BACHELOR OF ENGINEERING
IN

ELECTRONICS AND INSTRUMENTATION ENGINEERING

MADRAS INSTITIUTE OF TECHNOLOGY CAMPUS
CHROMPET
ANNA UNIVERSITY, CHENNAI 600 044
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A project report
on
"Heart beat Monitor"

For the laboratory
Sensors and Signal Conditioning circuits

Submitted by

MAHIMA .M (2018505528)
NIVETHA .R (2018505532)
RANJITH KUMAR .R (2018505536)
DINESH .D (2018505511)
RAM KISHORE .K.V (2018505535)

Second year Instrumentation engineering.

ANNA UNIVERSITY
MADRAS INSTITUTE OF TECHNOLOGY
CHROMPET, CHENNAI - 600 044

CERTIFICATE

This is to certify that the project entitled **"Heart beat monitor"** has been submitted to the **"Sensors and signal conditioning circuits laboratory"**, Department of instrumentation engineering, Anna university , MIT campus for the fulfillment of the requirement of the award of degree of Bachelor of Engineering in "Instrumentation " by the following student of the second year B.E.

MAHIMA .M (2018505528)
NIVETHA .R (2018505532)
RANJITH KUMAR .R (2018505536)
SIVAGURU .A (2018505542)
RAM KISHORE .K.V (2018505535)

COURSE –IN-CHARGE

ACKNOWLEDGMENT

We would like to thank the supreme power the Almighty God who is obviously the one has always guided us to work on the right path of life. Without his grace this project could not become a reality. Next to him we would like to thank our parents who encouraged us in doing this project. We would like to share our gratitude to our friends who helped us in completion of this project. During the work we faced many challenges due to our lack of knowledge and experience but these people helped us to get over from all the difficulties and in the final compilation of our idea to a shaped sculpture. In the last we would like to thank the management of Madras Institute Of Technology for providing us such an opportunity to learn from these experiences. we have no valuable words to express our thanks, but our heart is still full of the favours received from every person.

ABSTRACT

The project displayed here is designed to monitor the heart beat of a person . The pulse monitoring feature is mainly provided by the pulse sensor. There are several ways in implementing this project. This project is mainly focussed to show how the labview software is used to program a microcontroller (Arduino) and thereby monitoring the heart rate of a person .This project has made use of a special toolkit in labview called “Maker Hub” to program the microcontroller. For connecting with the microcontroller a suitable driver is installed. One can monitor the heart beat of a person by simply looking at the front panel of the labview.

Contents

1. Introduction

1.1 Objective

In this project we are going to design a heart beat monitoring system using the labview software and a microcontroller.

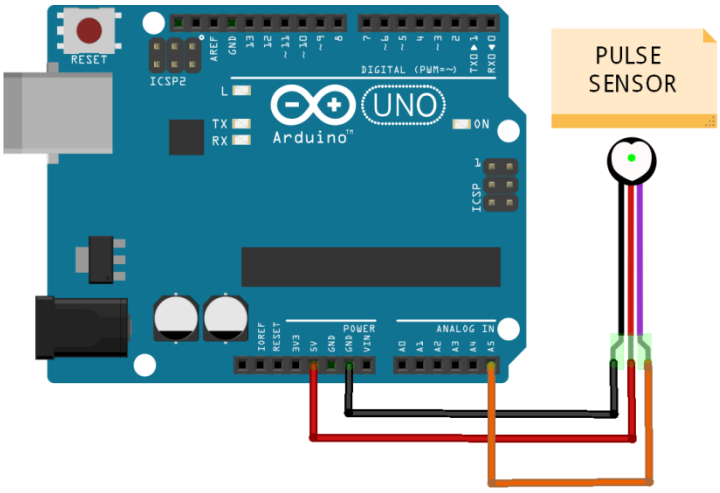
1.2 Materials required

- Pulse sensor
- Arduino uno
- Connecting wire

1.3 Brief introduction

Heart beat monitoring system

In today's world, there is a continuous need for automatic appliances. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Many times we need to monitor our pulse rate in our home itself. To provide solution for this we are going to implement a project called " Heart beat monitoring system" . The Basic concept behind this project is to measure and display theheart beat of a person in a simple way.This Project is useful in our daily life as we can periodically monitor our heart beat.



