IoT Based Tracking System for Patients

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Abstract-Health-care Environment has developed in science and patients require ongoing monitoring of their ECG readings, body temperature, blood pressure (BP), heart rate, and other vital indicators. So, the primary goal of the working model is to use wireless technology to transmit the patient's health parameters to the doctor in case anything is abnormal. All the characteristics will be sensed, even if the patient is unconscious, and relayed to the medical professionals. So, we are proposing an innovative project to dodge such sudden death rates by using Patient Health Monitoring that uses sensor technology and uses the internet to communicate with assistance in case of problems. This system uses Temperature, Spo2, gyroscope, and heartbeat sensors for tracking patients' health. These sensors are connected to the Arduino-Uno. A microcontroller that tracks the patient's health which is connected to an LCD display and a wireless network to transmit the information to a web server. In case of any abrupt changes in the patient's heart rate, temperature, or blood oxygen saturation level, an alert message is sent about the patient using IoT. This tracking system also shows patients' temperature, angular movements, and heartbeat tracked live data with timestamps over the Internetwork. Consequently, the IoT-based patient health tracking system actively monitors patient health through the internet, assists users in keeping an eye on their patients while at work, and perhaps saves lives. technology-based knowledge focused on Wireless-Sensing nodes.

Key Words: Monitoring, Arduino-Uno, LCD display, temperature alert, Ubidots.

I INTRODUCTION

In recent years wireless technology has increased the need of upholding various sectors. IoT has grabbed most of the industrial area, especially automation, and control. Biomedicals is one of the recent trends to provide better health care. Not only hospitals but Also, personal health care facilities are opened by IoT technology. So, having a smart system various parameter are observed that consumes power, and cost, and increase efficiency, In addition, Doctors play a very important role but the process of the check-up is quite lengthy so the IoT-based tracking system can simplify this. The physicians and nurses in a hospital put in long hours to help patients get better and preserve lives. In essence, a nurse must constantly check on patients who have been admitted to the hospital to ensure that nothing abnormal happens to the patients. Sometimes there are too many patients that the nurses must watch over at once. The nurses still need to visit each patient's room individually to check on patients and update their conditions. The new tracking system for patients can reduce the workload of doctors and other health professionals. The patient's body is often measured carefully using vital signs. Weight, height, blood pressure, pulse rate, body temperature, and respiration rate are the six vital signs. The focus of this study will be on Spo2 level, Heart rate, and Temperature (37°C is the typical mean body temperature). In this system, the ESP8266 Wi-Fi module is used to transmit the vital parameters of the patients. A customized Global System for Mobile communication (GSM) module is designed for wireless monitoring through Short Messaging Service (SMS). This module is able to receive serial data from radiation monitoring devices and transmit the data as text. By using of GSM module the alert message will be sent to the health professionals and relatives of the patient. The Arduino UNO board continuously reads input from these 4 sensors. Then the message is received and the data are noted.

II SURVEY

Riazul Islam, et al., (2015), This article addresses various IoT and Health policies and regulations around the world to determine how they can facilitate economies and societies in terms of sustainable development. It also discusses how various innovations such as big data, ambient intelligence, and wearables can be leveraged in a healthcare context. Finally, it offers some avenues for future research on IoT-based health care based on the findings in this article [1].

Moser, L.E., et al., (2015), The Well Phone connects to numerous health monitoring devices and gathers physiological data from them for the smartphone. It uses cutting-edge algorithms to do statistical analysis, connect collections of dissimilar measurements from various devices, and link physiological parameters to physical activity. The Well Phone provides feedback to the user by means of visualization and speech interaction, and alerts a caregiver, medical professional, or emergency responder, as needed Developing IoT Based on Smart Health Monitoring Systems [2].

Reddy, G.K., et al., (2015), The suggested IR sensor uses optical technology to monitor blood flow through the index finger and is affordable and user-friendly. In this project, an Arduino board with an embedded microcontroller ATmega328 is utilized, and appropriate algorithms have been built to detect and count heartbeats as well as to determine how many calories have been burned [3].

