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Real Life IOT Based Patient Healthcare Monitoring System

Salunkhe P.K.[1], Navandar R.K.[2], Sawant R.A[3], Chavan P.U.[3]

*[1]PG Scholar, Department of E&TC Engineering, JSCOE, Hadapsar, Pune, Maharashtra, India

[2]Associate Professor, Department of E&TC Engineering, JSCOE, Hadapsar, Pune, Maharashtra, India

[3]Assistant Professor, Department of E&TC Engineering, SBPCOE, Indapur, Maharashtra, India

ABSTRACT

Real Life IoT Based Patient Healthcare technology have observed quick development over the past ten years with the huge development of the Internet of Things (IoT) technology, where different types of medical sensors are accumulated for measuring medical parameters and sending them anywhere. Monitoring different medical aspects smart portable products can be used to track human health. Also, they can be used in the prediagnosis of various diseases and detecting abnormalities of organ functionality. In this article, we design and implement a multifunction and portable health monitoring system, which can help in daily medical inspections. The developed system monitors various medical aspects: heart rate (HR), blood oxygen saturation level (SpO2), body temperature, photoplethysmography (PPG) signal, electrocardiography (ECG) signal, room temperature, and room humidity. The obtained measurements are displayed on the built-in display or transmitted over Wi-Fi to either a mobile application, in the local mode, or to the cloud storage for remote monitoring

Keywords: ESP8266, Internet of Things (IoT), medical sensors, real-time monitoring, remote health monitoring.

I. INTRODUCTION

Today Internet has become one of the important part of our daily life. It has changed how people live, work, play and learn. Internet serves for many purpose educations, finance, Business, Industries, Entertainment, Social Networking, Shopping, E-Commerce etc. The next new mega trend of Internet is Internet of Things (IOT). Visualizing a world where several objects can sense, communicate and share information over a Private Internet Protocol (IP) or Public Networks. The interconnected objects collect the data at regular intervals, analyse and used to initiate required action, providing an intelligent network for analyzing, planning and decision making. This is the world of the Internet of Things (IOT).The IOT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring the typical structure of healthcare monitoring system using the IoT paradigm. Medical sensors are used to capture various health indicators, such as cardiovascular signs, temperature, blood pressure, glucose level, consciousness level, and so on. These health-related information are collected and processed using a local processing unit and then transmitted through either small-range or long-range communication protocols to a data center to provide data visualization, diagnosis, or storage. In general, there are two modes for health

monitoring: local mode, in which the patient or some relatives can monitor the biomedical signs and related measurements locally and may call the medical specialist if some readings are outside the normal ranges; and remote mode, in which the medical specialist can remotely monitor the patient's readings. This provides fast response and interactions from the health organization in case of emergency.This may help in early prediction and diagnosis of different diseases associated with abnormalities of those aspects. The proposed system can measure the following parameters: heart rate (HR), blood oxygen saturation (SpO2),photoplethysmogram (PPG), electrocardiogram (ECG), body temperature (_C), ambient air temperature (_C), and ambient air humidity.

II. LITERATURE SURVEY

With the wide use of internet this work is focused to implement the internet technology to establish a system which would communicate through internet for better health. Internet of things is expected to rule the world in various fields but more benefit would be in the field of healthcare. The proposed IoT based patient health monitoring system is integration of embedded and IoT application, provides platform in cost efficient manner, solution for patient and doctor located at remote location. The key objective of developing patient monitoring system is to reduce health care cost by reducing emergency room, physician office visits, hospitalization and diagnostic testing procedures.

A portable and real-time device has been introduced. It can be used in daily medical applications. The proposed system utilizes various sensors to capture the patient vital signals and associated biomarkers and provides access to this data either locally or remotely. Node MCU microcontroller is used to process data and provide connectivity to the Firebase server to deliver the health records. The developed system supports both local monitoring, by displaying readings and plots on the built-in display or sending them to a mobile application within the range of a local network, and remote monitoring by sending the readings to the Firebase cloud server. In the later mode, the remote monitoring dashboard is located in a trustworthy healthcare facility. To validate the accuracy of measurements, the proposed system results were compared to those of a commercial medical device. It is demonstrated that the measurements of the two devices are closely relative.

We also focused on presenting the challenges associated with Medical IOT healthcare applications and existing solutions to create a complete understanding that facilitates the design and implementation of Medical healthcare applications and provides an extensive state-of-the-art for further research. We believe that the review presented in this paper will be helpful for developers and researchers as a reference guide to fully understand the structure of BIOT healthcare applications and facilitate the choosing of appropriate software language, tools, and hardware for the design and implementation of Medical IOT healthcare applications

By using ESP8286 model is a key component, we implemented healthcare monitoring system with IOT concept for doctors and patients. This system continuously monitors the health of patients. The main objective is to design this system is to build user friendly device. We developed multipurpose system, this monitors patient health parameters which is measured easily in simple way as compared to other system The available data for doctors is monitor in real time even also patient is outside the hospital. In this machine learning mechanism is used to automatically predict the kidney disease and diabetes. It is low cost and accurate system. This system provides the better more efficient service to patients. It provides quick solution.

