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Smart Monitoring Device for ICU Patients

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ABSTRACT-

Health-care Science has advanced, and patients now need continuous monitoring of their vital signs, including their ECG readings, body temperature, blood pressure (BP), heart rate, and others. Therefore, the working model's main objective is to use wireless technology to send the patient's health parameters to the doctor in case anything is abnormal. Even if the patient is unconscious, all the qualities will be felt and reported to the medical staff. Therefore, we are putting forth an inventive project to prevent such high rates of sudden death using Patient Health Monitoring, which makes use of sensor technology and the internet to communicate with support in case of issues. For monitoring patient health, this system makes use of temperature, Spo2, gyroscope, and heartbeat sensors. The Arduino-Uno is coupled with these sensors. A microprocessor that monitors the patient's health and transmits data to a web server over a wireless network and an LCD display. An alarm message is delivered about the patient utilising IoT in the event of any sudden changes in the patient's heart rate, temperature, or blood oxygen saturation level. Additionally, this tracking system transmits live data with timestamps about the patients' heartbeat, angular movements, and temperature. As a result, the IoT-based patient health tracking system helps users keep an eye on their patients while at work, actively monitors patient health over the internet, and could even save lives. Wireless-Sensing nodes were the focus of technology-based expertise.

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

I. INTRODUCTION:

The necessity to support diverse sectors has expanded in recent years thanks to wireless technologies. Most of the industrial sector, particularly automation and control, has been captured by IoT. One of the most recent developments in better healthcare is biomedicine. IoT technology has opened up personal health care facilities in addition to hospitals. As a result, numerous parameters that affect efficiency, cost, and power consumption are noted while using a smart system. Doctors also play a crucial role, but the check-up process can be time-consuming. The IoT-based tracking system can make this process simpler. In order to aid patients in recovering and preserving their lives, hospital doctors and nurses put in long shifts. In order to make sure that nothing unusual occurs to patients when they are admitted to the hospital, a nurse must essentially keep an eye on them at all times. The nurses may have to oversee too many patients at once. To check on patients and get the most recent information on their ailments, the nurses must still go to each patient's room separately. The new patient tracking system may lighten the strain of physicians and other healthcare workers. Vital signs are frequently used to accurately measure the patient's body. The six vital indicators include body weight, height, blood pressure, pulse rate, body temperature, and respiration rate.

The three variables that will be examined in this study are Spo2 level, heart rate, and temperature (the average mean body temperature is 37 °C). The ESP8266 Wi-Fi module is utilised in this system to relay the patients' vital signs. For wireless monitoring through SMS, a customised Global System for Mobile Communication (GSM) module has been developed. This module can transfer text data that it receives in serial form from radiation monitoring equipment. The alarm message will be delivered to the patient's family members and other healthcare professionals via a GSM module.

These 4 sensors continuously provide input to the Arduino UNO board. The communication is then received, and the information is recorded.

