Wearable Device for Health Monitor

Ramya K, Vimal T, Sampath kumar K, Sudhagar G

Abstract*: In the modern world, most of the people are engaged in their work for most of the time. So, they could not monitor their health regularly but taking care of health is a vital one for the human beings in this generation. In order to provide solutions for this problem, a Smart healthcare device is necessary for people to monitor their condition continuously which may not be provided outside hospitals. It helps in town areas and villages where nearby healthcare centers can be in contact with city hospitals regarding the health condition of the patient. In hospitals, patient's health rate like pulse rate needs to be consistently observed. This proposed device is mainly designed for continual observation of the health parameters of the patients. The patient's health parameters are displayed on the designed device as well as transmitted to their trusted contacts using the Wi-Fi cloud. In this device, we used the pulse oximetry sensor to monitor the health parameters like blood oxygen level, blood pressure, hemoglobin, stressed and heart rate. And the measuring health parameters were display in the OLED display and the data were stored in Wi-Fi cloud and transmit the parameters with the blynk application.

***Keywords*: *Node MCU, GPS, Pulse oximetry sensor, alert system*.**

I. INTRODUCTION

Health is a main factor of human need for a better life. Unfortunately, for certain reasons such as insufficient health care facilities, existence of large distance between rural areas and nearby hospitals, absence of doctors and care takers during the emergency time of the patients, etc. have led to a concern about the Global Health Issue. According to World Health Organization, health is defined as the presence of physical, mental and social fitness with the absence of diseases. The only way to overcome all these problems is the fusion of technology and medical science. So the medical representatives are establishing new technologies to solve those problems. The portable monitoring embedded system can bring the healthcare to the next step of emerging technology. By using this technology, people can have done their checkup daily at home. It also used to monitor the people continuously in non-clinical environment. On the other hand, this system can be done by using portable monitoring devices along with smart sensors. In our project, the device is developed by interfacing both hardware and software. The Arduino microcontroller is interfaced with the Node MCU microcontroller, Blynk application and pulse oximetry sensor. Through this interface, the health parameters like heart rate, stress, blood pressure, hemoglobin content, blood oxygen level are obtained and displayed in the device. Similarly, these data are transferred to the Wi-Fi cloud through Node MCU. By connecting the Wi-Fi cloud with the Blynk application, these data are displayed in the mobile phones.

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II. LITERATURE SURVEY

Tarannum Khan , Manju K. Chattopadhyay et al, in the year 2017 [1]. Proposed the system based on the incorporation between the biosensors and the controller. They have used temperature sensor (Lm 35), heart beat sensor. These sensors are used to measure body temperature and heart beat rate. They had used SD card and RTC to store sensor output and they had uploaded it to online database, by using JSON link they receive their sensor data.

Junaid Mohammed et al, in the year 2017 [2]. Proposed a system which observes patient's ECG wave anywhere with IOIO-OTG Microcontroller. For observing ECG, they develop an ANDROID application. The android phone need to be connected to IOIO-OTG microcontroller using USB cable. Using that android application, the collected data or ECG wave can be checked and stored.

Mohammed S. Jasses et al, in the year 2015 [3]. Proposed a system focusing on measuring the temperature in the body by using Raspberry pi board. In this paper, they can measure the temperature in the body by using Raspberry pi and it is then transferred to cloud by using wireless sensor networks. By using this cloud based website, they have monitor body temperature of the patients.

Mathan kumar et al, in the year 2014 [4]. Proposed a system focusing body temperature, respiration rate, heart rate, ECG by using various sensors. These sensors were interfaced to the PIC16F887A microcontroller. Once the data is obtained from this device, they are sent to the cloud. For monitoring purposes, they had designed an android app and a website.

Karandeep malhi et al, in the year 2014 [5]. Focused on temperature and heart beat rate in body using C8051F020 micro controller. They use the wearable sensors for collecting those parameter readings and it can be send to the microcontroller. In this system, zigbee module is interfaced with the microcontroller, and it will transfer the data to the nearest reciver.

