IOT Based Wearable Health Monitoring System

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***Abstract* - Health has prime an incentive in our lifestyle. This task goes for building up a framework which gives body temperature and pulse and heartbeat sensor collectively by utilizing MAX30100. This sensor is obliging with controller NodeMCU board. Remote information transmission done by NodeMCU through inbuilt Wi-Fi module. The Wi-Fi module is utilized for remote information transmission on IoT stage for example Google drive. Information representation is done on web page. So that record of data can be stored in Google spreadsheet over period of time.**

***Index Terms* - IOT, Health, Sensor, NodeMCU, Remote**

I.INTRODUCTION

The term "Internet of Things (IoT)" has recently become popular in communication technology. It evolved in a certain way and named it because it is the closest field. The Internet of Things will soon change many aspects of our lives, and it will change our world [1]. The number of IoT devices is expected to surge in the next few years. Integrating IoT functions into medical equipment can improve the quality of care for elderly patients. IoT in the healthcare field can store thousands of computerized patient records and help patients collect their data at any time. Many components of health awareness have been improved. They are portable, so the patient can use the health monitor connected to the patient so that the doctor can monitor the patient at any time. Because IoT patients are often accessed through the Internet, the patient's health status is usually determined at the right time so that appropriate measures can be taken [2]. Since the patient can be accessed through the Internet of Things, the patient's health can be determined at the right time so that appropriate measures can be taken. The Internet of Things is defined as the integration of all devices connected to a network that can be controlled through the Internet, and these devices provide real-time information to interact with users who use it. One of them is the smart health department, in which new application provides us with incredible possibilities. Patients under supervision in the hospital rely on bedding, which makes them uncomfortable. Therefore, people are looking for an alternative, such as a device that can be worn on the body, which can continuously monitor the health of the user in real time but can also provide the user with timely information about various health parameters to their doctor and caretaker [2]. This research developed a portable patient monitoring system that allows patients to move in their social areas. The main motivation of the project is to obtain clinical advice as soon as possible in case of discomfort heart disease, so the patient's endurance will be expanded. In this project, the wearable device aims to quantify the required attributes, such as heart rate (beats per minute), oxygen level SPO2 (%) and body temperature (Degrees Fahrenheit), which are all NodeMCU from sensors [3]. The handheld device can continuously measure the patient's health parameters, and simultaneously send the patient's health information to family members through SMS and data when panic symptoms occur [4]. It is stored in a spreadsheet.

II. PROBLEM STATEMENTS

- No quick alert system is provided which increases the fatality rate of patient.
- Relatives and specialists cannot be connected to patient's current medical issue.
- Data is not put away in a deliberate manner for reinforcement during emergency circumstance.
- The wellbeing checking frameworks outlined are not incorporated into a little minimal wearable gadget.

III. OBJECTIVES

- Internet of Things (IoT) is the arising innovation, which contains immense measure of keen item

and keen gadgets associated with the web for speaking with one another.

- To examine and figure the patient wellbeing we are utilizing NodeMCU, which is the core of this undertaking.
- By utilizing sensors to quantify temperature, oxygen level, pulse, which are utilized to assess the medical issue of the patient.
- The end-product will be shown on OLED screen and the site and furthermore the outcomes will be sent as an alarm through SMS.
- This undertaking may assume indispensable part in saving the patient life at crisis time since "Time is life".

IV. SYSTEM COMPONENT

A. NodeMCU Specifications

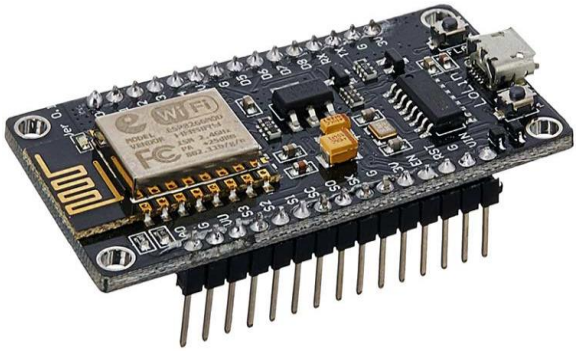

Fig.4.1 NodeMCU

Operating Voltage: 3.3V, Input Voltage: 7-12V, Digital I/O Pins (DIO): 16 Analog Input Pins (ADC): 1 Flash Memory: 4 MB SRAM: 64 KB Clock Speed: 80 MHz USB-TTL based on CP2102 is included onboard, Enabling Plug n Play PCB Antenna Small Sized module to fit smartly inside your IoT projects.

