Smart Health Band with Alert System

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Abstract – *The main aspect of our project is to reduce heart related deaths among people. So, we want to design the health band with less cost by using arduino technology. We also introduce Bluetooth and Wi-Fi module in the health band to monitor heart rate, body temperature and oxygen level. The sensors we used in this band detect the Heart rate, temperature and oxygen level. It also records the data of heart rate, body temperature and oxygen level for about 30 days. The OLED display works without backlight and it display all the information needed to identify the abnormality in the pulse, temperature and oxygen level. This also brings awareness about heart diseases among people. The buzzer gives alert signal to the surrounding in case of heart attack. It mainly focuses on elderly people, who are affected with Alzheimer disease and Autism to keep monitoring their health. In addition to that there is a high probability of risk is that the patient may lose their life due to Chronic Obstructive Pulmonary disease (COPD) and Obstructive Sleep Apnea Syndrome (OSAS) especially during their sleep as a result of excessive fatigue of the heart, these deaths can be reduced by this health band. By using this arduino technology we bring health band with less cost and it makes the use of health band not only by the rich people, also by the people from the low economic backgrounds.*

Key Words: Arduino, Biomedical Sensors, heart rate monitoring, health monitoring.

1. INTRODUCTION:

In this modern world, there is a rising interest in wearable fitness band and health care based smart watches and they are commercially available to monitor personal health care, fitness and activity awareness. These devices are used to record the regular activities in a periodical manner.

Based on current trends in technology health monitoring is possible. But still there are certain conditions of health are unpredictable, such conditions like heart attack can leads to deaths to predict such conditions our band might be helpful.

The sensors used in this Arduino technology usually monitor heart rate, temperature and oxygen level of our body. By using this technology, we can detect the people who are at the risk of death. This plays a major role in order to avoid heart related deaths in mere future. Reference [1] This is used to detect the various health parameters like heart rate, ECG, body temperature. It also locates the patient current location using GPS. This device uses GSM module for sending messages to the doctor and their relatives. This device usually sends the information is that "the patient condition is serious". It uses arduino UNO, its size is double to the Nano board. The LED displays used in this are not compatible in the areas of direct sunlight. So, monitoring it is difficult for the patient to identify the irregularity in the heart rate. [2] This uses IOT for the heart attack. The heart beat sensor is the only sensor used in this device. It transmits information through the GSM module and it uses microcontroller which receives the flag (information related to their health) from the sensors. This device is not wearable by the patients.

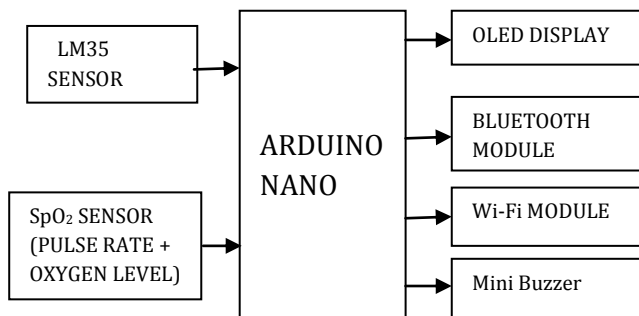## 2. WORKING OF THIS PROJECT

2.1 METHODOLOGY

This project consists of Bluetooth and Wi-Fi module in order to record and monitor the data. The inputs are SpO_2 and temperature sensor. The outputs are OLED display, Bluetooth module, Wi-Fi Module and Buzzer. Arduino Nano is used as the operating system of this project.

INPUTS: The SpO_2 sensor in this system is used to measure the heart rate lively by using the variation in the flow of blood. The temperature sensor used to measure the body temperature. These sensors give the output by means of electrical signal to the Arduino.

OUTPUTS: The OLED display is used to display the output readings such as heart rate, temperature of the body and oxygen level of the body. The Bluetooth module is used to transfer the data to mobile device nearby and then it transfers computerized text message to the relatives and family doctor's mobile. The Wi-Fi module uses Internet of Things (IOT) to store the data like heart rate, temperature and oxygen level for about 30 days. The buzzer is useful for closed range, in case of a high heart rate which may result in heart attack. Usually for old people's heart rate above 120bpm is referred as Heart attack.

2.2 BLOCK DIAGRAM:

The block diagram of the proposed system is given below, the Arduino nano has three inputs LM35 Sensor, SpO_2 Sensor and four outputs OLED Display, Bluetooth Module, Wi-Fi Module, Buzzer. It is all controlled by Arduino Nano, power supply and ground is given to Arduino, Wi-Fi module, Bluetooth module which is not shown in this block diagram.