Sowmya Roy et al, in the year 2014 [6]. Proposed a system to monitor the ECG waves of the patients. C8051F020 microcontroller is used to monitor the ECG waves. ZigBee module was used in this system which can transfer the ECG waves. ZigBee module is used to send the obtained data or the ECG waves to the nearby device.

Hasmah Mansor et al, in the year 2013 [7]. Proposed a system used to monitor the patient's body temperature using Raspberry pi. In that, he used temperature sensor (Lm 35) which can detect the body temperature and this data can be send to the customized website which is created in a SQL format. With this system, the system can monitor by anybody in a login process.

Nithin P. Jain et al, in the year 2012 [8]. Proposed a system for monitoring blood pressure, body temperature and heart rate of the patient. The AT Mega 32 controller is used in the system and it is interfaced with GSM module. Once the data is obtained from microcontroller, the system can send the SMS to the doctor when the health parameter values are lower than the threshold level by using GSM.

III. PROPOSED SYSTEM

The existing model, which is already designed for a health monitoring like heart rate and blood oxygen level by using this sensor we are designed this device to measure the blood oxygen level, blood pressure, hemoglobin, stress level and heart rate. In the measuring parameters the heart rate and the blood oxygen level can be monitor continuously. The hemoglobin content of the blood will be detected by using the blood oxygen level. The stress level will be measure using the heart rate, this are the parameters are measured and display in the device and the data will be store in the Wi-Fi cloud and it will be transmitted to the mobile phones through blynk application. This system helps the patients to monitor their health conditions easily.

IV. HARDWARE DESIGN

The pulse oximetry sensor (max 30100) is used to measure the patient's blood oxygen level and the heart beat rate. In this device has two LED's one is red light and other one is infrared light both are used for measuring the blood oxygen level in the blood. The pulse rate is determined by the increasing and decreasing of oxygenated blood. It low power and fast data output capability. The Node MCU is a microcontroller with ESP8266 Wi-Fi source from Espressif which can help the user to access an open source IOT platform which runs on the. By using this microcontroller, the measuring health parameters will be transmitted and display in the mobile phone with the help of blynk mobile application, from these blynk application, we can monitor the health parameters by the other persons. The Arduino Uno is a microcontroller which helps to monitor the sensor working and it will control display the output of the sensor which is connected in the board.

