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IOT Based Tracking System for Athletes

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Abstract-One of the most significant health indicators that is directly related to the human cardiovascular system is heart rate. Medical professionals use heart rate to identify and monitor a patient's medical conditions. It is also used by people like athletes who are interested in keeping track of their heart rate while running in order to maximise efficiency. The incidence of heart and vascular diseases has risen because of eating unhealthy foods or a change in lifestyle. In addition, a paper described how a single-chip microcontroller used to detect the heartbeat rate in real-time and also, it also permits doctors to get readings of heart beat. Furthermore, more and more heart problems are now being diagnosed in younger patients.

1.INTRODUCTION

A heart rate monitor is a portable monitoring tool that allows users to either record their heart rate for later analysis or monitor it in real time. Early versions had a chest-attached checking box with numerous cathode drives. A healthy man's heart rate is about 72 bpm, a baby's is about 120 bpm, and older kids' hearts are about 90 bpm. When exercising, the heart rate gradually increases, and it slowly returns to its resting level once the exercise is over. The number of heartbeats per unit of time is known as the heart rate.

The type of work or exercise a person is doing affects their heart rate because during exercise or sleep, the body needs to absorb oxygen and then release carbon dioxide. Medical professionals use heart rate to identify and monitor a patient's medical conditions. Athletes who are interested in monitoring their heart rate during a run to achieve maximum efficiency use it as well. Increased cases of heart and vascular diseases are a result of eating unhealthy food or changing one's lifestyle. Additionally, younger patients are now being diagnosed with heart problems on a steadily increasing basis.

Since coronary heart disease is now the leading cause of death worldwide, a device that can detect heartbeats in real time is required. As evidenced by statistics, each year nearly two million people experience the negative effects of a heart attack, with one Indian citizen passing away predictably. According to WHO predictions, the prevalence of coronary disease will rise sharply by 23.3% by 2030. Such a chronic illness necessitates ongoing, long-term supervision for management. A gatekeeper might not want to carry the paten to the CL, or a doctor might not be qualified to prescribe medication or provide medical care to patients. The patient is ineligible to give medications or other treatments.

In a clinical setting, the pulse is calculated under strictly controlled circumstances such as blood pressure monitoring, heart rate calculation, and electrocardiogram (ECG). In any case, it is important for patients to be able to measure their heart rate at home. During activities, the pulse gradually increases, and it gradually returns to normal after exercise. The design and development of a portable, microcontroller-based system for real-time heartbeat monitoring and patient alerting to a care provider are presented in this paper.

The need to maintain the consistency and affordability of accounts while achieving effective financial and HR management increases as the population increases and managerial attention increases. This project is finished. Utilizing current new technologies in this situation is the only unambiguous factor that ensures the success of such a communication system.

For patients and athletes, monitoring heart rate is crucial because it reveals the health of the heart (just heart rate). A heart rate monitor is a portable monitoring tool that enables real-time heart rate measurement. The most accurate way to measure heart rate is with an electrocardiogram, though there are other methods as well. However, using a Heartbeat Sensor is the simpler method

of keeping track of heart rate. It allows for an immediate way to measure the heartbeat and comes in a variety of sizes and shapes. Chest straps, smart phones, and wrist watches (smart watches) all have heartbeat sensors.

2. LITERATURE SURVEY

2.1 IoT based portable heart rate ans SPO2 pulse oximeter

A.Ruhan Bevi et al.,2022the suggested system has an inbuilt OLED with basic internet access that publishes data to both an HTML webpage and the OLED. The key characteristics are its portability, user-friendliness, and innovative method of online data transmission, which allows it to outperform currently available solutions in a variety of ways. The system Monirujjaman Khan et al.., 2021 proposed the study to develop a monitoring system that will enable medical includes a MAX30100 sensor (a pulse oximeter sensor) and, when combined with the WeMos D1 tiny IOT-based microcontroller, allows the facility to track patient health information in real-time via an HTML page.

