

Heart Beat Detector using Infrared Pulse Sensor

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Abstract— The heart rate or pulse rate, has been defined as a sign basic of medicine, and it is directly to a humans cardio health. Now we are going to make a computer – based heart rate monitor system using an Arduino software board and Pulse sensor, pulse detecting sensor that uses the principle by the Arduino, then it transfers the data to the computer through a serial monitor. A computer application is developed using processing programming java language to display the received PPG signal and instantaneous heart pulse rate. Of transmission photo-plethysmography (PPG) to sense the pulse signals from a fingertip. The sensor output is read by the Arduino board, which then transfers the data to the PC through a serial interface. A PC application is developed using Processing programming language to display the received PPG signal and instantaneous heart rate.

Key words: Arduino Software, Java Program, Infrared Emitter, Pulse Monitor

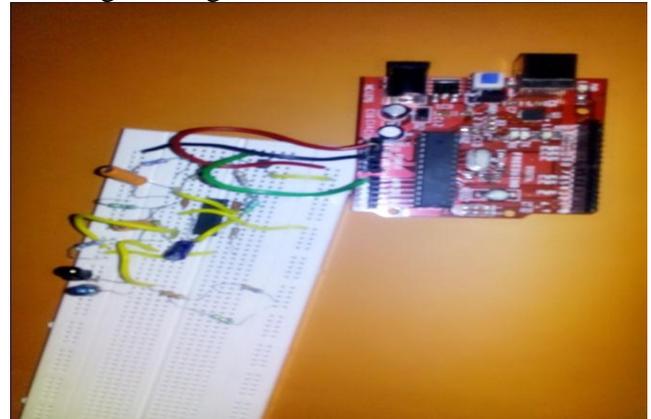


Fig. 2: Hardware IR

I. INTRODUCTION

Electronically there are many ways to detect a heartbeat generally heart beats 72 times per minute. One of the simpler ways is to take Arduino method. It is built a pulse detector using a few basic simple materials and an Arduino. This circuit uses a method known as PPG..while blood is pumped through our body. The volume of blood in our extremes increases and decreases with each heart rate. This approach uses a photo source and a detector to establish variations in the amount of blood in our extremes. In our case .Arduino is using the finger. Arduino board a finger cuff containing an infrared LED and a photodiode. These components reside on opposite sides of the finger. The IR LED shines light through the finger while the photodiode detects it on the other side. The photodiode detects changes in the amount of light as blood pumps in and out of the finger. An IR emitter/detector combo measure the amount of IR light reflected b terminal device blood circulating in our finger. The result is cleaned up by two op-amps amplified by a three (transistor) and then connect down a wire where it can be read by a oscilloscope.

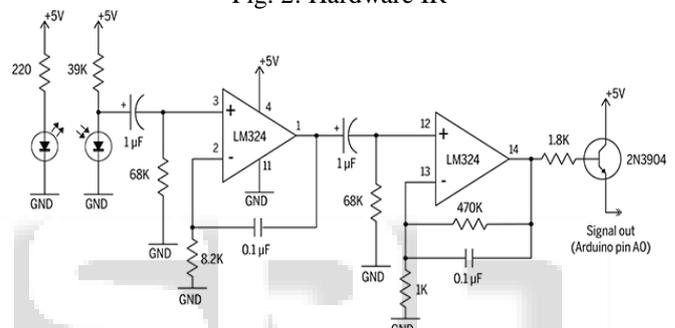


Fig. 3: Circuit Diagram

The sensor consists of an IR emitter and detector connected side-by-side and compressed closely against the skin. When the heart pumps, blood pressure rises accurately, and so does the amount of IR light from the emitter that gets reflected back to the detector.

When a detector receives more light it gives more current. Which in turn causes a voltage drop to enter the amplifier circuit. This design uses two consecutive (“op-amps”) to show a steady baseline for the signal, emphasize the peaks, and filter out noise. Two op-amps are having in a single circuit (IC or “chip”) and connecting them is really a matter of interconnecting the pins accurately.