II. LITERATURE 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:

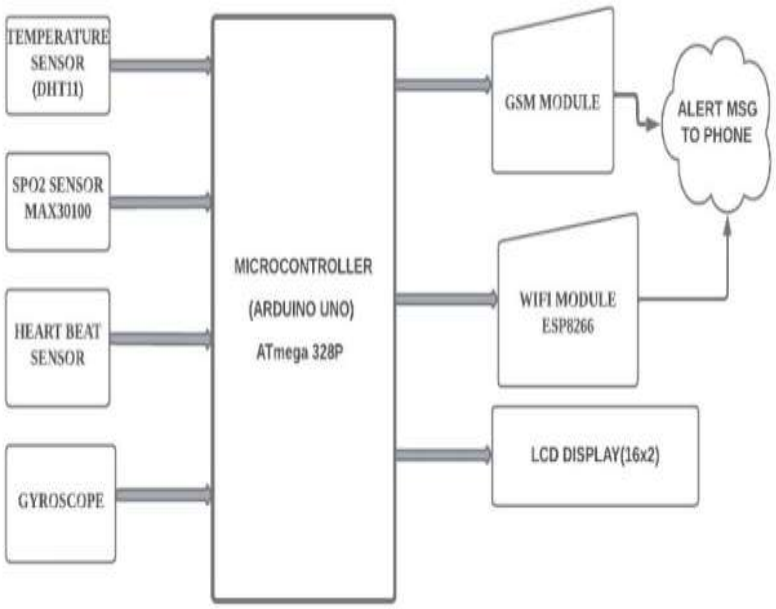

FIG 1. BLOCK DIAGRAM

This project will be carried out in a stage-by-stage fashion. Four sensors are used for IOT-based patient monitoring. They are a SPO2 sensor, gyroscope, temperature sensor, and heartbeat sensor. Healthcare practitioners can monitor patient health metrics by visiting Ubidots or SMS on mobile phones or PCs, which is a highly valuable initiative. Entrepreneurs and companies may develop and bring IoT innovations into production using the Ubidots Internet of Things platform. The Ubidots platform allows users to upload data to the cloud from any Internet-enabled device using any Internet-capable device. Therefore, using the Android application, healthcare professionals can now keep an eye on and track the patient's health. A Wi-Fi connection is required for the IOT-based health monitoring system to function.

The patient tracking system is put into place using the next few steps.

1. The data is collected using the four sensors (spo2, temperature, gyroscope, and heart rate), and it is transmitted using Arduino. When the patients wear the sensor on their bodies, data is collected. to gauge heart rate, spo2, humidity, and temperature.

2. The ESP8266 WiFi module and a specialised Global System for Mobile Communication (GSM) module are used to send data from the sensors.

3. The data is sent to the Ubidot server and kept in a distant database. The GSM will send the alarm message to the doctor's phone or the patient's family members.

3.1 IoT MANAGEMENT

The Internet of Things is used to investigate the specific conditions of mixed health. The Internet of Things is used by the patient testing device, and an internet system is used to send the typical patient health record parameters to the cloud. To enable doctors to view these details from anywhere in the world, these specs are sent to a remote Internet station. An IoT-based patient monitoring programme differs significantly from SMS-based patient condition monitoring. By accessing a website or URL, different patients can learn about the patient's condition using IoT-based tracking tools. As opposed to GSM-based patient checking, which uses SMS to send the health parameters over GSM.

3.2 SENSORS

With the aid of ADC, the temperature sensor linked to the analogue pin of the Arduino controller is transformed into a digital value. The controller uses the following calculation to translate the digital data into the real temperature value in degrees Celsius: temperature = [raw ADC value*5/4095-(400/1000)]*(19.5/1000).

The photoplethysmography theory serves as the foundation for the heartbeat sensor. The change in blood volume via any organ of the body that results in a change in the amount of light passing through that organ (a vascular area) is measured. A microcontroller receives digital pulses to determine the heat beat rate.

In essence, a gyroscope sensor is a device that determines its orientation with the use of the earth's gravity. IMUs (Inertial Measurement Units) contain a specific type of sensor. A gyroscope can be used to gauge rotation about a certain axis.

IV. RESULT AND DISCUSSION:

Finally, the patient's heart rate, temperature, and blood oxygen saturation level are shown on the LCD display and IOT platform (UBIDOTS), and message is sent to care takers mobile, allowing the carer to keep an eye on the patient's health without having to stay in one place all the time.