Heart beat monitoring system

2. Overview of the software

2.1 Labview software (version 19.0)

LabVIEW, short for Laboratory Virtual Instrument Engineering Workbench, is a fully featured Integrated Development Environment (IDE) produced by National Instruments. The programming language is officially named "G" for being graphical even though many refer to the language as LabVIEW. The G language unique in the method by which code is constructed and saved. There is no text based code, but is diagrammatic view of how the data flows through the program. Thus LabVIEW is a much loved tool of the scientist and engineer who can often visualize data flow rather than how a text based conventional programming language must be built to achieve a task.

LabVIEW contains two components:

- The Front Panel
- The Block Diagram

2.2 Front Panel

In LabVIEW, you build a user interface on the **Front Panel** with controls and indicators. Controls are knobs, push buttons, dials, and other input devices. Indicators are graphs, LEDs, and other displays. After you build the user interface, you add code using VIs and structures to control the front panel objects.

2.3 Block Diagram

The **Block Diagram** contains this code. In some ways, the block diagram resembles a flowchart showing the dataflow from one element, or "node", to the next. In text based code, the code inside of a programming structure is enclosed by brackets making it difficult to differentiate what is in the structure and what is out. In LabVIEW this is not the case. Structures, like: While Loops, For Loops, and Case Structures graphically surrounds and encompasses the code that operates within it.

2.4 Linx(version 19.0)

LINX is an open source project by Digilent and is designed to make it easy to develop embedded applications using LabVIEW.

LINX provides easy to use LabVIEW VIs for interacting with common embedded platforms like Arduino, chipKIT and myRIO. Use the built in sensor VIs to start getting data to your PC in seconds or use the peripheral VIs to access your devices digital I/O, analog I/O, SPI, I2C, UART, PWM and more.

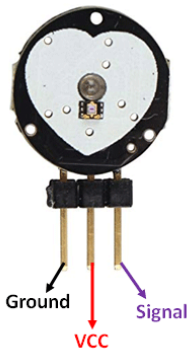
3. Sensors and microcontrollers

3.1 Pulse sensor

The working of the **Pulse/Heart beat sensor** is very simple. The sensor has two sides, on one side the LED is placed along with an ambient light sensor and on the other side we have some circuitry. This circuitry is responsible for the amplification and noise cancellation work. The LED on the front side of the sensor is placed over a vein in our human body. This can either be your Finger tip or you ear tips, but it should be placed directly on top of a vein.

Now the LED emits light which will fall on the vein directly. The veins will have blood flow inside them only when the heart is pumping, so if we monitor the flow of blood we can

monitor the heart beats as well. If the flow of blood is detected then the ambient light sensor will pick up more light since they will be reflect ted by the blood, this minor change in received light is analysed over time to determine our heart beats.



