IOT based Wearable Health Monitoring System

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Abstract—. **This study proposed a wearable health monitoring system for multifunction. A promising approach has been sensing, remote health monitoring, and, ultimately, recognizing activities of daily living. From a technical standpoint, the Internet of Things (IoT) is fast rising in popularity across many fields, particularly in the field of individualized healthcare. Meanwhile, the IoT framework's body area sensor network (BASN) has been widely used for anywhere health monitoring. It was based on the Internet of Things and micro-control chip technology. The main features of this health monitoring devices is to track heart rate, body temperature, and blood pressure using sensors. This information is saved to cloud using Wi-Fi and a message is sent to user's mobile using blink app**

Keywords——IoT, BASN, Blink, Micro Controller, Sensor.

I. INTRODUCTION

Over the past two decades, there have been changes in the population's size and makeup, and these trends are expected to continue. These demographic patterns have a big impact on practically every aspect of society, but especially on health and healthcare. Life expectancy has significantly increased, particularly in more affluent countries. This is something to celebrate and ought to be seen as a chance for people to enjoy longer and better lives. However, as older individuals typically require more healthcare than their younger counterparts, this calls for significant improvement in both the healthcare system and the living environment. As part of the normal ageing process, chronic disease is also more common among older persons. The price of health care is also a demographic time bomb, costing etc.


Fig 1: Illustration of wearable health monitoring system

Moving forward, it is anticipated that integrating contemporary information and communication technologies (ICT) into the healthcare system will provide elderly and chronic disease patients with more effective and efficient healthcare services. Several phenomena have emerged since then, including ambient assisted living (AAL), universal healthcare , and IoT for healthcare.
While they are all linked, these terms all differ from one another.

IoT emphasizes how all physical and digital objects are connected, including sensors, smart devices, cyber sensors, and a wide range of other goods. This enables automatic and effective data transfer and sharing over the Internet. Therefore, enhancing the use of IoT in healthcare with linked medical sensors, especially wearable or implanted ones, is thought to be able to deliver smart, accurate, and personalized healthcare at an affordable price.

In this paper, we presented a framework of the Wearable IoT-cloud-based health monitoring system (WISE).

II. METHODOLOGY

Intelligent wearable sensors are driving the transformation of healthcare from a traditional hospital-centric model to a personal wearable device-centric model. Multifunctional and personalized real-time monitoring of various biochemical targets and signals based on smart wearable sensors for health monitoring, especially wound healing, is urgently needed.
Monitoring health condition of patient under emergency conditions and forwarding the message to nearby relatives and doctors through wearable devices like watches, shoes, jewellery, clothes etc., can also be done through wireless communication techniques. One of the cheapest method is to implement this idea is with Arduino Uno board and sensors connecting to it ,the Arduino board is programmed using arduino ide and we also use blink app in the user's mobile.

A. SOFTWARE REQUIREMENT
1. BLINK IOS

This app is helpful for interfacing the controller such as arduino, Raspberry pi, Node MCU with the help of internet. With this application an interface is developed in the form of graphics known as widgets

2. ARDUINO IDE

It is an integrated development environment that supports various types of micro controllers especially for arduino developed controllers. It has a text editor to write code, a message window, a toolbar. It is easy interact with the hardware and to dump the code without the internet connection. The arduino IDE uses the variants of C++ language to write the code.

B. HARDWARE REQUIREMENT
Arduino Uno: Arduino Uno is a microcontroller board based on the ATmega328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP
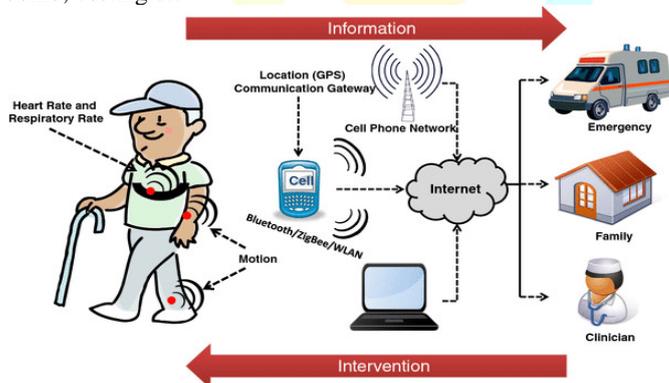
header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Power supply: A 5.5v AC power supply with the help of a usb cable connected to arduino uno and switch board

