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Smart Fitness Band for hospital applications

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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.

***Index Terms*– Arduino, Biomedical Sensors, heart rate monitoring, health monitoring**

I. INTRODUCTION

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

The sensors used in this Arduino technology usually monitors 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. This is used to detect the various health parameters like heart rate and body temperature. This device uses Wi-Fi 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. This uses IOT for the heart attack. The heart beat sensor is the only sensor used in this device. It transmits information through the Wi-Fi 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.

II. LITERATURE REVIEW

Numerous tracker types are utilized in various formats, including smart fitness equipment, fitness wristbands, pedometers, fitness applications, Nike Run Club, etc. The smart fitness machine is an aftermarket item that is made to automatically monitor a user's performance for a particular exercise equipment. It is a remedy for contemporary weightlifting equipment that is not intelligent. Microcontroller gathers sensor data for counts, reps, and sets and uploads it to a database through the internet so that users may read the information about their workouts on Android phones afterwards. In addition to counting steps and distance travelled, Fitbit bands also include the ability to reset data. It utilizes an accelerometer, a 3-axis implementation that enables measuring in

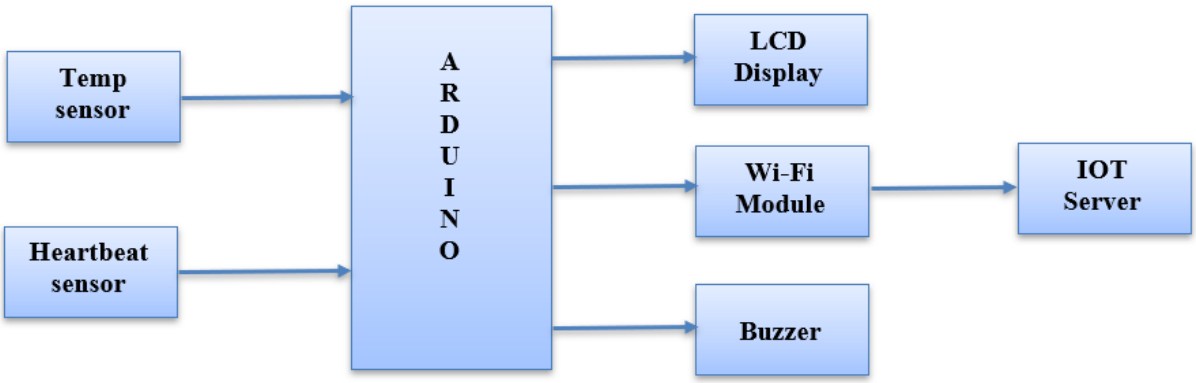
any motion and increases accuracy compared to single-axis pedometers. Both mechanical and electrical pedometers count steps through the use of a pendulum or hammer that swings back and forth between the center. The LCD display then displays a count of your steps; most will, at the touch of a button, translate this information to distance in kilometers or miles.

By stating that the ageing process may be somewhat delayed by appropriate training, Kevin C. Tseng explains about an integrated physical fitness assessment system to measure the level of physical fitness of the elderly [2]. Furthermore, Lee and Chung have incorporated sensors into a smart shirt for real-time ECG monitoring, while Otto et al. have improved the capabilities of health monitoring systems by employing networks. The inquiry and analysis on fitness instructors at fitness clubs in Wuhan are described by Yan Sun and Qun Liu [3]. There is little question that demand for fitness trainers will increase as the nation's fitness level rises. The primary goal is to advance the aerobics teacher team and offer the theoretical foundation for the quick growth of the clubs by examining age, gender, educational attainment, income, technical proficiency, and working circumstances utilizing literature and questionnaires. An android-based data management system for fitness equipment that can display, save, and manage fitness data was the subject of study by Hai Ying Yu, YanYan Wang, and Zhao Feng Liu [4]. Yaping Zhong and Wie Hong Hu conducted research on a WebGIS-based data a0nalysis and information integration platform for China's National Fitness Programme [5]. The data from the national physical fitness monitoring programme may be analyzed and evaluated using a novel method thanks to this study, which also serves as a resource for the National Fitness Program's next development.

