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Heartbeat Sensor

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Abstract: ***The main objective of the project is Heartbeat Sensor is an electronic device that is used to measure the heart rate i.e. speed of the heartbeat. Monitoring body temperature, heart rate and blood pressure are the basic things that we do in order to keep us healthy. In order to measure the body temperature, we use thermometers and a sphygmomanometer to monitor the Arterial Pressure or Blood Pressure. Our idea is to design a Heart Rate Monitor System using Arduino and Heartbeat Sensor. You can find the Principle of Heartbeat Sensor; working of the Heartbeat Sensor and Arduino based Heart Rate Monitoring System using a practical heartbeat Sensor. Monitoring heart rate is very important for athletes, patients as it determines the condition of the heart (just heart rate). There are many ways to measure heart rate and the most precise one is using an Electrocardiography. But the more easy way to monitor the heart rate is to use a Heartbeat Sensor. It comes in different shapes and sizes and allows an instant way to measure the heartbeat***

Keywords: Arduino UNO x 1, 2. 16 x 2 LCD Display x 1, 10KΩ Potentiometer, 330Ω Resistor, Push button, heartbeat sensor module with probe (finger based), Bread board, Connecting Wires.

I. INTRODUCTION

Monitoring heart rate is very important for athletes, patients as it determines the condition of the heart (just heart rate). A heart rate monitor is a personal monitoring device that allows a subject to measure their heart rate in real. There are many ways to measure heart rate and the most precise one is using an Electrocardiography. But the easier way to monitor the heart rate is to use a Heartbeat Sensor. It comes in different shapes and sizes and allows an instant way to measure the heartbeat. Heartbeat Sensors are available in Wrist Watches (Smart Watches), Smart Phones, chest straps. The heartbeat is measured in beats per minute or bpm, which indicates the number of times the heart is contracting or expanding in a minute. Time or record their heart rate for later study. Early models consisted of a monitoring box with a set of electrode leads that attached to the chest. The heart rate of a healthy adult at rest is around 72 beats per minute (bpm) & Babies at around 120 bpm, while older children have heart rates at around 90 bpm. The heart rate rises gradually during exercises and returns slowly to the rest value after exercise [2]. The rate when the pulse returns to normal is an indication of the fitness of the person. Lower than normal heart rates are usually an indication of a condition known as bradycardia, while higher is known as tachycardia. Heart rate is simply measured by placing the thumb over the subject's arterial pulsation, and feeling, timing and counting the pulses usually in a 30 second period. Heart rate (bpm) of the subject is then found by multiplying the obtained number by 2. This method although simple, is not accurate and can give errors when the rate is high. In this project, we have designed a Heart Rate Monitor System using Arduino and Heartbeat Sensor. You can find the Principle of Heartbeat Sensor; working of the Heartbeat Sensor and Arduino based Heart Rate Monitoring System using a practical heartbeat Sensor. Heart rate can vary according to the demand of muscles to absorb oxygen and excrete carbon dioxide changes, such as during exercise or sleep . It also varies significantly between individuals based on fitness, age and genetics. That means heart must beat faster to deliver more oxygen-rich blood. During exercise routines, the heart rate gives a strong indication of how effective that routine is improving health. Normal heart rate of a resting person is about 70 bpm for adult males and 75 bpm for adult females. A heart rate monitor is simply a device that takes a sample of heartbeats and computes the beats per minute so that the information can easily track heart condition .Medical professionals use heart rate for tracking of patient's physical conditions. Individuals, such as athletes, who are interested in monitoring their heart rate to gain maximum efficiency from their training, also use it. Body temperature means measurement of the body's ability to generate and get rid of heat. It is one of chief indicators of normal functioning and health. The nature of the human body is to keep its temperature within a narrow, safe range in spite of large variations in temperatures outside the body.

II. LITERATURE REVIEW

A literature review on heartbeat sensors reveals a focus on applications in healthcare, fitness, and technology. Studies highlight the accuracy and reliability of sensors in monitoring heart rate for various purposes. Additionally, research explores advancements in sensor technology, signal processing techniques, and integration with wearable devices.