Fig. 1: Diagram of IR Pulse Sensor

II. PROPOSED METHOD

The Project is proposed in Hardware IR pulse sensor with symbolic op-amp representation the circuit diagram consist of following components.

III. MAJOR COMPONENTS USED

Major component used in this project is ARDUINO software



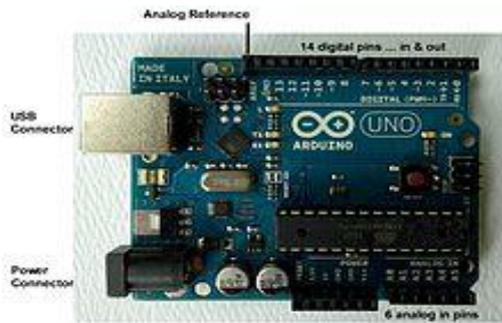


Fig. 4: Major Components

Arduino is an open source prototype based on easy-to-use both hardware and software. Arduino boards are able to read inputs – light on a sensor, a finger on a button, or a message – and turn it into an output – activating a motor, turning on a LED. We can give instruction to the microcontroller on the board. To do as you use the arduino software programming language (based on wiring) and the Arduino software (IDE) based on java processing

Arduino software has been the main for several projects from basic equipments to complex scientific instruments.

Arduino was born at the Interaction Design Institute as an easy tool for fast, programming aimed at students without a background in electronics and programming. In short period of time it reached a wider in all over the world, the Arduino board started developing in technology day by day, differentiates its offer from basic 8-bit boards to products for lot of applications, 3D printing, and embedded environments. Arduino boards are fully open –source, empowering users to build them independently. The software, too, is open-source, and it is growing through the contributions of users.

IV. SOFTWARE CODING

```
// Based on examples from Arduino's Graphing Tutorial and
OscP5 documentation
import processing.serial.*;
Serial myPort; // The serial port
int xPos = 1; // horizontal position of the graph
float oldHeartrateHeight = 0; // for storing the previous
reading
void setup ()
{
  // set the window size:
  size(600, 400);
  frameRate(25);
  // List available serial ports.
  println(Serial.list());
  // Setup which serial port to use.
  // This line might change for different computers.
  myPort = new Serial(this, Serial.list()[0], 9600);
  // set initial background:
  background(0);
}
void draw () {
}
void serialEvent (Serial myPort) {
  // read the string from the serial port.
  String inString = myPort.readStringUntil('\n');
  if (inString != null) {
```

```
    // trim off any whitespace:
    inString = trim(inString);
    // convert to an int
    println(inString);
    int currentHeartrate = int(inString);
    // draw the Heartrate BPM Graph.
    float heartrateHeight = map(currentHeartrate, 0, 1023,
    0, height);
    stroke(0,255,0);
    line(xPos - 1, height - oldHeartrateHeight, xPos, height -
    heartrateHeight);
    oldHeartrateHeight = heartrateHeight;
    // at the edge of the screen, go back to the beginning:
    if (xPos >= width) {
      xPos = 0;
      background(0);
    } else {
      // increment the horizontal position:
      xPos++;
    }
  }
}
```