2.2 Heart rate monitoring System

Ved Prakash et al.,2018 this experiment, the heartbeat may be felt through the fingertips utilising pulse oximetry. Diastole, or heart expansion, causes the fingertip's blood volume to rise, whereas systole, or heart contraction, causes the fingertip's blood volume to fall. If you could somehow count the number of pulses in one minute, that would be the heart rate in beats per minute (bpm). The subsequent pulsing of blood volume inside the fingertip is precisely proportional to the heart rate. An IR transmitter and receiver pair (LED) in close proximity to the fingertip is used for this. In this experiment, the heartbeat may be felt through the fingertips utilising pulse oximetry. Diastole, or heart expansion, causes the fingertip's blood volume to rise, whereas systole, or heart contraction, causes the fingertip's blood volume to fall. If you could somehow count the number of pulses in one minute, that would be the heart rate in beats per minute (bpm). The subsequent pulsing of blood volume inside the fingertip is precisely proportional to the heart rate. An IR transmitter and receiver pair (LED) in close proximity to the fingertip is used for this..

2.3 An Overview On heart Rate Monitoring And Pulse Oximeter System

Esrat Jahan et al.,2014the goal is to look at how finger-based measurements of the subject's heart rate and oxygen saturation are processed and displayed. The design, which is compact and simple to use, enables a non-intrusive, real-time means of delivering health-related information. This makes it possible to manage the healthcare system in an effective and affordable way. This document is designed for engineers, manufacturers of medical equipment, and anyone involved in the medical field who is curious about how pulse oximeters and heart rate monitors work..

2.4 IoT based System for Heart Rate Monitoring

Sahana S Khamitkar et al.,2020this project, we outline the development of a portable, low-cost heart rate monitoring device based on Bluetooth technology. The Heart Rate Module, Android application, and Bluetooth Module are only a few of the components that make up the overall system. The Heart Rate (HR) module collects heart rate data from the subject (patients) using a non-invasive method called Photoplethysmography and transmits it wirelessly to a computer or an Android application using a Bluetooth module. This system can be used in conjunction with other telemedicine components. The heart rate module's data can be preserved and accessed for future medical applications.

2.5 Heart Rate Monitoring System Using Finger Tip Through IoT

Varun Goel et al.,2018This article covers a method for measuring heart rate via a fingertip, showing the heartbeat on an LCD, and displaying the findings via the internet utilising both a local server and the Thingspeak website.

3.HARDWARE DESCRIPTION

The Components used in this project are

- Arduino UNO
- Jumper wires
- OLED display
- Buzzer
- Heart rate sensor

3.1 Arduino UNO

The Arduino Uno is an open-source microcontroller board created by Arduino.cc that is based on the Microchip ATmega328P microcontroller. A variety of expansion boards (shields) and other circuits can be interfaced with the board's sets of digital and analogue input/output (I/O) pins. The board has 6 analogue I/O pins and 14 digital I/O pins, six of which can be used for PWM output. It can be programmed using the Arduino IDE (Integrated Development Environment) using a type B USB cable. Though it can operate with voltages between 7 and 20

volts, it can also be powered by an external 9-volt battery or by a USB cable. A number of Arduino Uno pins, specifically I/O digital and analogue pins, are present on the board and run at 5 volts. However, these pins have standard operating ratings between 20 and 40 mA. The board uses internal pull-up resistors to restrict current from exceeding the specified operating conditions. These resistors are rendered useless and the device is harmed by an excessive increase in current. 6 The Arduino Uno has the ability to connect to computers, microcontrollers, and other Arduino boards. Using pins like Rx and Tx, the Atmega328 chip mounted on the board offers serial communication. Using USB com drivers, the Atmega16U2 integrated on the board offers a channel for serial communication.

3.2 Heartrate Sensor

The MAX30100 is a sensor solution with integrated pulse oximetry and heart-rate monitoring. To detect pulse oximetry and heart rate signals, it combines two LEDs, a photodetector, improved optics, and low-noise analogue signal processing. The MAX30100 sensor chip uses I2C for serial communication and can measure blood oxygen temperature and heart rate. The sensor MAX30100 can measure blood oxygen levels and heart rate. The heart rate and blood oxygen saturation levels can both be determined using the MAX30100 pulse oximeter. The pulse rate is measured using the red light that the red LED emits. In MAX30100, one LED emits infrared light while the other emits monochromatic light.