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LM35          ┌──────────┐      OLED DISPLAY
SENSOR ──────▶│          │────▶
              │          │      BLUETOOTH
              │ ARDUINO  │────▶ MODULE
              │  NANO    │
SpO₂ SENSOR   │          │────▶ Wi-Fi MODULE
(PULSE RATE + │          │
OXYGEN LEVEL)─▶          │────▶ Mini Buzzer
              └──────────┘
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2.3 HARDWARE DETAILS:

S.No.	COMPONENTS	QUANTITY
1	SpO$_2$ sensor	1
2	Arduino Nano	1
3	Temperature sensor LM35	1
4	Wi-Fi Module	1
5	Li-Po 3.7V Battery	1
6	OLED Display	1
7	Bluetooth Module	1
8	Mini Buzzer	1

1)SpO$_2$ Sensor: It is used to measure both oxygen level of blood and pulse rate of heart by oxygen saturation method. This is defined as the measurement of the amount of oxygen dissolved in blood.

Fig.1.SpO$_2$ sensor

2)Temperature Sensor: It is a device, usually an RTD (resistance temperature detector) that collects the data about temperature. It converts the data into understandable form a device.

Fig.2.Temperature sensor

3)Arduino Nano: The Arduino nano is a very small, compete, compact and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x). It has more or less the same functionality of the Arduino, but in a different package. It only has DC power jack, and works with a Mini-B USB cable instead of a standard one.

Fig.3.Arduino nano

4) Wi-Fi Module: Wi-Fi module is complete Wi-Fi network it can easily connect as a serving Wi-Fi adapter based on Internet of Things (IOT). It is used to store data up to 30 days through IOT.

Fig.4.WiFi Module

5) Li-Po Battery: It is called lithium polymer battery, or lithium ion battery. It is a battery using a polymer electrolyte instead of a liquid electrolyte. These batteries provide higher specific energy than other lithium battery types and these are used in mobile devices and radio-controlled aircraft.

Fig.5.LiPo Battery

6) OLED Display: OLED Display works without backlight because it emits visible light. Thus, it can display deep black levels and it can be thinner and lighter than LCD. The OLED we are using is the 128*64 display which is compact to be a watch display.

Fig.6.OLED Display

7) Bluetooth Module: BLUETOOTH Module HC-05 is used for controlling Arduino via Bluetooth communication. It's works on serial communication; an android app is designed sending serial data.

Fig.7.Buetooth Module

8) Buzzer: The Buzzer is an audio signalling device, which may be mechanical, electrochemical or piezo electric. The main purpose of using buzzer is to alert the surroundings in case of heart attack.

Fig.8.Mini Buzzer

3. SYSTEM DESCRIPTION

The main aim of this project is to monitor health of a patient and alert in case of emergency. It is done by the help of Internet of Things (IoT). The health is monitored by two bases, they are OLED display and IoT website. The OLED is used for self-realization of health condition of patient who wears it. The IoT website is useful for doctor and relatives who frequently monitor the health of the patient. The OLED result is just read only type it cannot be stored. The IOT website can store data up to 30 days by using the Wi-Fi module.
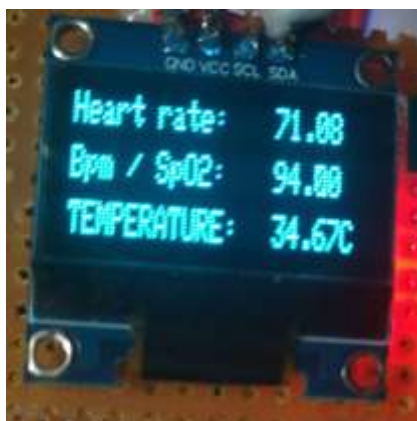

Fig.9. OLED Output

Fig.9 shows the OLED output of this project, it has three main parameters, they are Heart rate, SpO_2 and Temperature. The Heart Rate is based on Bpm (Beats per minute), the normal bpm is around 70-100. The beats above 100 is consider as abnormal. The O_2 is measured per 100, 95-100 is considered as good oxygen level, above 100 is abnormal. The temperature is measured by ^{0}C. Above 36^0C is considered as abnormal body temperature.

Fig.10. IOT Output

Fig.10 shows the IoT output for a day, it shows the heart beat graph for a day. This data can be stored day by day for a month, this is so helpful to monitor the abnormality in the patient's body.

4. CONCLUSION

The main implementation of the project is to detect the heart related issues and reduce the early death of the patients. It determines the heart rate and gives periodical information. IOT technology paves a way to achieve rapid technological growth. This developing technology monitors the patient at any time without depending on hospitals. It gives a constant data for about a month.

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