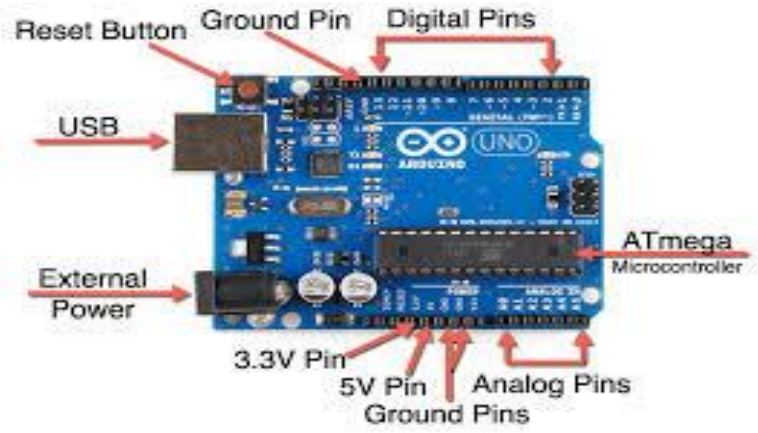
Pulse sensor- pin diagram

Specifications of pulse sensor

- Biometric Pulse Rate or Heart Rate detecting sensor
- Plug and Play type sensor
- Operating Voltage: +5V or +3.3V
- Current Consumption: 4mA
- Inbuilt Amplification and Noise cancellation circuit.
- Diameter: 0.625”
- Thickness: 0.125” Thick

3.2 Arduino uno

Arduino a microcontroller is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.



Arduino uno- pin diagram

Specifications of arduino uno

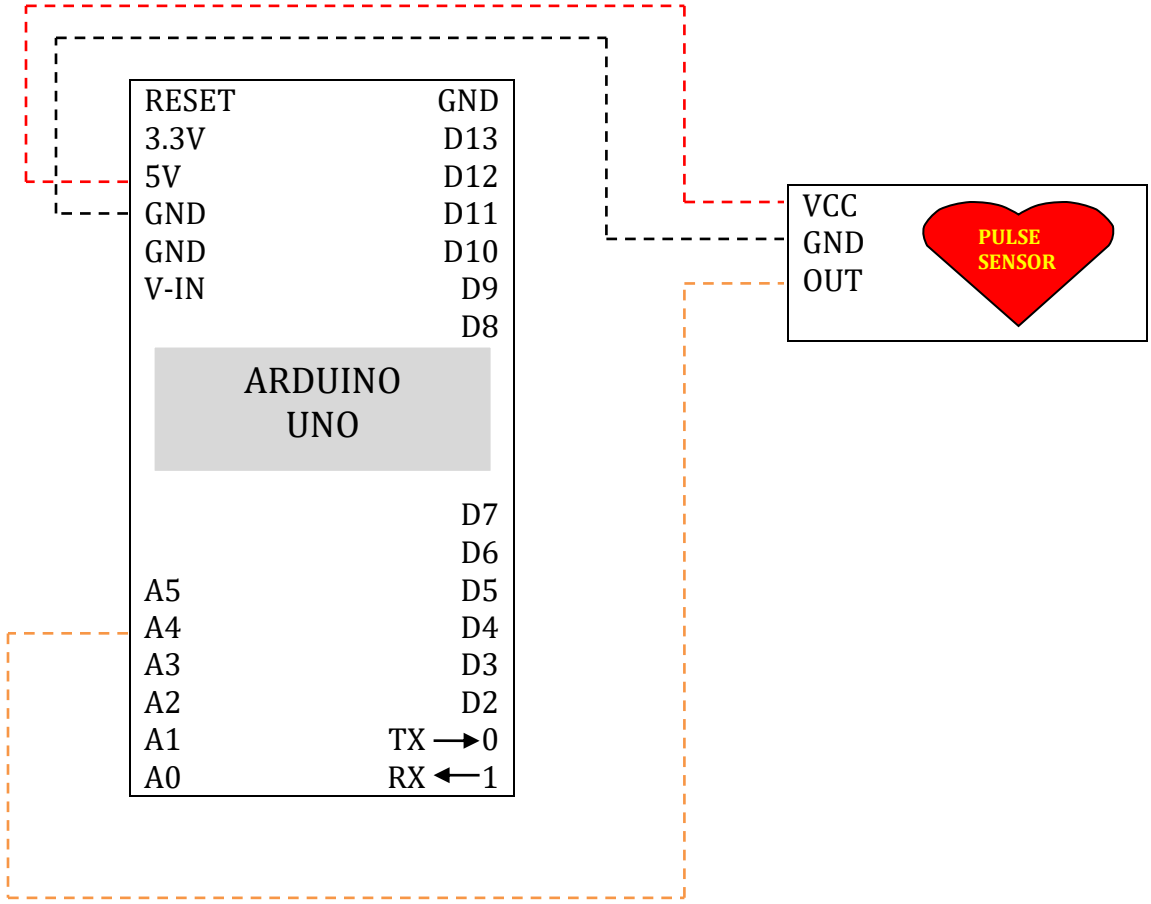
- The operating voltage is 5V.
- The recommended input voltage will range from 7v to 12V.
- The input voltage ranges from 6v to 20V.
- Digital input/output pins are 14.
- Analog i/p pins are 6.
- DC Current for each input/output pin is 40 mA.
- DC Current for 3.3V Pin is 50 mA.
- Flash Memory is 32 KB

