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IOT BASED HEALTH MONITORING SYSTEM USING ARDUINO UNO

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Abstract: The main aim of this paper is to design a "IoT based Health Monitoring System" that involves integrating various sensors and devices to gather and analysis health data of an individual. This project is an open source IoT platform that provides an easy-to-use interface to collect, analyze and visualize data from IoT devices. It can monitor our heart rate, oxygen rate and temperature in a systematic manner. In this world Health is very important topic for every human being and to monitor it is also a major thing to be done. There are many devices that has been already developed for monitoring health but this device is very much convenient as well as efficient. Looking into all this situation we have made a device that can monitor our health wirelessly. This device basically consists of Arduino UNO, LCD Display, MAX30100 pulse oximeter and HC-05 Bluetooth Module along with the different resister of different values. In future by adding more sensors this device can be more useful and it can have many new functions.

Keywords: Arduino UNO, LCD Display, MAX30100, HC-05 Bluetooth.

I. INTRODUCTION

In current scenario on the earth, health related problems are increasing day to day.151,600 people are dying per day. This graph can be reduced by modernization in the techniques used for patient monitoring. In the traditional approach the healthcare professionals play the major role. They need to visit the patient's ward for necessary diagnosis and advising. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. In order to solve these two problems, the patients are given knowledge and information about disease diagnosis and prevention. Secondly, a reliable and readily available patient monitoring system is required. In order to improv e the above condition, we can make use of technology in a smarter way. In recent years, health care sensors along with Arduino uno play a vital role. Wearable sensors are in contact with the human body and monitor his or her physiological parameters. We can buy variety of sensors in the market today such as temperature sensors and pulse oximeter sensor. The cost of the sensors varies according to their size, flexibility and accuracy.

II. THE PROBLEM

Some of the most common problems in patient monitoring today come with alarm setting, complication artifacts, information overload, tangled cables, issues switching between monitors made from different manufactures and difficulties arising from human performance.

III. PROPOSED SOLUTION

The solution of this device is made to solve all the problems being faced in terms of health monitoring. It is affordable and easy to use which aims to perform automatic patient health monitoring from anywhere.

IV. COMPONENTS

SL.NO	ITEMS	QUANTITY
1.	Arduino UNO	1
2.	MAX30100 Sensor	1
3.	LCD Display	1
4.	HC-05 Bluetooth Module	1

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5.	Resister	3
6.	Capacitor	1

Table. no-1

V. BLOCK DIAGRAM

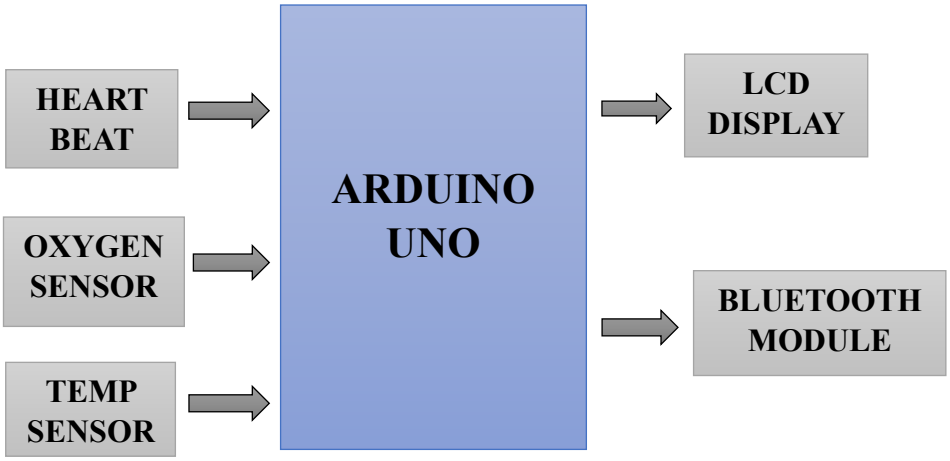

Fig. no-1

VI. BLOCK DIAGRAM DESCRIPTION

Heart Beat Sensor: In this project we have used Heart Beat Sensor that detects the pluses after each 10 seconds and it is designed to give digital output heart beat when a finger is placed on it. When the Heart beat detector starts working the LED blinks.

Oxygen Sensor: Oxygen Sensor is used to measure oxygen saturation in a blood and monitor heart rate by using Sp02 Sensor. It uses a cold light source that shines a light through the fingertip, making the tip appear to be red. By analysing the light from the light source that passes through the finger, the device is able to determine the percentage of oxygen in the red blood cell.

Temperature Sensor: The Sensor tip contains a spring that sits inside the stem sensing end, which attaches to a rod, leading up to the gauge needle. It is the movement in the sensing coil when heat is applied that causes the needle in the gauge to move, displaying the temperature reading.

Arduino uno: It is a controller board; it is an open source available freely on the internet. This is based on ATmega328P microcontroller. It has both input and output digital and analog pin. It has 6 analog I/O pin 14 digital I/O pins and is also programmable.

Lcd display: The LCD which we used is a 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16x2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbol.