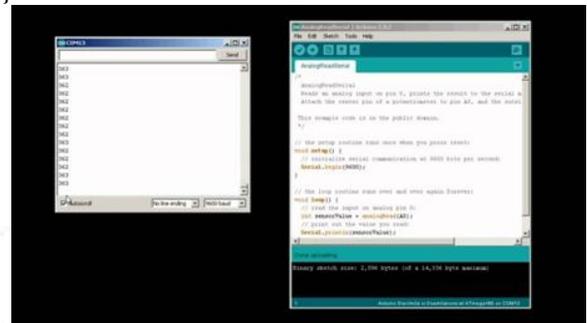


Fig. 5: Screenshot

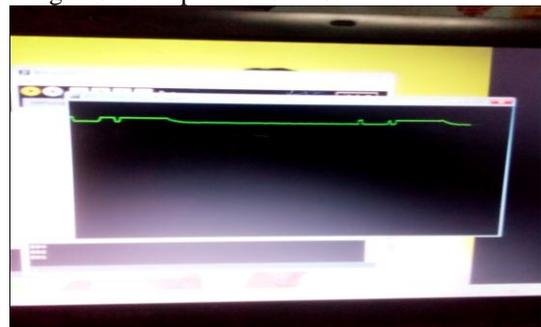
The Simple Serial Reporter reads values from terminal pin AO and passes them down the USB cable to your PC as numbers between 0 and 1024, 0 corresponds to a reading of 0V, and 1024 to a reading of 5V. Once it's running correctly on our Arduino, we can close the Arduino software. The program now lives on the board and it will run whenever the Arduino is powered until you overwrite it with something else.

The 32-bit version of Processing is required; just unpack the archive in a convenient folder and double-click the executable file “processing” within. Grab IR Pulse Sensor. Pde from open it from inside Processing, and click the button to run it. Slip the cable clip over your thumb or finger. We need proper contact between our skin and emitter and detector.

A. Output

1) Case 1:

When finger is not kept the result is



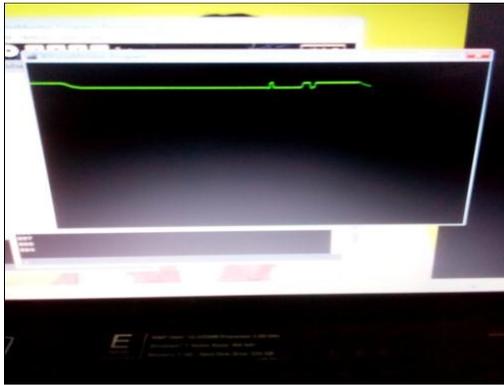


Fig. 6: When finger is not kept the result is

2) Case 2:

When Paper is kept

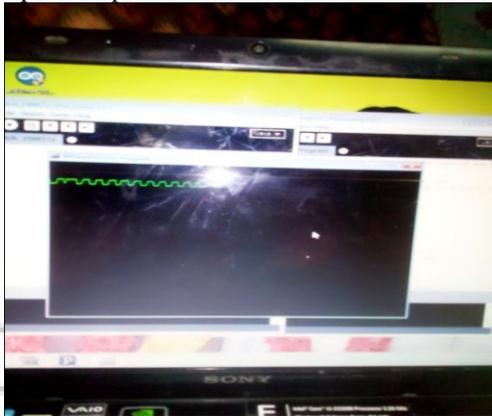


Fig. 7: When Paper is kept

3) Case 3:

When finger is kept

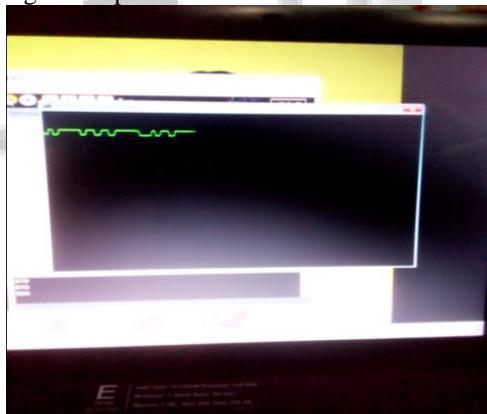


Fig. 8: When finger is kept

V. FUTURE SCOPE

Sensor is made up to an op amp circuit in order to convert the varying current to a voltage. The signal is then filtered and amplified. An Arduino software detects the voltage changes and transmits the data's to a computer via serial. (Arduino) has written both a Lab VIEW program.

VI. CONCLUSION

There are various scopes to take this project further, many in software alone. The simple IR Pulse Sensor display a "sweep" of the signal from the sensor. If we need to record the information, we could add code to write the serial values to a file, as well.

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