5. Procedure

5.1 connection procedure

- Connect the arduino board to the pc via a USB cable.
- From the arduino board give the supply of 3.3v to the VCC terminal of the pulse sensor.
- Similarly the GND pin of the arduino is also connected to the GND pin of the pulse sensor.
- Take the OUT pin of both the pulse sensor and connect it to the analog pin of the arduino.
- Mount the pulse sensor in such a way that it measures the heart beat of a person.

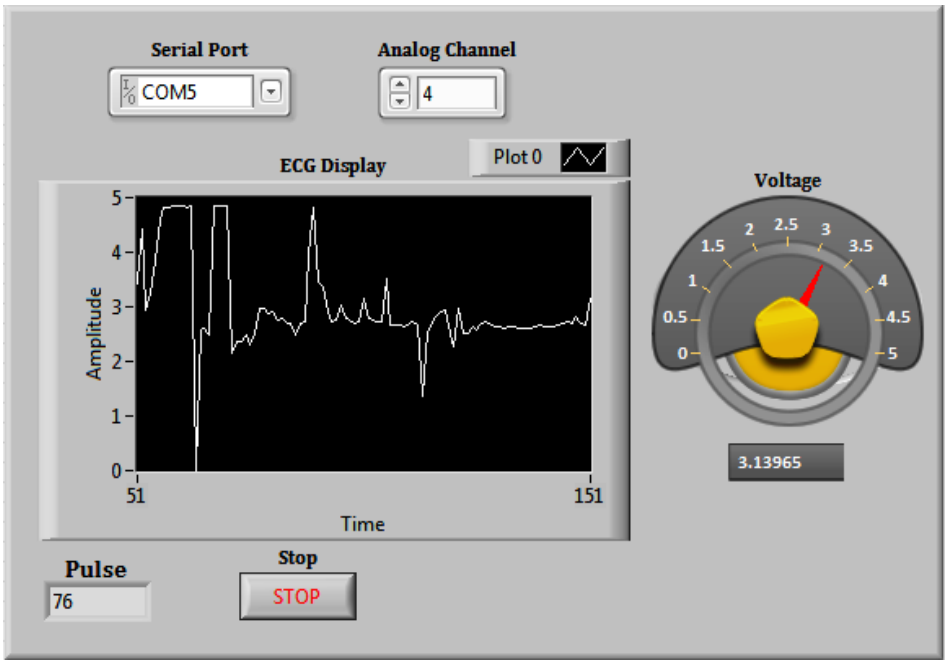
5.2 Connection diagram



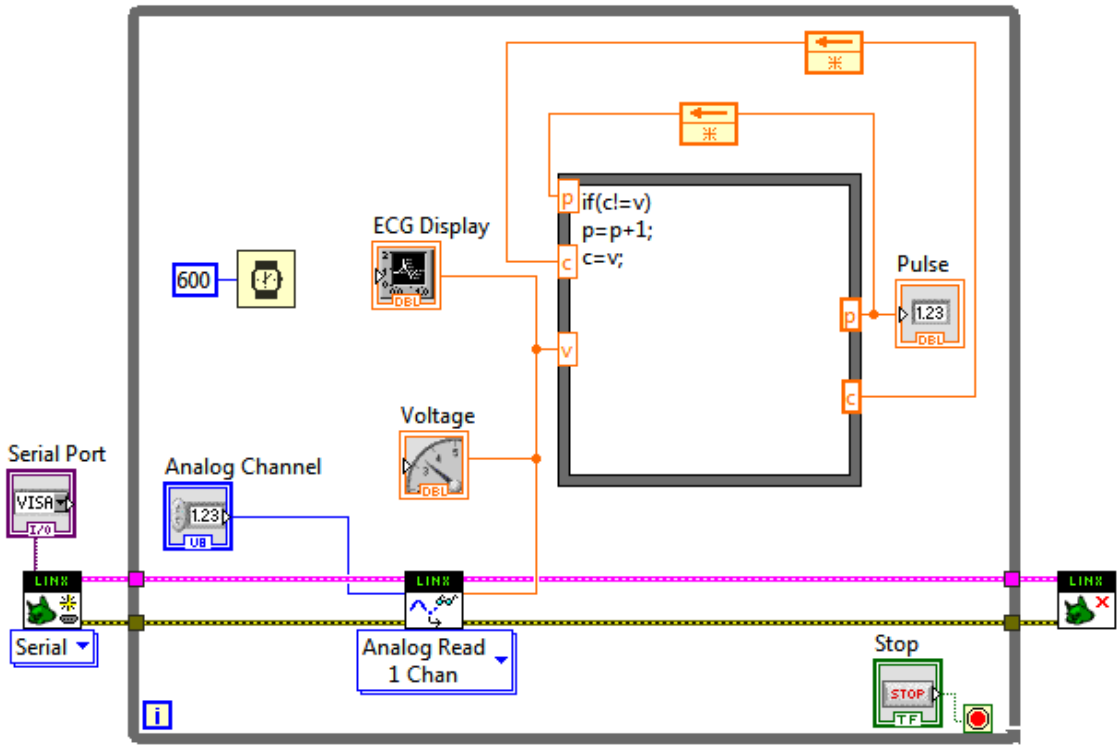
5.3 Steps to execute

- First of all open the labview software
- From the linx palette select the start ,stop and analog read blocks
- Connect the linx source and error in –error out of blocks with each other
- In the start block create a control for the serial port
- Similarly create a control for analog read blocks to control the analog pin configuration
- Create a indicator in the same block to show the output voltage of the pulse sensor.
- The while loop and formula node is selected from the structures palette.
- Create a control to the while loop to get the stop button.
- Formula is typed in such a way that the pulse is obtained.
- Obtained pulse reading is shown on an indicator.
- Add a ‘wait ms’ block to control the time.
- Flash the microcontroller with the linx firmware.
- Finally run the program continuously .

5.4 Front panel



5.5 Block diagram



6. Advantages and Disadvantages

6.1 Advantages

- Easy to construct at a low cost.
- Can be used to diagnose a person easily.
- It will help to save time as we need not go to visit a doctor to see our heart rate.
- In school / companies it can be used to check the pulse rate instantly.

6.2 Disadvantages

- Pulse sensor is not a rugged sensor and so it should be handled with care.
- It is only a simple circuit so that its accuracy is poor.
- The range of the pulse sensor is also very poor.

7. Conclusion

In this project the design of low cost heart rate monitoring system has been discussed. This device is economic, portable, durable and cost effective. Tests have shown excellent agreement with actual heart beat rates. This devive could be used in clinical and non clinical environments. It can also be easily used by individual users like athletes during sports activities. For most approximate reading the LED should be placed just beside the upper portion of the nail. The more the finger contacts with the LED the more accurate the reading becomes. The counted beat varies from person to person, so no need to worry about the accuracy of the device.