III.METHODOLOGY

A. Block Diagram

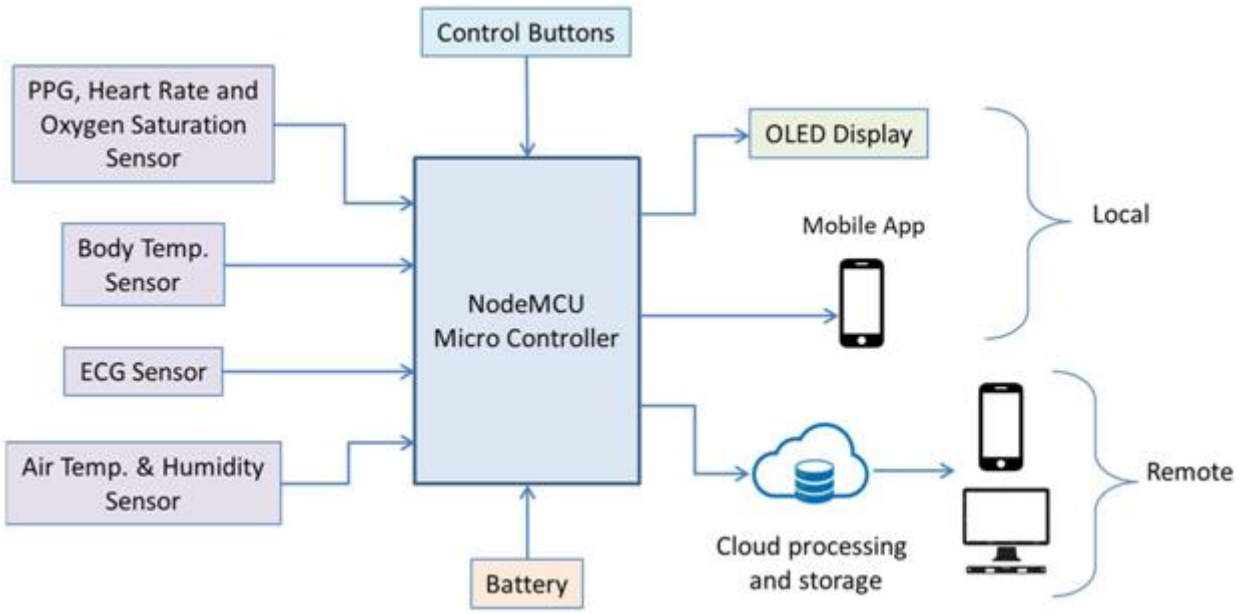

Figure1:Portable And Real-Time Iot-Based Healthcare Monitoring System

The proposed system measures multiple vital aspects (HR, SpO2, PPG, ECG, body temperature, air temperature, and humidity). Therefore, it is sufficient to utilize this system merely to measure and keep track of the numerous bodily processes and environmental factors. The system measures a variety of bodily functions from standard places familiar to doctors, unlike certaincommercial gadgets that adopt non-standard places for measurement, such as smartwatches.

There are multiple ways to read the measurements on the system. A small embedded organic light emitting diode (OLED) display, a mobile application, or a web application can all be used to display measurements. The system can send alerts to emergency centers or caregivers if there is any disruption in the body functions or the measured biosignals fall outside of the predetermined limits. The coordinating specialist may be allowed to access the patient side remotely to view and monitor measurements from time to time to quickly take the appropriate actions if any defect or emergency case occurs. The system depends on a 160-MHz microprocessor to assure measuring speed and accuracy. The system is compact and lightweight, making it simple to carry with you wherever you go. The system measures the ambient temperature and humidity, as most of the body functions differ according to the surrounding weather conditions. It can also be used if the patient should be kept in constrained weather conditions.

B. Circuit Diagram

The sensor collects data from two channels: one channel captures data from the ulnar artery, while the other captures data from the radial artery. They demonstrated that the new geometry of the sensor improved the PPG signal amplitudes and reduced the consumed power. Also, it showed promising results when compared with ground-truth values, which makes it suitable for wearable presented a comprehensive review of the use of smartphone sensors in health monitoring.