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Challenges such as motion artifacts and environmental factors are addressed, emphasizing the importance of robust sensor designs. Overall, the literature underscores the growing significance of heartbeat sensors in promoting health and well-being through continuous monitoring and data-driven insights.

III. METHODOLOGY

The methodology for a heart rate sensor project involves a systematic approach to designing, implementing, and validating the system.

A Heart Beat (HB) sensor is being developed for acquainting the input signals using Light Dependent Resistance (LDR) and Light Emitting Diode (LED). It senses the heartbeat of a person and converts it in the form of electrical signals and pulses.

Transmission types measure pulse waves by emitting red or infrared light from the body surface and detecting the change in blood flow during heart beats as a change in the amount of light transmitted through the body. This method is limited to areas where light can easily penetrate, such as the fingertip or earlobe.

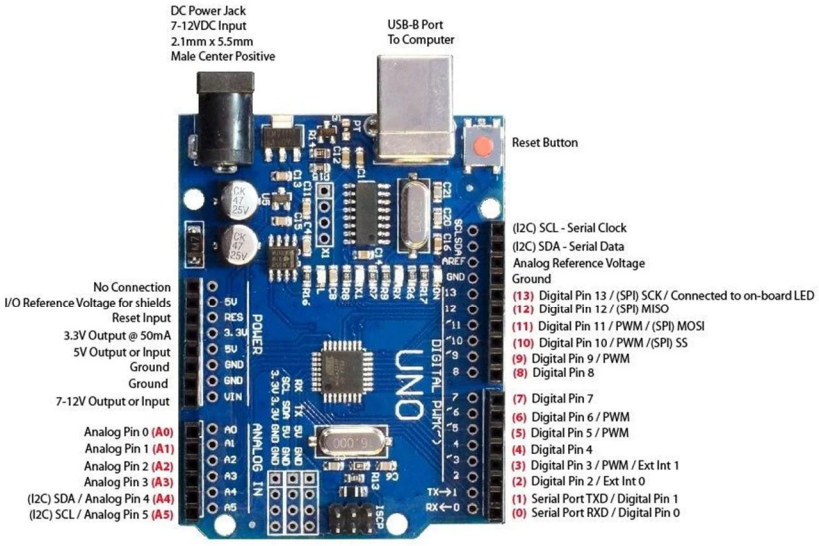
IV. SYSTEM DESIGN

The overall design of the system is explained through the block diagram shown below.

A. Arduino uno

The Arduino Uno is a microcontroller board built on the ATmega328. It has 14 digital I/O pins (6 can be used a s PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and can be connected to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno does not use FRDI USB-to -serial driver chip unlike other boards. Figure 2 below shows the pin diagram of Arduino Uno R3.

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module. It is intended for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration in wireless communication. This serial port Bluetooth module has a fully capable Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and Adaptive Frequency Hopping Feature. The Bluetooth module HC-05 is a MASTER/SLAVE module.



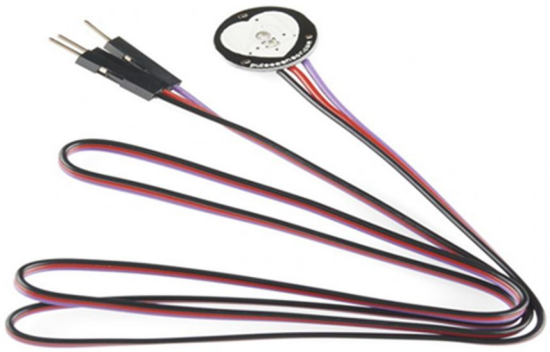
B. Pulse Sensor

The Pulse Sensor Amped is a plug-and-play heart-rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart-rate data into their projects.It essentially combines a simple optical heart rate sensor with amplification and noise cancellation circuitry making it fast and easy to get reliable pulse readings. Also, it sips power with just 4mA current draw at 5V so it's great for mobile applications.

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Simply clip the Pulse Sensor to your earlobe or finger tip and plug it into your 3 *or *5 Volt Arduino and you're ready to read heart rate! The 24" cable on the Pulse Sensor is terminated with standard male headers so there's no soldering required. Of course Arduino example code is available as well as a Processing sketch for visualizing heart rate data.



