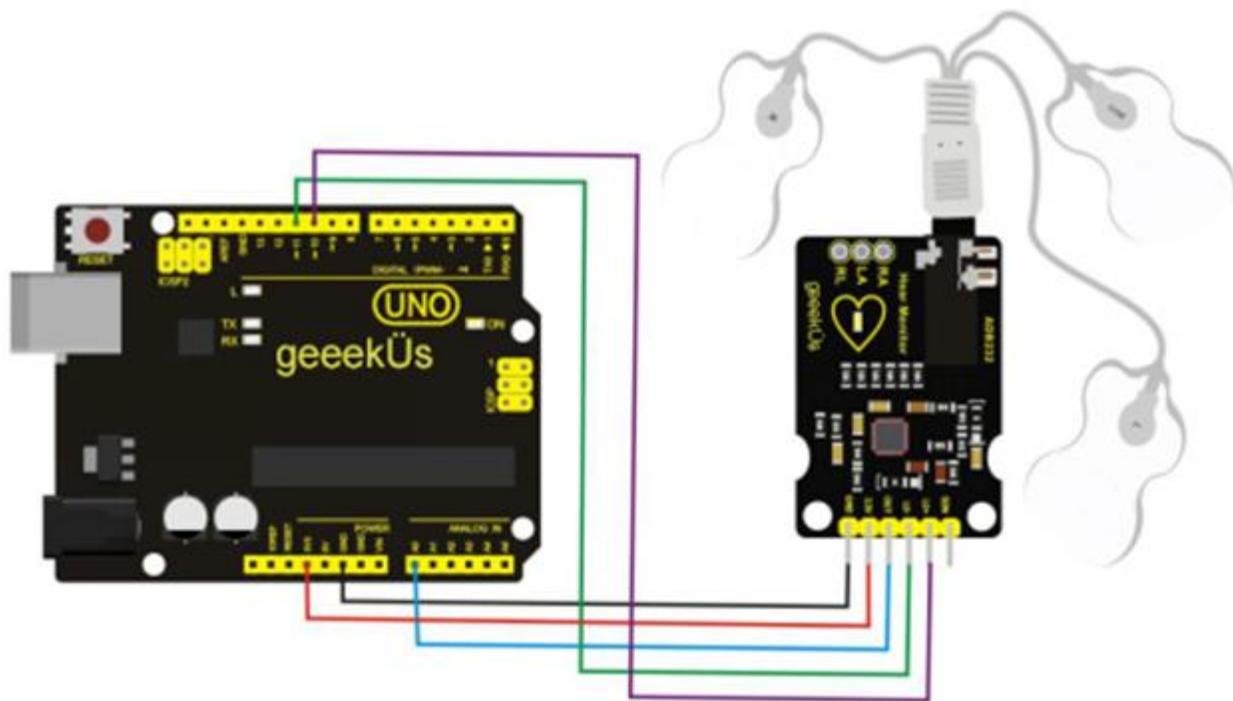
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Introduction

GK-HEART-AD8232 is a heart measurement monitor sensor module utilized to measure heart rate with the use of *Gold Hand healthy-pads*, Arduino UNO, and the AD8232 module. The device is front end, low in cost and power consumption, and monitors all types of vital signs through conditioning of cardiac bioelectrical signals.

Setting Up the Device

The connection diagram below demonstrates the wiring of the device between an Arduino UNO and an AD8232:



SDN: Unconnected

LO+: ~10

LO-: ~11

OUT: A6

3.3V: 3.3V

GND: GND

*Note: “~” symbol simply means that the pin could be used for PWM (Pulse-Width-Modulation), which in this case is what’s desired for the output because it will behave as analog.

AD8232 Specifications

- AD8232 Power Voltage: 3.3VDC
- AD8232 Working Temperature: -40°C to 85°C (-40°F to 185°F)
- Output Type: Analog

Refer to *AD8232 (Rev. D)* datasheet for more technical information



Programming Guide

Begin by burning the following code onto the Arduino UNO with the use of Arduino IDE:

```
void setup() {
  Serial.begin(9600); //Initialize serial communication at a baud rate of
  9600.
  pinMode(10, INPUT); //Set LO+ pin for input.
  pinMode(11, INPUT); //Set LO- pin for input.
}

void loop() {
  if((digitalRead(10) == 1)|| (digitalRead(11) == 1)){
    Serial.println('!');
  }
  else{
    Serial.println(analogRead(A0)); //Print the value obtained of analog
input 0.
  }
  delay(1); //Delay to prevent serial data saturation.
}
```

After the code has been uploaded to the Arduino device, find the name of the port it is connected to (e.g., COM1, COM3, COM5...). This can be done by opening Windows' *Device Manager* and looking into the branch "Ports".