Penmatsa, P.L, et al., (2016), It primarily keeps track of the family members' daily health situations, allowing for the proper management of a variety of chronic diseases as well as disease prevention. At the same time, it can assist patients in controlling their daily diet and medical care for some family members who have been afflicted with chronic illnesses [4].

Kumar, et al., (2016), Patients who are dangerously ill are admitted to the intensive care unit, or ICU, for treatment. Physicians need to be constantly updated on the patient's health-related data, such as blood pressure, heart rate, and temperature, for such serious diseases. This task is too tedious to complete manually, and it also becomes nearly impossible when dealing with several patients. This IOT-based solution can provide an automation for these kinds of circumstances that may inform the doctors constantly online[5].

Turner, J, et al., (2017), Many people consider health monitoring to be a crucial part of daily living. This paper discusses the creation of a Bluetooth-enabled heart rate monitor. The heart of the design is the AD8232 Single Lead Heart Rate Monitor. As the monitor's output is analog, the Dragon12-Plus2 board contains an analog-to-digital converter. Bluetooth is used to wirelessly deliver data to a smartphone. To determine a heart rate in beats per minute, the data from the monitor is evaluated. The program that will show the heart rate on a smartphone was created using MIT App Inventor 2 [6].

Tripathi, et al., (2017), The primary goal of this work is to provide a thorough overview of this field of study, the sensors used in health monitoring devices, and the operation of wearable health monitoring devices, including how they collect data and produce reports based on various factors[7].

F. M. Yassin,et al.,(2019), This monitoring system was specifically created to alert them of their patient's condition, reducing the risk to the monitored patients. This monitoring device transmits the respondent's body temperature and heart rate using an Arduino Uno microcontroller that is Bluetooth-connected to a laptop. Heart-Rate Grove and LM35 temperature sensors were used to get this data. The data were continuously processed and shown on the laptop every minute. As a warning, several colours of LED were utilised as indicators to show if the respondent's body temperature or pulse rate was high or low. This monitoring system was developed successfully and can show the data[8].

III METHODOLOGY

This project will be implemented and executed in step by a step procedure. IOT-based patient monitoring has four sensors. They are a temperature sensor, heartbeat sensor, gyroscope, and SPO2 sensor. This project is very useful for healthcare professionals as they can monitor patients' health parameters by visiting Ubidots or SMS on mobile phones or PC. A platform for the Internet of Things called Ubidots enables entrepreneurs and businesses to prototype and expand IoT innovations to production. Using any Internet-capable device, the Ubidots platform can upload data to the cloud from any Internet-enabled device. So now healthcare professionals can monitor and track the patient's health through the Android application. To operate IOT based health monitoring system, it needs a Wi-Fi connection.
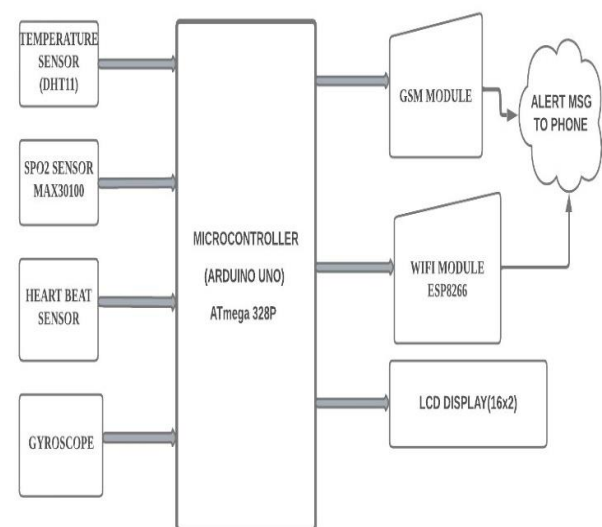

FIG 1. BLOCK DIAGRAM

This simple block diagram explains the IoT Based tracking system for patients using ESP8266, Arduino, and GSM. Heartbeat sensor, DHT11 Temperature Sensor, and Spo2 sensor measure heartrate & Environmental Temperature, and blood oxygen saturation level respectively. Gyroscope can capture the angular movements of the patient if the patient is unconscious

condition. The Arduino processes the code and displays it on a 16*2 LCD Display. ESP8266 Wi-Fi module connects to Wi-Fi and sends the data to the IoT device server, GSM sends the alert message to the physicians. The IoT server used here is Ubidots. Finally, the data can be monitored from any part of the world by logging into the Ubidots channel.

