

IoT BASED PATIENT HEALTHCARE MONITORING SYSTEM

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ABSTRACT

This paper represents the system enables healthcare providers to remotely monitor the health status of patients, enhancing the quality of care and improving overall patient outcomes.

The system consists of various components, including IoT devices, sensors, a network infrastructure, and a data processing platform. These devices and sensors are embedded in wearable gadgets, medical equipment, and even the patient's environment. They capture vital signs, such as heart rate, temperature, and saline levels, among others. It's broken into three parts. The first component entails using sensors to detect a patient's vitals, the second sending data to cloud storage, and the third delivering the observed data for remote viewing. The data may be seen remotely, allowing a doctor or guardian to monitor a patient's health state even while they are not in the hospital. The proposed outcome of this project is to provide suitable and effective health facilities to patients.

Keywords: Patient Monitoring, IoT, Smart Device, Medical Services, Network Infrastructure.

INTRODUCTION

Internet of Things (IoT) is the network of physical objects comprising of all the devices, vehicles, buildings and the other items embedded with Electronics, software and sensors which enables these objects to collect and exchange data amongst each other. The Internet of things has evolved due to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Whenever a saline is fed to any patient, he/she needs to be constantly monitored by a nurse or any relatives. Most often due to negligence, inattentiveness, busy schedule and a greater number of patients, the nurse may forget to change the saline bottle as soon as it is totally consumed. Just after the saline finishes, blood rushes back to the saline bottle due to difference in blood pressure and pressure inside the empty saline bottle. This may cause reverse flow of blood to saline bottle from the Load cell vein. This results in the reduction of hemoglobin level of patients and may also lead to shortage of red blood cells (RBC's) in the patient's blood causing tiredness. Therefore, there is a need of developing a saline level monitoring system which will reduce the patient's dependency on the nurses or caretakers to some extent.

In this system, IoT based automatic alerting and indicating device where LOAD CELL sensor is used as a level sensor. LOAD CELL sensor output voltage level changes when intravenous fluid level is below certain limit. The comparator continuously compares

the LOAD CELL output with pre-defined threshold. When the transceiver output is negative then the Arduino controller identifies that the fluid level is too low and it alerts the observer by buzzer. When the saline drops down to a certain low level then an alarm generated to alert the nurse that the saline fed to the patient is over. The difference of weight is used to sense the amount of saline present in the bottle and hence is used to provide an audible alarm present in the indicator board at attendant or nurse room. If the nurse fails to attend the patient immediately then a motor arrangement is done which suppresses and flattens the saline tube. This prevents the upward flow of saline from the veins to the bottle.

I. LITERATURE REVIEW

1. Narasimha Rao Jasti Madhu (2010): The author researched the “IoT based Remote Patient Health Monitoring System” and the conclusion is that the developed system modules can be refined and manufactured as a single circuit. The fact that all of the circuit components utilized in the remote health detection system are readily available was also discovered during project design. Micro Electro Mechanical Systems (MEMs) and microcontrollers have grown more inexpensive, smaller, and power-efficient thanks to advancements in the integrated circuit industry. As a result, more embedded technologies are being developed and adopted by healthcare professionals. Smartphone technology has also incorporated these integrated systems.

2. Usha Rani et al (2017): These authors' research regarding the “IoT Patient Health Monitoring System” and conclusion are given that, the reading of the patient's different essential indicators, followed by an evaluation at cloud, and then a warning to the doctor or concerned persons about the patient's health status. It keeps track of vital indicators and detects any irregularities. These irregularities inform medical personnel, reducing the need for manual monitoring. The data is sent to the cloud platform using the MQTT connection.

3. LIM SHENG KEONG (2017): The author studied “IoT Healthcare Monitoring System with Capability to Detect ECG, Blood Pressure and Temperature” and the conclusion are given that, the average accuracy for each sensor in measuring the health parameter is 99.21% for temperature measurement, 99.26% for pulse rate measurement, 99.17% for Systolic pressure and 98.72% for diastolic pressure. The measured data are transmitted to the IBM Bluemix Cloud

Platform with

1.53 milliseconds per sample of data. The DE1-SoC platform uses the onboard RJ45 port to connect to the Internet. A local web page is developed to allow the user to view the results from the measurement and finally perform the disease prediction.

4. Banka et al (2018): These authors research his work regarding the “Smart Healthcare Monitoring using IoT” and conclusion are given that, exhibited a prototype for an autonomous system that enables continuous monitoring of multiple health indicators as well as the prediction of any disease or issue, sparing the patient the agony of repeated hospital visits the proposed method might be utilized in hospitals to collect and store massive volumes of data in an online database. An application can also be used to get the findings from a mobile device.

