

Article

Heartbeat Sensor and Stress Indicator

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A B S T R A C T

Heartbeat rate is a very vital health parameter of a human body. Heart rate is number of times the heartbeat per minute. The heart rate reflects the different physiological as well as biological conditions of human body. Heart rate can be measured by various systems such as ECG waveform or by sensing the pulse. This paper describes system for measuring heart rate through fingertip and Arduino. Beating of heart is actually pumping of blood throughout body which changes the blood volume in fingertip. This change can be detected using optical sensor consisting of IR LED IR diode and this signal will be sent to arduino and the beat rate will be display on the LCD. The infrared light is transmitted through fingertip and reflects light is detected by photodiode. The amount of reflected light depends on the amount of blood volume in the finger arteries. With every heartbeat the blood volume changes and the amount of reflected light also changes which can be detected by photodiode.

Keywords: Adriano, Heartbeat sensor, IR Diode, IR LED, LCD Display

Introduction

Technological innovation in the field of medical, for prevention from disease and maintain of patient health have enabled evolution like health monitoring system, heartbeat sensor and stress indicator. The heart rate of healthy person at rest is around 72 beats per min. and babies at around 120 beats per minute. The heart rate rises during doing heavy work and returns to normal after some time. The rate of heart beats return to normal indicates fitness of the person. More sophisticated method to monitor heart rate is ECG, but it is expensive. For instantaneous measurement devices like wrist watch can be used but they are costly. So this heart rate sensor with stress indicator is cost effective as well as useful for health monitoring and easy to use at home.

Literature Survey

This paper describes the working of wireless heartbeat system based on microcontroller ATmega328 (Arduino Uno). This system consists of heartbeat sensor, Arduino

and LDC Display on which we can see heart rate and stress level.¹ The pulse rate is important parameter used by doctors to diagnose a patient. The heart rate sensor is input of system which produces digital output and it sends to arduino for processing.³ In this paper they present the concept of two studies that are stress indication with low cost heart rate sensor. Stress commonly defines feeling strain and pressure.⁴

Proposed Method

System Description

Current technology consists of optical and electrical monitors. The optical method does not require strap around one's chest like in electrical methods and can be used more conveniently. A cost efficient way of heart monitoring is IR LED and DIODE combination.

Optical Method

Optical technique is based on the fact that any patch of skin may be fingertip, ear lobes wrist etc. having good blood supply through capillaries whose blood volume changes

Block Diagram

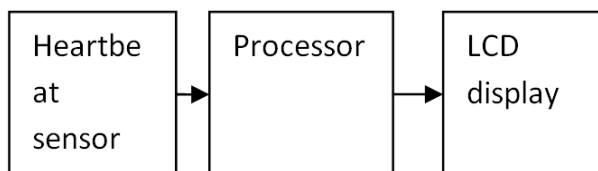


Figure 1. Block Diagram of Heartbeat Sensor & Stress Indicator

Figure 2.Circuit Diagram of Heartbeat Sensor

The Heartbeat is sense by IR LED and reflects light is detected by Photodiode. The small yet detectable change is compared by comparator and the output is shown by using LED. The blinking of LED is same as that of heartbeat rate. By using arduino the heart rate will be displayed on the LCD display. The LCD display will also display the emotions of human like relax or worried.

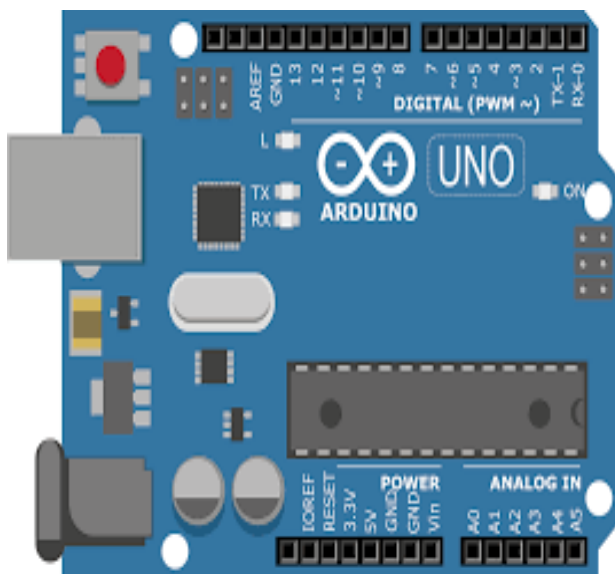


Figure 3.Arduino Uno

No.	Symbol	Function
1	VSS	Ground
2	VDD	5V
3	VO	Contrast
4	RW	Register
5	RS	Read/Write
6	EW	Enable
7	D0	Data bus
8	D1	Data bus
9	D2	Data bus
10	D3	Data bus
11	D4	Data bus
12	D5	Data bus
13	D6	Data bus
14	D7	Data bus
15	A	Anode (5V)
16	K	Cathode (GND)

Figure 4.LCD Display 16x2

16x2 means it can display 16 character per line and there are 2 such a lines. In this LCD each character is displayed in 5x7 pixel matrix. This display has two registers namely data and command. The command register stores command instruction given to the display. The data register stores data to be displayed on the LCD.

External power can come either from an AC-to-DC adapter or battery. The adapter can be connected by plugging a 2.1mm center positive plug into the boards. Power jack. Leads from a battery can be inserted in the ground and Vin pin headers of POWER connectors.⁵

From this research we can conclude that even a simple low cost heart rate monitor device can detect features that change significantly under the influence of mental stress detection algorithm. Cardiovascular disease causes ultimately death and heart beat rate is the only diagnostic tool that can be used to detect cardiac events [5]. This paper focuses on heart rate monitoring as well as stress indicator. This system determines heart beat rate per minute. This system is cost effective and portable as well as efficient and easy to handle. This system provides flexibility and is more convenient than conventional monitoring system.

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