B. Specifications of MAX30100 Pulse Oximeter

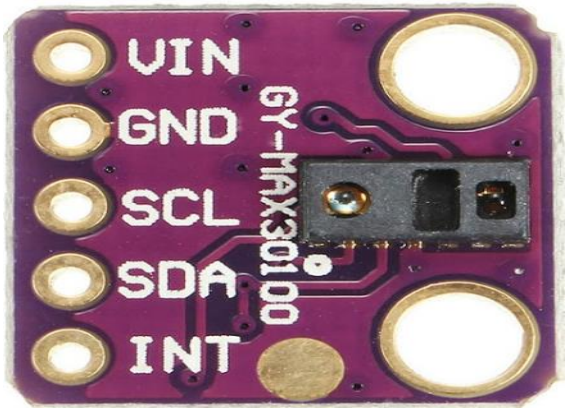

Fig.4.2 MAX30100

The MAX30100 is an integrated pulse oximetry and heartrate monitor sensor solution. It combines two LEDs, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse oximetry and heart-rate signals. The MAX30100 operates from 1.8V and 3.3V power supplies and can be powered down through software with negligible standby current, permitting the power supply to remain connected at all times. Low power operation increases battery life for wearable devices advanced functionality improves measurement performance, high SNR provides robust motion artifact resilience integrated ambient, light cancellation high sample rate capability fast data output capability.

C. Specification of OLED

Fig.4.3 OLED

OLED (Organic Light Emitting Diodes) is a flat light emitting technology. Its Resolution: 128 x 64. Visual Angle: >160°. Input Voltage: 3.3V ~ 6V. Compatible I/O Level: 3.3V, 5V. Mini Size: 2.7 x 2.8cm. Only Need 2 I/O Port Control. Full Compatible with Arduino. Working temperature: -30°C ~ 70°C. Module volume: 32 x 35.5 x 4mm.

D. Specifications of SIM800A GSM Module

Fig.4.4 SIM800A GSM Module

The Features and specifications of SIM800A Module includes the bands ranging from GSM 850MHz, EGSM 900MHz, DCS 1800MHz, PCS 1900MHz values. The coding schemes consist of CS-1, CS-2, CS-3, CS-4 Tx power: Class 4 (2W), Class 1 (1W) ,GPRS class 2/10. It also consist of control via AT commands (3GPP TS 27.007, 27.005 and SIMCOM enhanced AT command set). The voltage supply required is in range from 9VDC to 12VDC with minimum 2A peak current capability high-quality product (not hobby grade). There is a 5V interface for direct communication with MCU kit. The Male Berg strip connectors are used for TTL and RS 232 interface. It has a configurable baud rate with a built-in SIM card holder and a built-in network status LED. The inbuilt powerful TCP/IP protocol stack for internet data transfers over GPRS. It operates on low power and the operating temperature ranges from -40C to +85C with external finger type antenna.

V. METHODOLOGY

In this undertaking we are utilizing NodeMCU as regulator for data, information processor and transmitter, the sensor is utilized for estimating different wellbeing boundaries which will go about as contribution to the framework. NodeMCU will contain an algorithm to check whether information esteem (patient's wellbeing boundaries) coordinate with the basic worth range or not. On the off chance that the qualities are not coordinated the estimated qualities are sent to the guardian via SMS and the data will be furthermore sent to google spreadsheet as backup storage. The website gives medium to moment mind boundaries even from a far of spots, specialist and family members can immediately check upon the patient's wellbeing whenever they need.