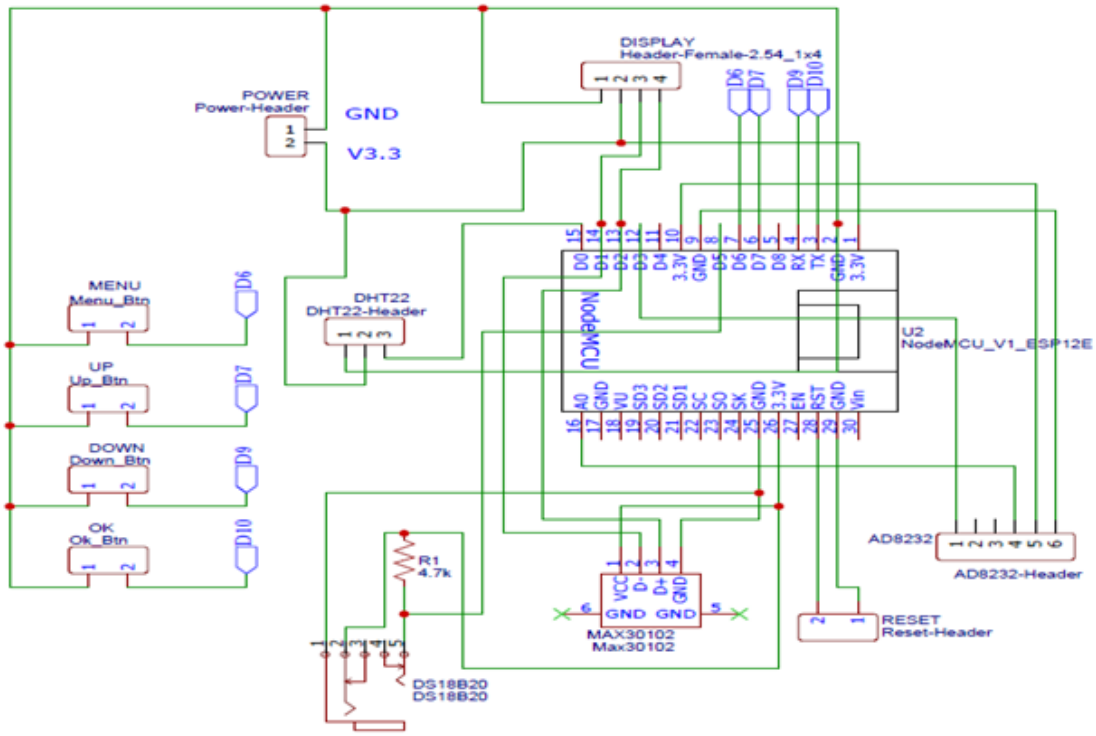

Figure2:Electrical circuit for the proposed health monitoring system.

They elaborated the numerous advances in smartphone-based health monitoring, due to the high-speed computing and communication technologies of modern smartphones, which come with numerous embedded sensors. Several health parameters and conditions can be monitored using these embedded sensors of the smartphone, such as HR, cardiovascular activity, respiratory rate elderly patients' health monitoring architecture that can be used in homes, ambulances, and hospitals. They target four health aspects: HR, body temperature, glucose level in blood, and body position of patient. They also adopted machine learning to detect deterioration in the health data. A system to monitor the HR, body temperature, room humidity, level of CO, and CO2gases. They have utilized four different sensors to catch the signals and send these data to ESP32 microcontroller for processing and delivering data to a mobile phone application via Bluetooth.

IV. RESULTS AND DISCUSSION

Figure3:Result for proposed health monitoring system

Figure4: Result displayed on mobile

Figure5: Result displayed Web page.

Depicts the web-based monitoring dashboard for remote monitoring, which displays the patient vital data in real time on gauge charts with a scale indicating normal and abnormal ranges for each physiological parameter. The measured vitals are transferred to a mobile application through Wi-Fi in mobile-based monitoring. depicts the main monitoring dashboard for the mobile application. Illustrates real-time snapshots of PPG and ECG on mobile monitoring, respectively.Furthermore, the proposed system allows for local monitoring by displaying the results on the device built-in display. Fig. 10 depicts the device screen with the measurements and acquired signals displayed.

V. CONCLUSION

A portable and real-time device has been introduced. It can be used in daily medical applications. The proposed system utilizes various sensors to capture the patient vital signal and associated biomarkers and provides access to this data either locally or remotely. Node MCU microcontroller is used to process data and provide connectivity to the Firebase server to deliver the health records. The developed system supports both local

monitoring, by displaying readings and plots on the built-in display or sending them to a mobile application within the range of a local network, and remote monitoring by sending the readings to the Firebase cloud server. In the later mode, the remote monitoring dashboard is located in a trustworthy healthcare facility.

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