Blood pressure sensor: It is a non-invasive MEMS pressure sensor

(a): ECG Report on BLYNK app
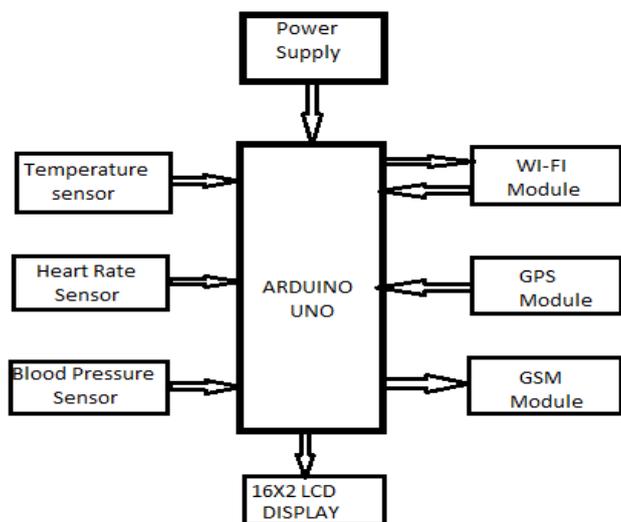
Fig 2: Hardware Implementation

which is same as manufactured as a semiconductor .A threshold voltage is set according to the user's needs

Temperature sensor: Used to measure temperature of any surface. Temperature sensors work by providing readings via electrical signals. Sensors are composed of two metals that generate an electrical voltage or resistance when a temperature change occurs by measuring the voltage across the diode terminals. When the voltage increases, the temperature also increases.

Heart Rate Sensor: heart rate sensor measures pulse waves, which are changes in the volume of a blood vessel that occur when the heart pumps blood. Pulse waves are detected by measuring the change in volume using an optical sensor and green LED.

Blood Pressure Sensor: The Blood Pressure Sensor is a sensor for measuring blood pressure that doesn't hurt. Using the oscillometric method, it measures the mean arterial pressure, diastolic pressure, and systolic pressure. Also reported is the pulse rate.

LCD Display: A 16x2 Liquid Crystal Display is used for displaying the user's Heart rate, Blood pressure, Temperature

Wi-Fi Module: A ESP8266 is used as a wi-fi module for transmitting and receiving the patient's information. This is used as a communication device between server and user's mobile.

GPS Module: Used for tracking location of user.

GSM module: A GSM modem or GSM module is a device that uses GSM mobile phone technology to provide a wireless data connection to a network. GSM modems are used in cell phones and other devices that communicate with cell phone networks. They use SIM cards to identify their device online.

The program for implementing the above hardware is written according to the input and output pins connected to arduino uno and other components. The program is executed using Arduino IDE and it is dumped into the board by selecting the required board. After dumping the program into the board the required connections are made and interfaced both hardware and software using the Blynk app on the user's mobile and the wi-fi module connected to the board.
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III.RESULTS

An IOT Wearable System for monitoring health of a person is designed and implemented with the help of Arduino Uno as a heart of the system. This system will show the readings of temperature, Pulse Rate, Blood pressure of the person also sends alert messages to the user mobile and to the nearest hospitals in case of emergency.
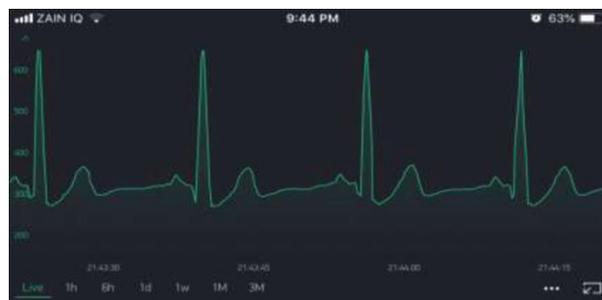
(b): Combined report of ECG, Temperature, Heart Rate on Blynk App

Fig 3: Results for the proposed system

IV.APPLICATIONS AND ADVANTAGES

By tracking patient activity and data, wearable technologies can help doctors better understand how their patients are feeling and managing their diseases. Additionally, wearable's like anklets and watches can provide valuable insights into patient care settings such as hospitals and nursing homes.

The benefits of wearing wearable technology devices are numerous. First and foremost, they provide an innovative solution for improving patient safety. By providing patients with easy-to-use tools to keep track of their health and well-being, these devices help to reduce the risk of harm to both the patient and caretaker and helps to reduce the hospital costs

V.CONCLUSION

Technology and the number of apps that utilize it are continually growing. IoT technology is rapidly growing to incorporate new industries and applications. One of them is the smart health industry, which provides us with enormous prospects through innovative applications. With the current infrastructure and methodologies, monitoring patients who should be constantly monitored in the hospital setting is extremely challenging. People under observation in hospitals are reliant on bedding, which causes discomfort. Several health disorders that require prompt identification might produce serious complications for the patients if they are not properly managed. For people suffering from cardiac disease, early detection is critical.

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