C. Cords and Cables

Cables are used to connect one device to another, whether the device is a television, router, or computer. However, not every device uses the same kind of cable, and some devices have different types of cables for various peripheral outputs or to draw power from the electrical outlet.

Cables are used to connect one device to another, whether the device is a television, router, or computer. However, not every device uses the same kind of cable, and some devices have different types of cables for various peripheral outputs or to draw power from the electrical outlet.

Due to the range of cable types, it’s important to have an understanding of the differences between cables for computers and types of audio cables. It’s also helpful to know how to differentiate a micro USB vs. USB-C cable, and so on.



D. Jumper Wires

Jumper is an electric cable with connector end. This is normally used to connect the components on bread board, test circuits, and connecting the components on embedded chip. Each end is fitted according to the requirements. By using them we can avoid soldering as these come with several types of endings and colors.



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V. WORKING

The working principle of a heart rate sensor depends on the type of sensor technology being used.

Heartbeat Sensor is an electronic device that is used to measure the heart rate i.e. speed of the heartbeat. Monitoring body temperature, heart rate and blood pressure are the basic things that we do in order to keep us healthy.

Heart Rate can be monitored in two ways: one way is to manually check the pulse either at wrists or neck and the other way is to use a Heartbeat Sensor.

In this project, I have designed a Heart Rate Monitor System using Arduino and Heartbeat Sensor. You can find the Principle of Heartbeat Sensor, working of the Heartbeat Sensor and Arduino based Heart Rate Monitoring System using a practical heartbeat Sensor. The circuit design of the Arduino based Heart rate monitor system using the Heartbeat Sensor is very simple. First, in order to display the heartbeat readings in bpm, we have to connect a 16×2 LCD Display to the Arduino UNO.

VI. CONCLUSION

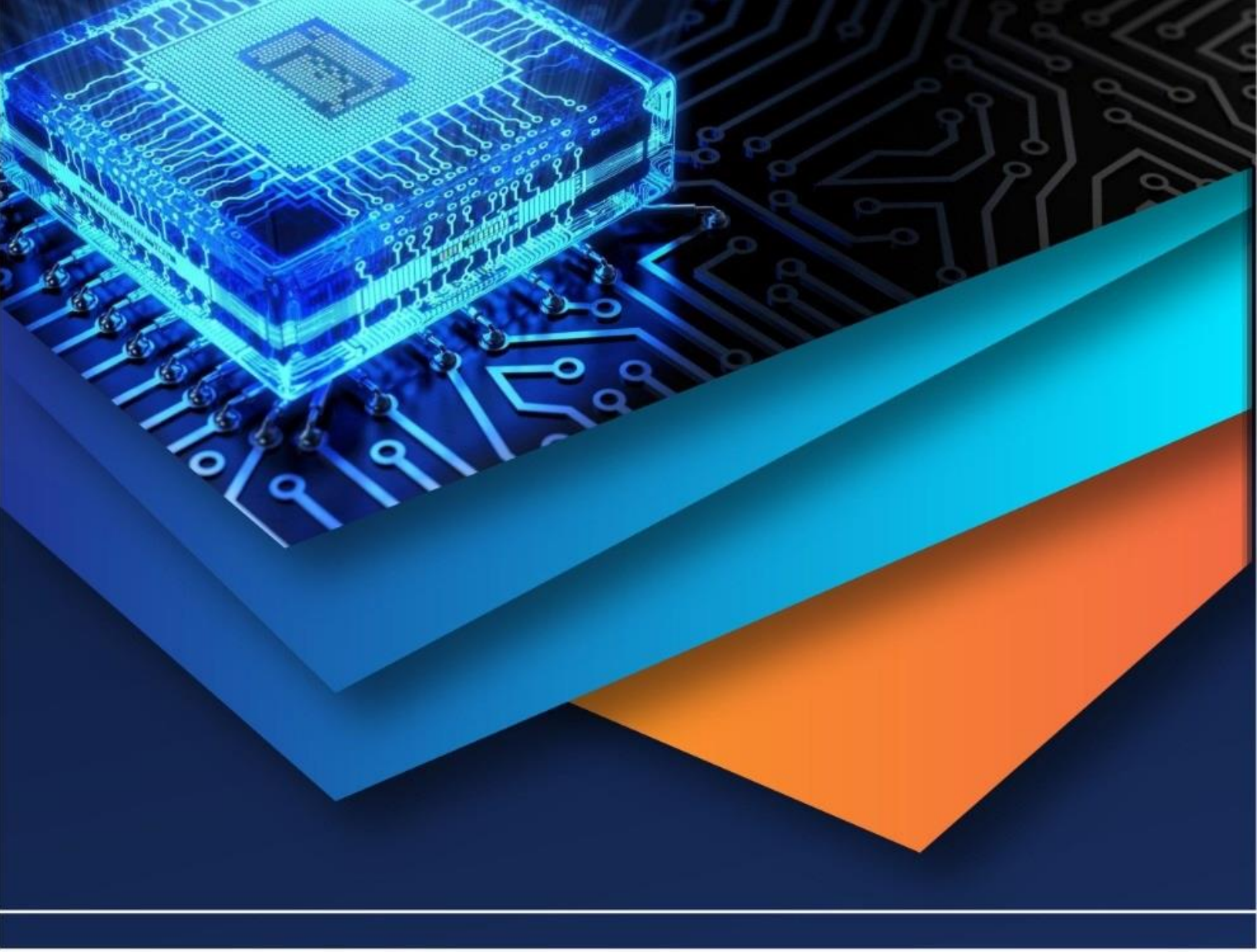
A heart rate sensor is a valuable tool for monitoring and tracking your heart rate. It can provide real-time data about your heart rate, helping you assess your physical activity levels, stress, and overall cardiovascular health. By analyzing the data collected from a heart rate sensor, you can make informed decisions about your fitness routines and health management. It's important to consult with a healthcare professional for a comprehensive evaluation of your heart health if you have any concerns or abnormal readings from a heart rate sensor.

