Green University of Bangladesh

Department of Computer Science and Engineering (CSE)

Semester: (Spring, Year: 2024), B.Sc. in CSE (Day)

Pulse Rate Sensor

Course Title: Digital Logic Design
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Students Details

Name	ID
Promod Chandra Das	231002005
Md.Miadul islam nizzan	231902032

Submission Date: 09-06-2024
Course Teacher's Name: Md.Shihab Hossain
[For teachers use only: Don't write anything inside this box]

Lab Project Status	
Marks:	**Signature:**
Comments:	**Date:**

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Chapter 1

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1.1 Abstract

A pulse sensor is a device that measures the heartbeat rate by detecting the pulsations of blood flow in a person's body. It is commonly used in medical settings,fitness trackers and wearable devices to monitor heart and provide information about person's cardio-vascular health. A bread-board is a construction base for prototyping of electronics. It is used for temporary prototyping and experimenting with circuit diagram.Resistor is a passive component used to control current in a circuit. Its resistance is given by the ratio of voltage applied across its terminals to the current passing through it.LED means "Light-Emitting Diode." An LED is an electronic device that emits light when an electrical current is passed through it. LEDs are commonly used for indicator lights (such as power on/off lights) on electronic devices So basically its very important thing and we use it our daily purpose. It also have some electrical things that we have to learn how does it work.

1.2 Objective

i. The objective of this project is to measure heartbeat using LM358 and pulse sensor. [**?**].

1.3 Learning Outcomes

i. First of all understand about the pulse rate.

ii. Learn about the technology behind the sensor.

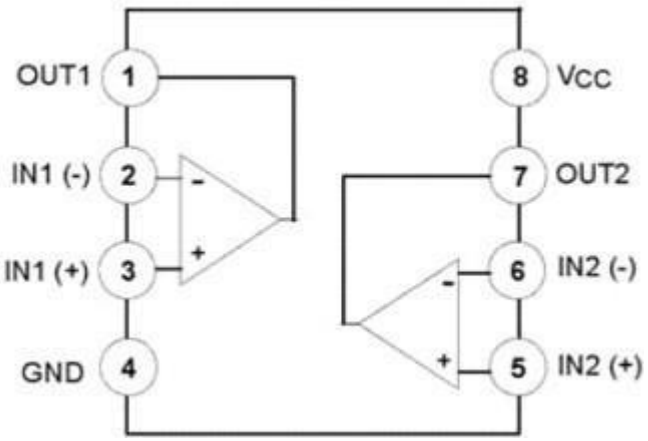
iii. Familiar with all the concept we use .

1.3.1 Brief Theory and Working Procedure

We have right here a capacitor (4.7uF) and resistor (47k) that are connected together in series and we took from it the output to the amplifier so that the signal comes from the pulse sensor pin-3 and we get filtered signal using RC filter and after that the signal goes to the amplifier. We have an amplifier LM358. R=6.8k is connected from the negative terminal of the operational amplifier to the ground and the ground is connected to the negative terminal of the battery and this capacitor (0.1uF) is for filtering the signal that comes out from op amplifier. we have the LED that is connected to the output of the amplifier and we have connected a 330 ohms resistors to lower the voltage that comes from the amplifier because the maximum voltage comes out from the amplifier is 3.7 volts as we connect this amplifier with a supply of 3.7 volts. So, we must lower the voltage using this resistance to allow the current or to give the LED a 2.2v approximately across the pins of the LED.

1.3.2 Sub section

Ic pin Diagram and Explanation:



Pin configuration of LM358:

Pin Number Pin Name Description

1 OUTPUT 1 This pin is the output of first operational amplifier

2 INPUT 1 – This pin is the inverting input of first op-amp

3 INPUT 1 + This pin is the non-inverting input of first op-amp

4 GND or This ground or negative supply to op-amp

5 INPUT 2 + This pin is the non-inverting input of second op-amp

6 INPUT 2 – This pin is the inverting input of second op-amp

7 OUTPUT 2 This pin is the output of the second op-amp

8 This pin is the positive voltage supply to both op-amp

1.4 Pin Configuration:

The heartbeat sensor includes three pins which discussed below.

Pin-1 (GND): Black Color Wire – It is connected to the GND terminal of the system.

Pin-2 (VCC): Red Color Wire – It is connected to the supply voltage (+5V otherwise +3.3V) of the system.

Pin-3 (Signal): Purple Color Wire – It is connected to the pulsating o/p signal.

1.5 Equipment used

1. Capacitor 4.7uF
2. Red LED
3. Resistor 47k,6.8k,680k,330ohm
4. IC LM358
5. Bread Board
6. 3.7 volt Lithium Battery 2 pin header pins
7. Pulse Sensor module
8. Active buzzer
9. Jumper wire
10. 104 Ceramic capacitor (0.1uF)