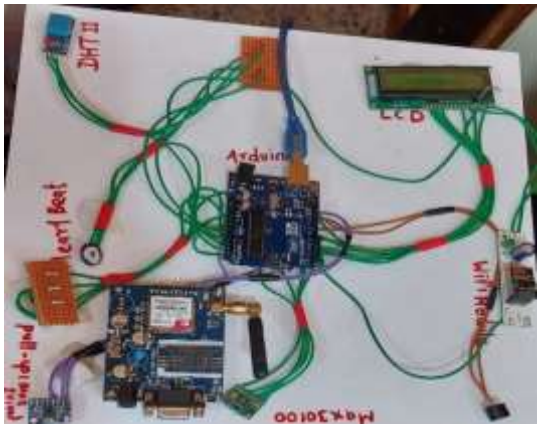

FIG 2. DISPLAY OF VALUES IN LCD

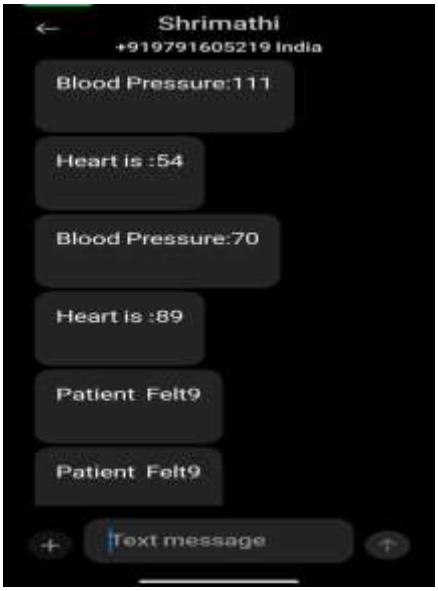

FIG 2. DISPLAY OF VALUES IN MOBILE

Recent technological advancements and their application to healthcare-related issues have been amazing. Healthcare services have greatly improved as a result, and are now more accessible. Through the application of intelligent sensors, cloud computing, and communication technologies, IoT has successfully changed the healthcare industry. IoT, like other technologies, encounters a number of challenges and issues that may be the focus of future research. A handful of the subjects are discussed in the section that follows.

VI. CONCLUSION

Recent technological advancements and their application to healthcare-related issues have been amazing. Healthcare services have greatly improved as a result, and are now more accessible. Through the application of intelligent sensors, cloud computing, and communication technologies, IoT has successfully changed the healthcare industry. IoT, like other technologies, encounters a number of challenges and issues that may be the focus of future research.

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VIII REFERENCES

[1]. Riazul Islam, S.M., Kwak, D., Kabir, H., Hossain, M., Kwak, K.S. (2015). The internet of things for health care: a comprehensive survey. IEEE Access, 3: 678-708. http://dx.doi.org/10.1109/ACCESS.2015.2437951

[2]. Moser, L.E., Melliar-Smith, P.M. (2015). Personal health monitoring using a smartphone. 2015 IEEE International Conference on Mobile Services, pp. 344-351. http://dx.doi.org/10.1109/MobServ.2015.54

[3]. Reddy, G.K., Achari, K.L. (2015). A noninvasive method for calculating calories burned during exercise using heartbeat. 2015 IEEE 9th International Conference on Intelligent Systems and Control (ISCO), pp. 1-5. http://dx.doi.org/10.1109/ISCO.2015.7282249

[4]. Penmatsa, P.L., Reddy, D.R.K. (2016). Smart detection and transmission of abnormalities in ECG via Bluetooth.2016 IEEE International Conference on Smart Cloud (SmartCloud), pp. 4144.http://dx.doi.org/10.1109/SmartCloud.2016.10

[5]. Kumar, R., Rajasekaran, M.P. (2016). An IoT-based patient monitoring system using raspberry Pi. 2016 International Conference on Computing Technologies and Intelligent Data Engineering (ICCTIDE'16), pp. 1-4.http://dx.doi.org/10.1109/ICCTIDE.2016.7725378

[6]. Turner, J., Zellner, C., Khan, T., Yelamarthi, K. (2017). Continuous heart rate monitoring using a smartphone. 2017 IEEE International Conference on Electro Information Technology (EIT), pp. 324-326. http://dx.doi.org/10.1109/EIT.2017.8053379

[7]. Tripathi, V., Shakeel, F. (2017). Monitoring health care system using internet of things-an immaculate pairing. 2017 International Conference on Next Generation Computing and Information Systems (ICNGCIS), pp. 153-158. http://dx.doi.org/10.1109/ICNGCIS.2017.26

[8]. F. M. Yassin, N. A. Sani, and S. N. Chin, "Analysis of heart rate and body temperature from the wireless monitoring system using arduino," Journal of Physics: Conference Series, vol. 1358, Article ID 012041, pp. 1–6, 2019.