3.3 Buzzer

A buzzer is a simple audio device that produces sound from an incoming electrical signal. It is also known as a sounder, audio alarm, or audio indicator. Piezo buzzers and magnetic buzzers are the two main types of buzzers. A sounding device that can transform audio signals into sound signals is a buzzer. DC voltage is usually used to power it. It is frequently used as a sound device in alarms, computers, printers, and other electronic products. For projects requiring alarm systems and timers, the gadget is ideal because it only requires one pin unit. When a signal is strong, it contains a piezoelectric buzzer with an internal oscillator that generates a sound at about 2.5 kHz.

3.4 OLED display

A light-emitting diode (LED) with an organic compound film as the emissive electroluminescent layer emits light in response to an electric current is referred to as an organic light-emitting diode. Due to the OLED display's high contrast, despite their small size (only about 1" diagonal), these displays are very readable. Each white OLED in an OLED display has an individual size of 128x64 or 128x32, and the controller chip can turn any of them on or off. No backlight is necessary because the display generates its own light.

3.5 JUMPER WIRES

For solderless breadboarding, jump wire (also known as jumper wires) can be purchased in ready-to-use jump wire sets or made manually. For larger circuits, the latter can become laborious work. Jumper wires that are ready to use come in a variety of qualities, some of which even have teeny plugs attached to the wire ends. If no tiny plugs are intended to be attached to the wire ends, solid copper, tin-plated wire should typically be used for jump wires, whether they are purchased ready-made or made at home. Strip the wire ends between 3/16 and 5/16 in (4.8 and 7.9 mm) in length. Tweezers are useful when inserting or removing wires, especially on crowded boards, as longer stripped wires increase the risk of short-circuits on the needle pillars.

4 . SOFTWARE DESCRIPTION

4.1. ARDUINO DEVELOPMENT ENVIRONMENT

Java was used to create the cross-platform Arduino integrated development environment (IDE), which is available for Microsoft Windows, macOS, and Linux. It came from the IDE for the programming languages Wiring and Processing. It has a code editor with tools for text copying and pasting, text replacement, automatic indenting, brace matching, and syntax highlighting. It also offers straightforward one-click compiling and uploading tools for Arduino programmes. A hierarchy of operation menus, a message area, a text console, a toolbar with buttons for standard functions, and more are also included. The GNU General Public License, version, governs the release of the IDE's source code. The Arduino IDE uses specific code structuring rules to support the languages C and C++. A software library from the Wiring project, which offers numerous standard input and output procedures, is provided by the Arduino IDE. The cyclic executive programme using the GNU toolchain, which is also distributed with the IDE. The executable code is transformed by the Arduino IDE's use of avrdude into a text file with hexadecimal encoding, which is then loaded into the Arduino board by a loader programme in the firmware. Only Windows 7 or newer OSes are supported by the Arduino IDE Windows compiler. When trying to

verify or upload a programme on Windows Vista or earlier, one receives a "Unrecognized Win32 application" error. Users can either use version 1.8.11 or copy the "Arduino builder" executable from version 11 to their current install folder since it is independent of IDE to run IDE on older 14 machines. People who want to create images, animations, and interactions can do so using the open-source programming language and environment known as Processing. Processing was initially created as a software sketchbook and to teach the basics of computer programming in a visual context, but it has since developed into a tool for producing finished, expert work. The Arduino runs the Arduino IDE software. The Wiring project and the IDE for the Processing programming language were the inspiration for the Java cross-platform Arduino IDE. It is intended to acquaint artists and other newcomers who are not familiar with software development with programming. It has a code editor with tools like syntax highlighting, brace matching, and automatic indentation. With just one click, programmes can also be compiled and uploaded to the board. Editing make files or running programmes via the command-line interface are rarely necessary. Although some third-party tools, like Ion, make it possible to build on the command line if necessary. The "Wiring" C/C++ library, from the project of the same name, is included with the Arduino IDE and simplifies many common input/output operations. 15 C/C++ programmes for Arduino are available.