To address childhood obesity, Fletcher Lu and Kei Turner wrote about how a mobile fitness game may improve adolescent fitness attitudes [6]. The prototype of this mobile fitness game offered 13 workouts with the ability to collaborate and communicate with friends about exercise progress. Results show that subjects' opinions of fitness activities were improved by the socialization components of the programme. The proposed Digital Fitness Connector architecture by Nisheeth Gupta and Sruti Jilla makes use of already-available smartphone and sports and fitness gadget technology [7]. This enables interoperability with more than 80 ANT+ health and fitness sensors, allowing users to measure their physical activity in real time or after an exercise. The majority of smartphone systems are compatible. The analysis of data from physical fitness tests of college students is described by Chao Yang, Xu Zhao, and Long Zhou [8]. Body mass index (BMI), lung capacity, running, standing long jump, sit and reach, and pull-ups (for men) and sit-ups (for women) are all included in the test. The weighted total of the seven elements is the final outcome. Students are given a fair assessment of their physical prowess by the learnt weights, which also provide a solution method. A customized fitness schedule based on endurance is described by S. Sahoo, V. N. Tiwari, and R. Narayanan [9]. The suggested model offers a tool to forecast a test subject's future endurance after a certain workout regimen. This gives a test user access to a fitness planner with the ability to design workout schedules to meet predetermined fitness goals.

III. RESEARCH METHODOLOGY

3.1 BLOCK DIAGRAM



3.1 Block diagram

The block design of the suggested system is shown below; the Arduino has three outputs (LCD Display, Wi-Fi Module, and the Buzzer) and two inputs (Temperature Sensor and Heartbeat Sensor). Arduino controls everything; it receives power supply and ground along with Wi-Fi module depicted in this block diagram.

The major goal of this project is to keep track of a patient's health and notify authorities in case of an emergency. The Internet of Things (IoT) is used to aid with this. Two platforms, an IoT website and an LCD display, are used to monitor health. The LCD is meant to help the patient who is wearing it become aware of their own health status. The doctor and family members who often check on the patient's health can benefit from the IoT website. The LCD result can only be read; it cannot be saved. Using the Wi-Fi module, the IOT website may keep data for up to 30 days.

3.2 METHODOLOGY

This project consists of Wi-Fi module in order to transmit the data. The inputs are heartbeat sensor and temperature sensor. The outputs are LCD display, Wi-Fi Module and Buzzer. Arduino Uno is used as the operating system of this project.

- **Software Specifications-**

  Arduino IDE

  Proteus

  Thinkspeak (IOT)

- **Hardware Specifications-**

  Arduino UNO

  Heartbeat Sensor

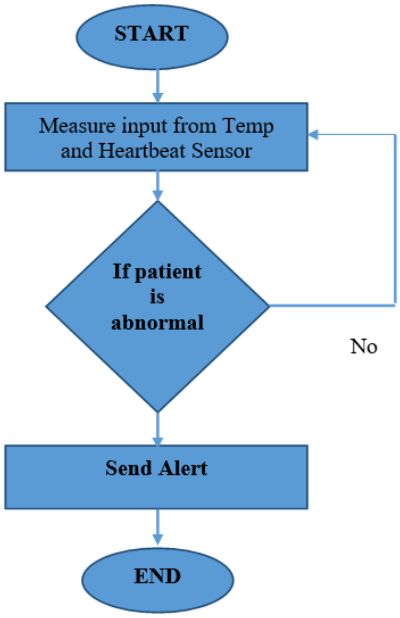
  Temperature Sensor (LM35)

  Wi-Fi Module (ESP8266)