1.6 Circuit Diagram

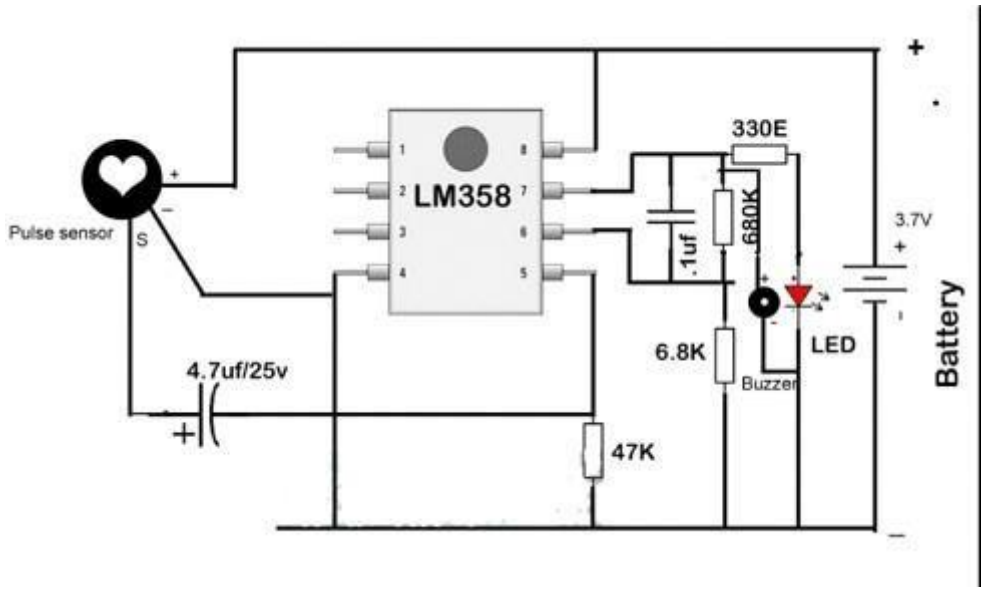
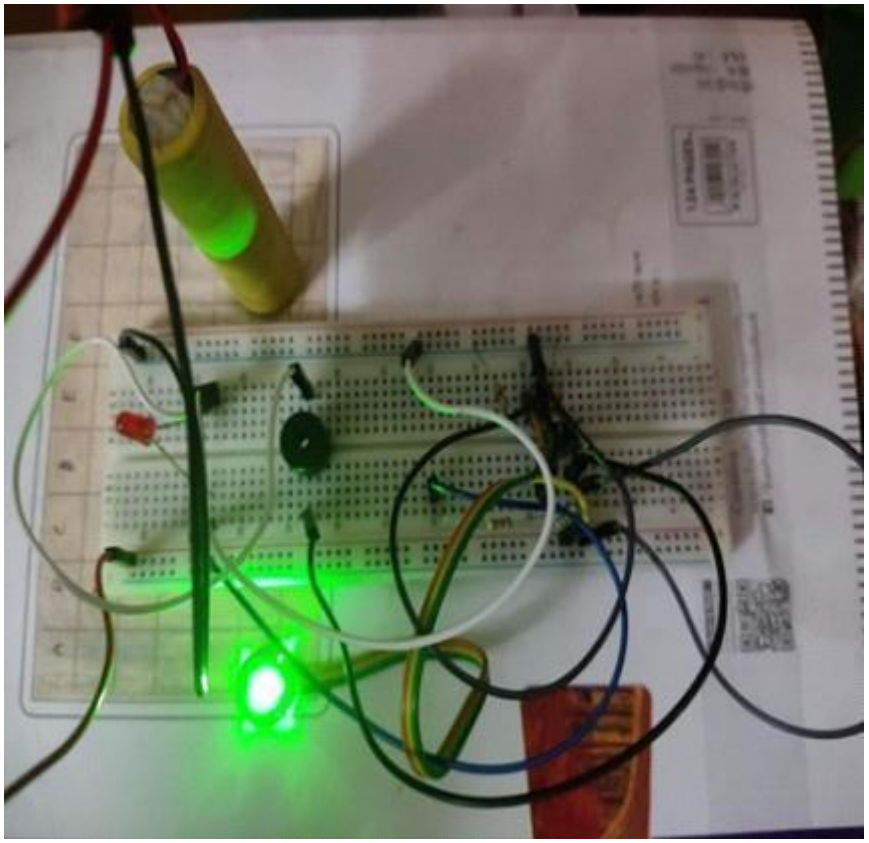


Figure 1: Ideal Circuit

1.7 Result



1.8 Discussion

i. The pulse sensor working principle is very simple. This sensor has two surfaces, on the first surface, the light-emitting diode ambient light sensor is connected. Similarly, on the second surface,the circuit is connected which is accountable for the noise cancellation amplification.

ii. The LED is located above a vein in a human body like ear tip or fingertip,however, it must be located on top of a layer directly.

iii. Once the LED is located on the vein, then the LED starts emitting light.

iv. Once the heart is pumping, then there will be a flow of blood within the veins. So if we check the blood flow, then we can check the heart rates also.

v. If the blood flow is sensed then the ambient light sensor will receive more light as they will be reproduced by the flow of blood. This small change within obtained light can be examined over time to decide our pulse rates.

1.9 Application and Limitations of the Project

1. Sleep Tracking
2. Anxiety Morning
3. Patient Monitoring
4. Alarm System
5. Health Bands
6. Complex Gaming Consoles

1.10 Conclusion and Recommendation for Future Works

A pulse rate sensor project aims to measure the heart rate or pulse of an individual using a photoplethysmography(PPG) sensor. The project involves placing the sensor on a part of the body with good blood flow, such as a fingertrip or earlobe. The sensor emits light into the tissue, which gets absorbed and scattered by the blood vessels. The photodetector detects the light that has passed through or been reflected by the tissue and converts it into an electrical signal. This signal contains fluctuations corresponding to the variations in blood volume caused by the heartbeat.

The raw signal is then processed to extract the pulse rate information,which involves filtering out noise, amplifying the signal,and applying digital signal processing techniques. The pulse rate can be calculated based on the detected peaks or the time interval between consecutive heartbeats. The calculated pulse rate can be displayed on screen , output to a microcontroller or computer or integrated into a larger system.

1.11 References

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