4.2. EMBEDDED C LANGUAGE

• It is used to programme microcontrollers and processors in industries like automotive, industrial automation, consumer electronics, aerospace, and medical applications. It is suitable for developing applications that must directly communicate with the hardware because it is a low-level language with direct access to the hardware. It is ideal for use in memory-constrained applications due to its smaller memory footprint than other languages. Additionally, embedded C can be used to create trustworthy and efficient software.

5. METHODOLOGY

To view the health parameters clearly, the MAX30100 pulse oximetry and heart rate monitor module with Arduino UNO board for measuring BPM using the module OLED display is used. A buzzer is used to warn athletes of abnormal circumstances. This tool aids athletes in maintaining a healthy body condition. Athletes have higher than average resting heart rates—often 90—and low spo2 levels, which can be avoided by checking them using this device. This device will undergo many changes in the future and be suitable for use by athletes of all levels. It will be the most crucial tool for them to quickly assess their physical condition. The different modules contain the MAX30100. Placing the finger tip on the sensor will reveal this. The main methods for non-invasively monitoring heart rate (HR) in a convenient manner in daily life are summarised in this work. The various modules contain the MAX30100. Once your finger is in place, keep it there until you hear the buzzer beeps that are timed to your heartbeats or the OLED animation, at which point you can read the BPM accurately. Each white OLED in an OLED display has an individual size of 128x64 or 128x32, and the controller chip can turn any of them on or off. No backlight is necessary because the display generates its own light. This work provides a summary of the key methods that have been suggested for non-invasive heart rate (HR) monitoring that is simple to do on our own.

6. DESIGN AND IMPLEMENTATION

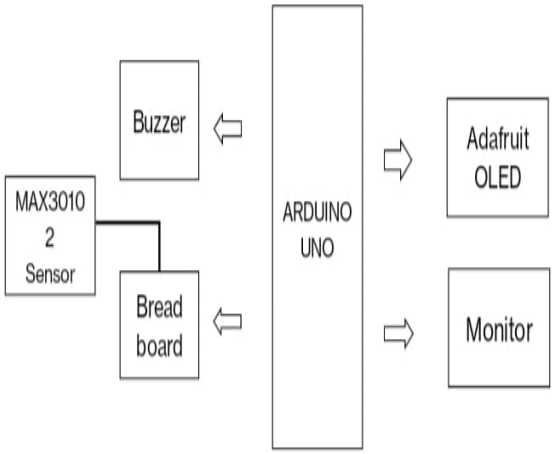

Fig 1 BLOCK DIAGRAM

7. RESULT

While we place our finger in the heartrate sensor and spo2 sensor, it detects our heartrate and spo2 and gives us the result, and the outcome and result are displayed in the OLED display.

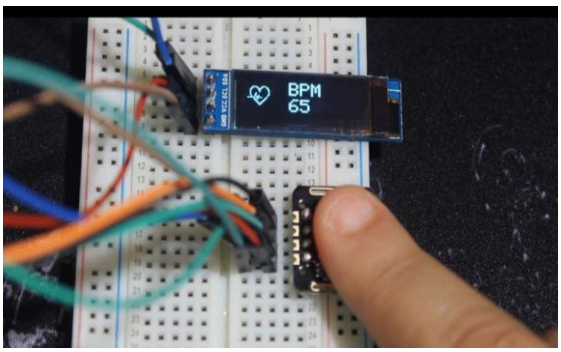

Fig 2 OUTPUT

8. CONCLUSION

The athletes can easily monitor their heartrate thanks to this low-cost sensing parameter. The athletes who use this device don't experience any pain. In order to keep track of their condition via the systems, this device also has a GPS tracker. When we place our finger on the sensor, it detects the situation and provides us with the outcome.

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