  LCD

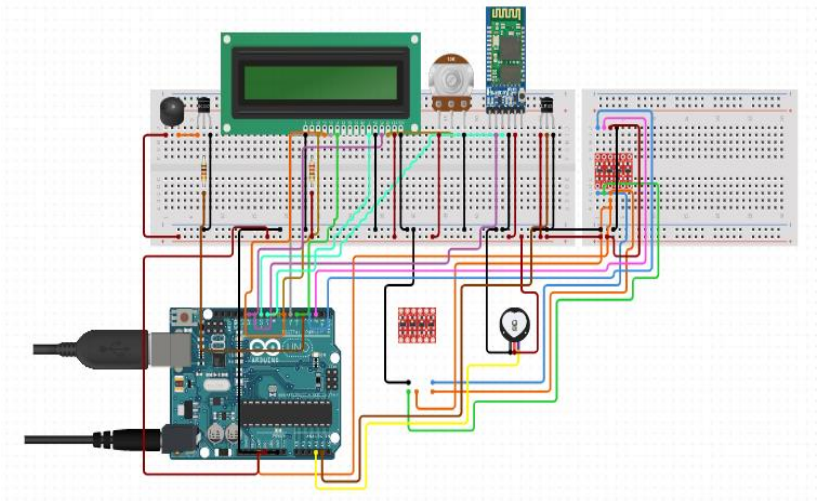
  Buzzer

• **Flow chart of the system-**



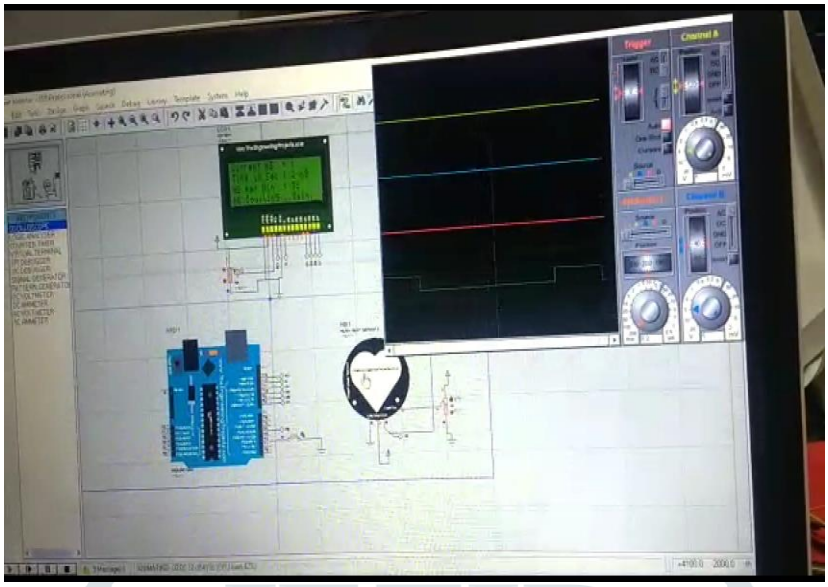
3.2 Flow Chart

• **Circuit Design-**



3.3 Circuit Design

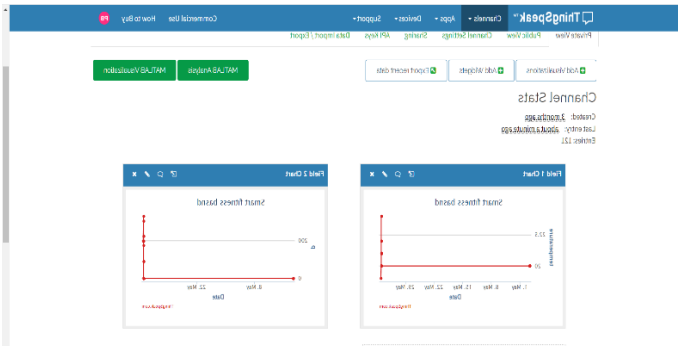
• **Simulation Results using Proteus-**



3.4 Simulation

IV. RESULTS

4.1 HARDWARE IMPLEMENTATION



4.2 IOT DATA

V. CONCLUSION

Smart fitness band for hospital applications is a low cost, reliable and secure health monitoring system. It is designed to be used as health tracking device, which also sends alerts in case of an emergency. It displays the heartrate and temperature on the LCD and in case of emergencies, will trigger the buzzer and send an alert to a medical professional via the IOT. This will decrease the stress on the healthcare professionals while helping the patients to track their health seamlessly. The data collected from the smart fitness band can also be used for better decision-making process. This device can also be used in a cluster mode in hospitals for monitoring the patients remotely.

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