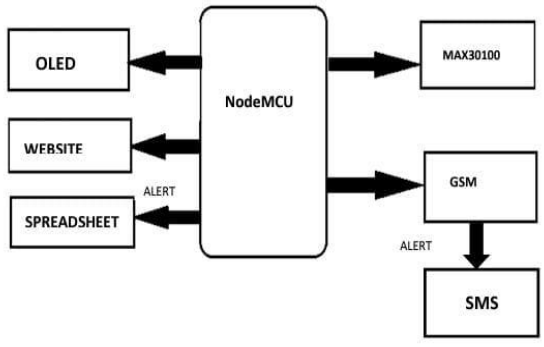

Fig.5.1 BLOCK DIAGRAM

In our project, we evaluated three health limits: temperature, pulse, and immersion in oxygen (SPO2). For pulse, SPO2, and temperature, we use the MAX30100 sensor, which is an integrated module for pulse oximetry, temperature estimation and pulse display. A sensor that receives readings of two wavelengths of light from two LEDs (one red and one infrared), and then uses a photodetector to measure the absorption of pulsating blood. This special LED color combination is optimized for reading at the fingertips. The PPG device contains a light source and a photodetector. The light source transmits light to the fabric, and the photodetector measures the light reflected from the fabric. The reflected light corresponds to different blood volumes. Evaluate temperature, heart rate and oxygen from a small blood organ, like a fingertip. This information will be passed to NodeMCU, where the preparation work ends. After using NodeMCU, the power will be displayed on the OLED screen in Celsius, HR in BPM and SPO2 in %.When the temperature of the activated model exceeds the normal range, we use the SIM800A GSM module to send the SMS to the patient's family [4]. Here, we send data such as temperature, heart rate, SPO2 and crisis contact information.

VI. PROCEDURE ADOPTED

In future reference, when we look for the past estimated values we will be using google drive as a data backup. When the sensors collects the health information from patient body at critical condition and transfer this data to NodeMCU [4].

To store this data for future reference to the concerned doctor or relatives, we directly connect our NodeMCU to theirs PC's here we will have to login to their google drive where we can enter data which is collected by NodeMCU to spreadsheet for specific parameters like time, temperature, etc. This data is in code format will be entered in script editor where we can write our codes then further deploying will generate URL, (there is a part of URL, which acts as unique id to generate path from NodeMCU to spreadsheet, we just need to copy that URL and paste it by selecting 'any one' key which is present on window in the Arduino IDE then deploy will lead to generation of NodeMCU code which will be executing. Once the code is generated, we can directly get access to data by just logging in.

So here we are collecting sensors information from NodeMCU and values are transferred to google script and output will be deployed on google spreadsheet.
As we place our fingertip on the sensor, the sensor information gets displayed on the OLED screen where we get to see the Temperature, Heart Rate and Oxygen Level. We need to connect the Wi-Fi of the NodeMCU to the computer or laptop or the mobile phone. We can do this simply by connecting to the Wi-Fi module of NodeMCU and then going to the browser where we need to enter the IP address and then click on enter [5]. By doing so, the sensor data which is been displayed on the OLED screen would be displayed on the computer or laptop or even on the mobile phone. Thus, here we can monitor the real time sensor data which is displayed on the website.