The following steps is used to implement the patient's tracking system.

1. The four sensors(spo2, temperature, gyroscope, heart rate) are used to capture the data, while Arduino is used to transmit it. Data is gathered when the patients wear the sensor on their bodies. To measure the temperature and humidity, spo2, and heart rate.
2. Data from the sensors is transmitted over wifi (ESP8266) and A customized Global System for Mobile communication (GSM) module.
3. The information is transmitted to the Ubidot server and stored in a remote database. The alert message will be sent by the GSM to the physician's phone or the patient relatives.

3.1 IoT MANAGEMENT

The Internet of Things is exploited to examine mixed health detailed stipulations of the subject. The patient testing device is reliant on the Internet of Things, the typical parameters of patients' health records are transmitted to the cloud utilizing an internet system. These specifications are forwarded to a distant Internet station so that physicians will be prepared to observe these details from anywhere in the world. There is a marked distinction between SMS-based patient condition monitoring and an IoT-based patient monitoring scheme. In IoT-based tracking techniques, a report of the patient's condition can be determined by various patients by hitting a site or an URL. Whereas, in GSM-based patient checking, the health parameters are sent utilizing GSM through SMS.

3.2 SENSORS

The temperature sensor connected to the analog pin of the Arduino controller is converted into a digital value with the help of ADC Using this digital data, the controller converts it into the actual temperature value in degrees Celsius using the equation:

temperature =[raw ADC value*5/4095-(400/1000)]*(19.5/1000).

The heartbeat sensor is based on the principle of photoplethysmography. It measures the change in the volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region). The digital pulses are given to a microcontroller for calculating the heat beat rate,

A gyroscope sensor is essentially an instrument that uses the earth's gravity to help it determine its orientation. It is a particular kind of sensor that is found in IMUs (Inertial Measurement Unit). You may measure the rotation around a specific axis using a gyroscope.

IV RESULTS

The patient's heart rate, temperature, blood oxygen saturation level are finally displayed in the IOT platform (UBIDOTS) and in the LCD display, Where the caretaker can monitor the patient's health and to avoid continuously monitoring from same place.

FIG 2. DISPLAY OF VALUES IN UBIDOTS

FIG 3. DISPLAY OF VALUES IN LCD

V FUTURE WORK

The healthcare sector has recently experienced impressive technical advancement and its use to address healthcare-related problems. As a result, healthcare services have substantially improved and are now easily accessible. IoT has successfully altered the healthcare sector through the

use of smart sensors, cloud computing, and communication technologies. IoT, like other technologies, faces a number of difficulties and problems that could be the subject of future study. The section that follows has a discussion of a few of the topics.

VI CONCLUSION

Nowadays, the Internet of Things is viewed as one of the workable alternatives for any remote value tracking, particularly in the sphere of health monitoring. It makes it easier for people to have their personal financial information securely stored in the cloud, to have fewer hospital stays for routine checkups, and—most importantly—to have their health tracked and diseases remotely diagnosed by any doctor. An IoT-based health monitoring system was created in this study. Using sensors, the system kept track of the user's body temperature, pulse rate, temperature and humidity in the room. This information was also shown on an LCD. A wireless connection is subsequently used to transmit these sensor values to a medical server. Thereafter, these data are downloaded into an authorized individual's smartphone using an IoT platform. The doctor then determines the patient's condition and the disease after receiving the results.

VII. ACKNOWLEDGEMENTS

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