HC-05 Bluetooth Module: HC-05 Bluetooth Module is a Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication. It has red LED which blinks in different frequencies indicating the status of connection

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VII. CIRCUIT DIAGRAM

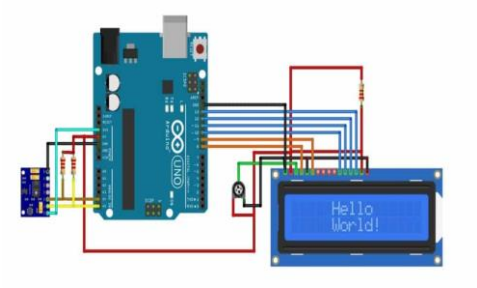

Fig. no-2

VII CIRCUIT DIAGRAM DESCRIPTION

Pulse Oximeter

MAX30100 is an integrated pulse oximeter and heart-rate monitor sensor solution. It's an optical sensor that derives its readings from emitting two wavelengths of light from two LEDs – a red and an infrared one – then measuring the absorbance of pulsing blood through a photodetector. This particular LED colour combination is optimized for reading the data through the tip of one's finger. The pulse oximetry subsystem in MAX30100 consists of ambient light cancellation (ALC), 16-bit sigma delta ADC, and proprietary discrete time filter. It has an ultra-low-power operation which makes it ideal for battery operated systems. MAX30100 operates on a supply in the range of 1.8 to 3.3V. It can be used in wearable devices, medical monitoring devices. The MAX30100 operates from 1.8V and 3.3V supplies.

LCD Display

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

HC-05 Bluetooth Module

HC-05 Bluetooth Module is a Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication. It has red LED which blinks in different frequencies indicating the status of connection. Bluetooth Communication is a 2.4GHz frequency-based RF Communication with a range of approximately 10 meters. It is one of the most popular and most frequently used low range communication for data transfer, audio systems, handsfree, computer peripherals etc.

2.2k Ohm Resister

The 2.2k Ohm resistor is one of the most common resistors in electronics. The four band 2.2k resistor is very easy to recognize with its' distinctive pattern of three red color bands. The 5 and 6 band versions have a pattern of red, red, black, brown, followed by the tolerance band and temperature coefficient band on the 6-band version. One difficulty is that the 2.2k ohm resistor is easy to confuse with a 220 ohm resistor, so keep this in mind and verify using the color code or a multimeter if possible.

Arduino UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

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IX. APPLICATION

The Iot Based Patient Health Monitoring System project we are monitoring various parameters of the patient using the Iot. In the Iot based system details of the patient's health can be seen by many users. The user just needs a working internet connection to view this data via app. To operate an Iot based health monitoring system project we need a Bluetooth connection. It is the most demanding field in the medical area this project is specially for elderly people in our home and for disable patient who find it really difficult to go to doctor on a daily basis. Support continuity of care for chronic patients. Enable chronic patients a platform to track, monitor and quantify their health. Make available data for health risk assessment. Follow good clinical practices varying from clinical record keeping to sharing relevant information. Patient can communicate with doctors remotely, thereby saving time on visiting the clinic. Collecting and analysing data and providing them in real time.

X. ADVANTAGES

- Save time and efforts.
- Real-time remote monitoring via connected IoT devices and smart alerts can diagnose illnesses, treat diseases, and save lives in case of a medical emergency.
- Smart sensors analyse health conditions, lifestyle choices, and the environment and recommend preventative measures, which will reduce the occurrence of diseases and acute states.

XI. DISADVANTAGES

- There's no consensus regarding IoT protocols and standards, so devices produced by different manufacturers may not work well together. The lack of uniformity prevents full-scale integration of IoT, therefore limiting its potential effectiveness.
- While IoT promises to reduce the cost of healthcare in the long term, the cost of its implementation in hospitals and staff training is quite high.

XII. RESULT

The project has been tested in proteus and also in breadboard. This device has been more efficient and effective as it was earlier before. It has been simulated in Proteus Software Version 8.0 and also it has been executed in breadboard. It has been developed in such a way that it can monitor our health wirelessly. The clear output readings can be seen in our LCD display.

XIII. CONCLUSION

Hence, we have completed our project successfully during the project we faced lots of problems which were disturbing the further steps of the project. But by the guidance of a coordinator, guide and the help which we got from our teachers and friends give us the idea to solve the problems and today we are able to complete our project. From this project we came to learn about how to trouble shoot the problem and how to designed the filter.

The designing of heath care monitoring system is successfully achieved. It gives us accurate reading and it has no any working disabilities.

ACKNOWLEDGEMENT

Firstly, we would like to thank our project guide "**MR. ARUN PRADHAN**" for helping out in our project and the implementation of our project. Through his guidance our project was successfully completed.

The successful presentation of this project in itself acknowledgement of the immense blessing of our parents. At the completion of this project, we feel very obliged to express our gratitude towards all those who make variable contribution throughout the duration of the project. We also like to thank all of the staff of Department of Electronic and Communication for their immense help as well as non-teaching and our friends for helping us during the project either directly or indirectly.

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