VII. RESULT

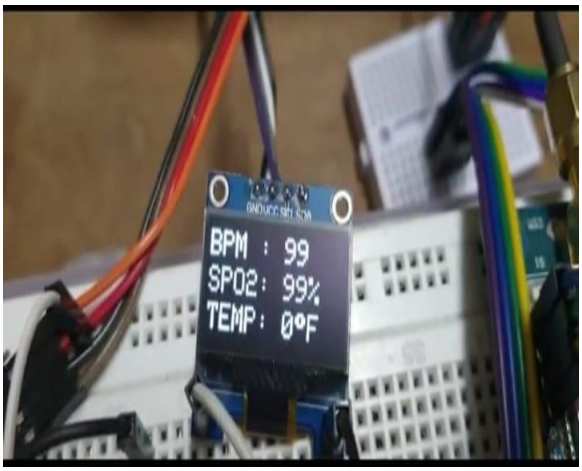

Fig 7.1 OLED Screen

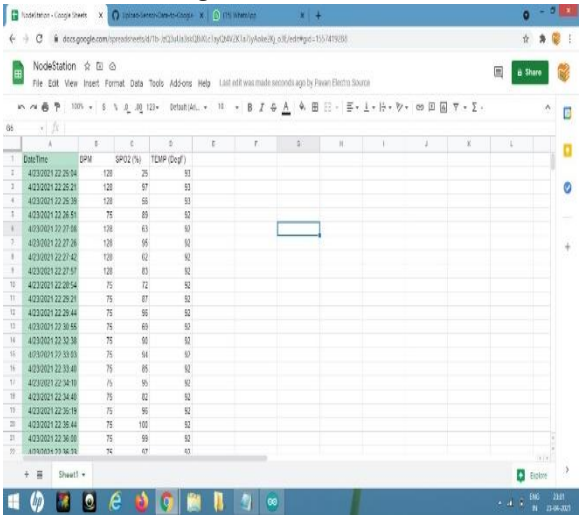

Fig 7.2 Google Spreadsheet

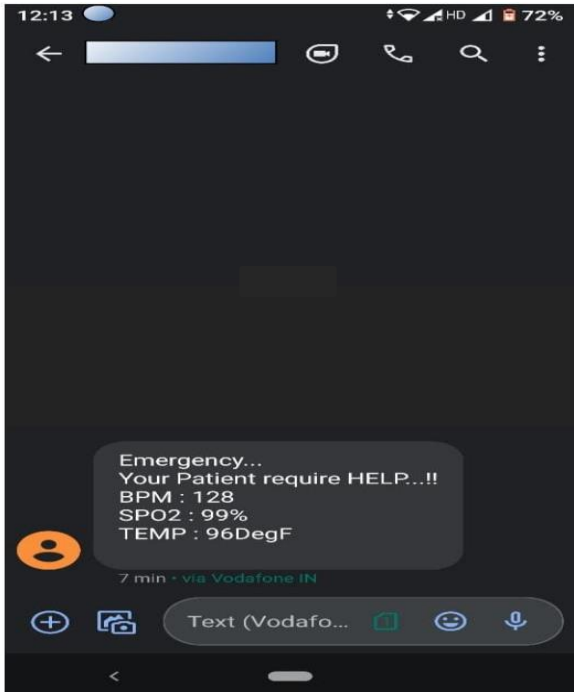

Fig 7.3 SMS Alert

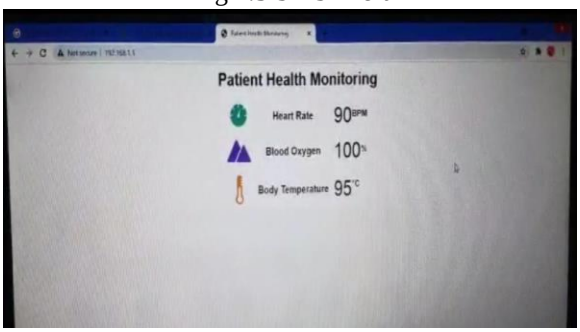

Fig.7.4 WEB PAGE

VIII. CONCLUSION

This wearable health monitoring system based on the Internet of Things proposes a physiological examination system that can continuously monitor the patient's heart rate, blood pressure and body temperature. In the Wi-Fi module database based on remote communication. The proposed system can serve as a patient's lifeline and track key parameters directly related to human health, so it is very useful for patient life support. The distance information is for future reference, which is the focus of the project.

IX. FUTURE SCOPE

As technology advances and product features improve, a new version of the device may be introduced. The

current system works effectively, but several other modules can be added to increase the functionality of the device without severely affecting the current functionality. In the developed system, the improvement will be an Internet connection that can measure several other health parameters, which is useful for monitoring patients, that is, connecting all objects to the Internet for quick and easy access. Detection, camera, scream and electric shock generator.

X. ACKNOWLEDGMENT

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