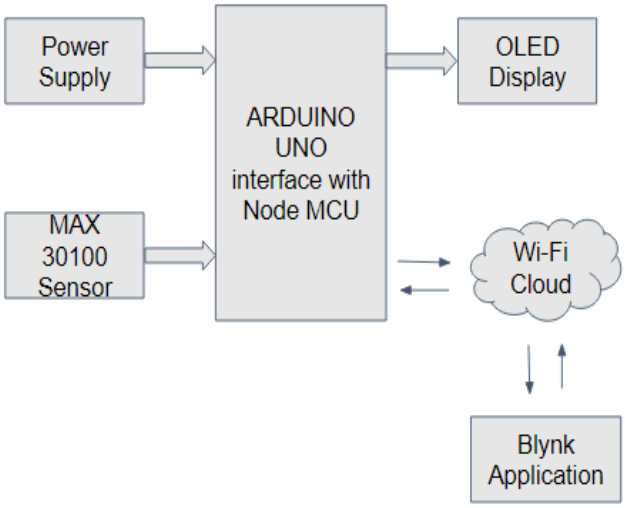

Fig 3.1 Block diagram

V. WORKING

The device is developed for monitoring the health parameters for both men and women. In human body, oxygen enters the lungs and is then absorbed into blood. The blood brings oxygen to the other body organs. The main way that oxygen is distributed in our blood is by hemoglobin. This proposed system is designed as a portable device consisting of Arduino UNO microcontroller, Node MCU microcontroller, pulse oximetry sensor (max30100) and OLED display. When this device is placed in the wrist like a watch, a tiny clamp-like sensor touches the wrist. During a pulse oximetry test, small beams of light in the finger travel into the blood measuring the oxygen content. This process can be done by measuring the changes in the light absorption in oxygenated or deoxygenated blood. Then the MAX 30100 sensor incorpates two LED's that is infrared light and red light to track pulse and heart rate signals, a photo detector, advanced optics and low noise analog signal processing. When the heart pumps the blood, the oxygenated blood increases while the heart relaxes, the oxygenated blood decreases. By comparing the time of rise and fall in the oxygenated blood, the pulse rate is calculated. Infrared light is only required for measuring the pulse rate. The red light as well as the infrared light is used to monitor and calculate the amount of blood oxygen level in the body. From the blood oxygen level, we can calculate the hemoglobin content of the blood and the IRD and RD count of the sensor output the blood pressure will be measured, the heart rate variability is directly proportional to the stress rate, the stress rate will be monitor continuously and display in the device similarly transmit the health parameters from the Wi-Fi cloud through the blynk application, by this application we will monitor the health parameters by their trusted contacts.

VI. RESULTS

Implementation of this project will help to monitor the health parameters like blood oxygen level, blood pressure, hemoglobin, stress level, and heart rate. This are the major parameters will be considering for the patients, by this device they were know about their health conditions and they can be consulting a doctor to take a proper medicine. The normal persons are also aware about their health condition by this device, it helps to transmit the data from the device to the mobile phones through blynk application. The fig:6.1 represent the heart rate and blood oxygen level with their stress level, and the fig:6.2 represent the blood pressure and hemoglobin content of the blood.

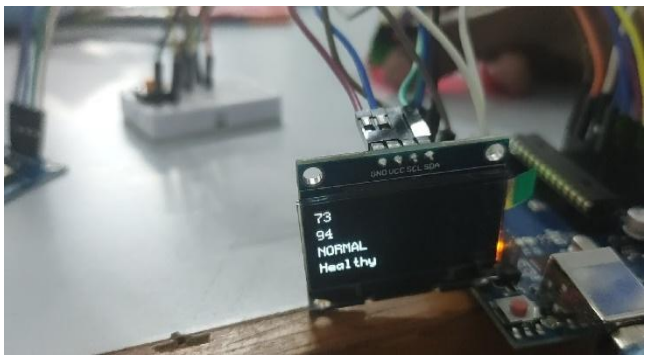

Fig 6.1

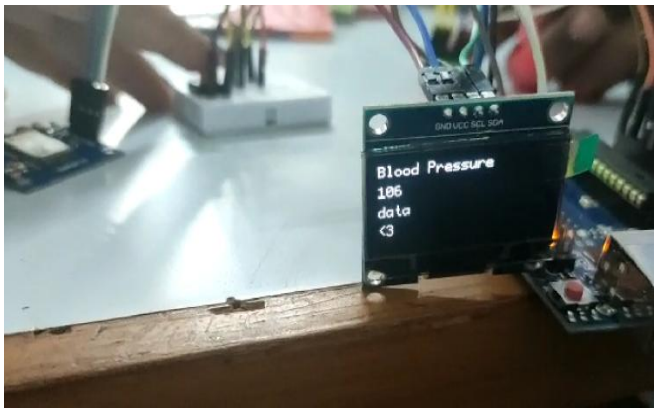

Fig 6.2

VI. CONCLUSION

In this paper, new idea of developing a health monitoring device has proposed. The existing device can measure the heart rate, . But this proposed device can measure the parameters like pulse rate, blood pressure, blood oxygen, stress and hemoglobin. These obtained data are displayed in the device as well as uploaded in Wi-Fi cloud. By connecting the Wi-Fi cloud with the Blynk application, these data are displayed in the mobile phones.

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