The following sample code provides a guide on how to setup the display of the heartbeat:

```
import processing.serial;
Serial myPort; //Initiating the serial port.
int xPos = 1; //Variable for the position in the graph along the x
coordinate.
float height_old = 0;
float height_new = 0;
float inByte = 0;
```

```
void setup () {
  size(1000, 400); //Setting the size of the pop-up window display.
  myPort = new Serial(this, Serial.list()[5], 9600); //Open the COM port
  used by the Arduino.
  myPort.bufferUntil('\n'); //Prevent serialEvent() function execution
  unless a new line is made.
  background(0xff); //The color of the graph's background - white.
}

void draw () {
  //Function exists only to execute serialEvent();
}

void serialEvent (Serial myPort) {
  String inString = myPort.readStringUntil('\n'); //Obtain the ASCII string.

  if (inString != null) { //If no character detected, trim the whitespace.
    inString = trim(inString);

    if (inString.equals("!")) { //If no detected activity in the heartbeat,
    execute.
      stroke(0, 0, 0xff); //Set the color of the line to blue with RGB
      colorcode.
      inByte = 512; //Variable for the middle of the ADC range to display
      the blue flatline.
    }
    else { //Activity detected, execute.
      stroke(0xff, 0, 0); //Set the color of the heart stroke to red.
      inByte = float(inString);
    }

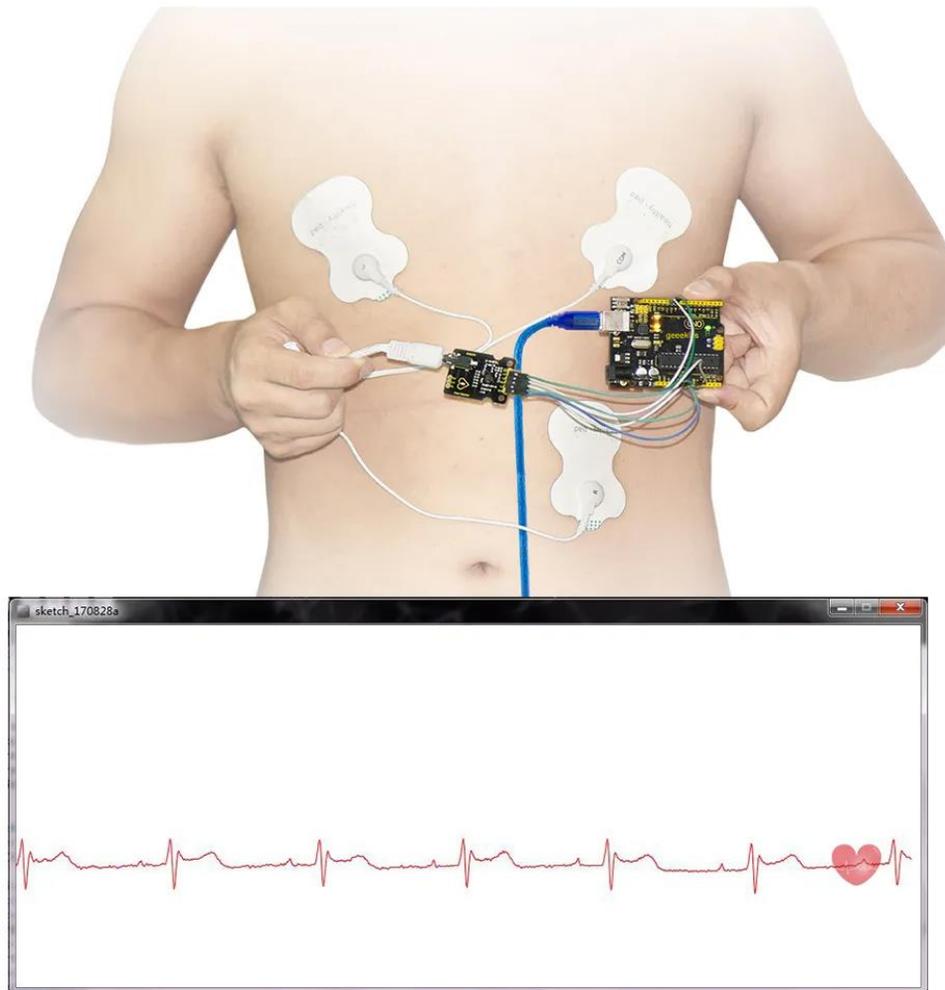
    inByte = map(inByte, 0, 1023, 0, height); //The following four lines
    map and draw the heart stroke.
    height_new = height - inByte;
    line(xPos - 1, height_old, xPos, height_new);
    height_old = height_new;

    if (xPos >= width) { //If the stroke reaches the end of the screen,
    execute.
      xPos = 0; //Variable responsible for the position of the stroke -
      starting from the left.
      background(0xff);
    }
    else { //Otherwise, execute.
      xPos++; //Continue drawing the stroke.
    }
  }
}
```

To view the heartbeat in real time, an application Processing.exe must open the sample code and run it.

Output Results

Before running the code on Processing.exe, the pads must be applied to the body as follows: L against the right chest, R against the left chest, COM in near the abdomen (refer to image below). When Processing.exe runs the sample code, the following window should pop up to display the heartbeat as shown in the following:



The heartbeat LED will also flash in rhythm with the rate of the heart.