VII. RESULT

The result of a heartbeat sensor project using Arduino UNO typically involves measuring and displaying the user's heart rate. The sensor detects the pulsatile flow of blood, and the Arduino processes the data to calculate the heart rate. The output can be displayed on an LCD screen, serial monitor, or another output device. If you have specific questions about your project or encounter issues, feel free to provide more details for assistance.

REFERENCES

[1] https://youtu.be/JlODP0riCJk?si=nl6JYhRvmXm_b5AL
Burke E, ed. (1998). Precision Heart Rate Training. Champaign, IL: Human Kinetics. ISBN 978-0-88011-770-8.
[2] Pan J, Tompkins WJ (March 1985). "A real-time QRS detection algorithm". IEEE Transactions on Bio-Medical Engineering. **32** (3): 230–236. doi:10.1109/TBME.1985.325532. PMID 3997178. S2CID 14260358.
[3] Lloret J, Sendra S, Ardid M, Rodrigues JJ (2012). "Underwater wireless sensor communications in the 2.4 GHz ISM frequency band". Sensors. **12** (4): 4237–4264. Bibcode:2012Senso..12.4237L. doi:10.3390/s120404237. PMC 3355409. PMID 22666029.
[4] Saygin D, Tabib T, Bittar HE, Valenzi E, Sembrat J, Chan SY, et al. (2020). "Transcriptional profiling of lung cell populations in idiopathic pulmonary arterial hypertension". Pulmonary Circulation. **10** (1). doi:10.1109/ISBB.2015.7344944. PMC 7052475. PMID 32166015. S2CID 10254964.
[5] Haskins T (23 April 2022). "Chest Strap Vs Wrist Based HR Accuracy". CardioCritic.com.
[6] "ECG vs PPG for Heart Rate Monitoring: Which is Best?". neurosky.com. 28 January 2015. Retrieved 2018-11-28.
[7] Barnhart P (21 March 2022). "Are Wrist Type Monitors Reliable?". All The Stuff.



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