5. Sathya et al (2018): These authors research their work regarding the “Internet of things (IoT) based health monitoring system and challenges” and conclusion are given that, the importance and advantages of incorporating IoT into remote health monitoring systems. The Internet of Things- enabled little sensors will have a big impact on every patient's life, allowing them to reduce their fear of danger even while they are away from home and their doctor.

II. ARCHITECTURE OF SYSTEM

A. PROBLEM STATEMENT

IOT based health monitoring system is basically the safety and alert system designed for patients in hospital. There are few parameters which need to be

monitored constantly while patient is admitted. Like pulse, temperature, moisture and the new addition in system is saline level detection. System monitors all sensor data and gives messages on LCD, sounds and message to concern people through internet accessible Wi-Fi device connected to system.

B. METHODOLOGY

An IoT-based health observation system works on the patient's body observation system such as pulse rate and body temperature. Heartbeat device hooked up to the patient's fingers and temperature the sensing element is additionally hooked up to the patient's body.

Temperature sensing element could be a sensing element supported resistance its resistance is set by dynamic the patient's vital sign, and pulse rate sensing element, vibration sensing element or flow in its price it's transmitted within the variety of associate signaling.

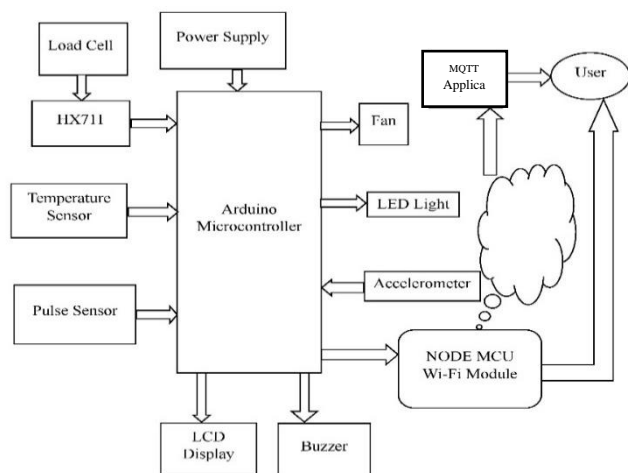


Fig.1

The accelerometer sensor at same time can be used as motion sensor for controlling FAN and light of room by hand gesture .2 the quantity of sensors obtained by Arduino UNO, nice or wise management of this when receiving these values, these values are saved showed on the display and at a similar time sent to the IoT system exploitation the Wi-Fi module with Wi-Fi modules within the IoT display system these numbers area unit for various websites and applications Wi-Fi sources, and chat area unit used for this employing a

web site or app, doctors will track pulse rate and their patients from anyplace. In this system two sensors are used for one heat sensor another heart rate sensor. Thing-speak IOT cloud platform can be used. To use this application user needs a Wi-Fi connection. Arduino board connects to Wi-Fi network functionality using Wi-Fi module. Arduino board learned sin from two senses. After that this installation is sent to IoT cloud with the help of Wi-Fi module. Rated inputs displayed on LCD screen. At the same time this data is sent to the IoT cloud and the measured data is displayed on the screen when the application is opened. The limit value range is set to system. If the available value is greater than or below the limit value range a notification message will be sent to the smartphone screen.

III. RESULT

IOT Monitoring proves really helpful when we need to monitor & record and keep track of changes in the health parameters of the patient over the period of time. So, with the IOT health monitoring, we can have the database of these changes in the health parameters. Doctors can take the reference of these changes or the history of the patient while suggesting the treatment or the medicines to the patient.

Hospital stays are minimized due to Remote Patient Monitoring. Hospital visits for normal routine checkups are minimized. Patient health parameter data is stored over the cloud. So it is more beneficial than maintaining the records on printed papers kept in the files. Or even the digital records which are kept in a particular computer or laptop or memory device like pen- drive. Because there are chances that these devices can get corrupt and data might be lost. Whereas, in case of IOT, the cloud storage is more reliable and does have minimal chances of data loss.

With IoT based saline level monitoring system, the manual effort on the part of the nurses is saved. As the entire proposed system is automated, it requires very less human intervention. It will be advantageous at night as there will be no such requirement for the nurses to visit patient's bed every time to check the

level of saline in the bottle since an alert notification will be sent to the nurses, doctors, caretakers when saline reaches the critical level. It will save the life of the patients. This will reduce the stress in continual monitoring by the doctor or nurse at an affordable cost. This automatic saline level monitoring system provides more flexibility to doctors, thereby the patients caring is enhanced. Hence it saves lots of time for doctor or nurse who is on duty. It also proposes the system which can automatically monitor the saline flow by using microcontroller. The system is reliable, cost effective and convenient for nurses. It can be reused for the next saline bottle. The system helps nurses to monitor the saline flow from a distance. It is mainly advantageous at night timing as there is no need for nurses to go to patient's bed to check the level of saline in the bottle.

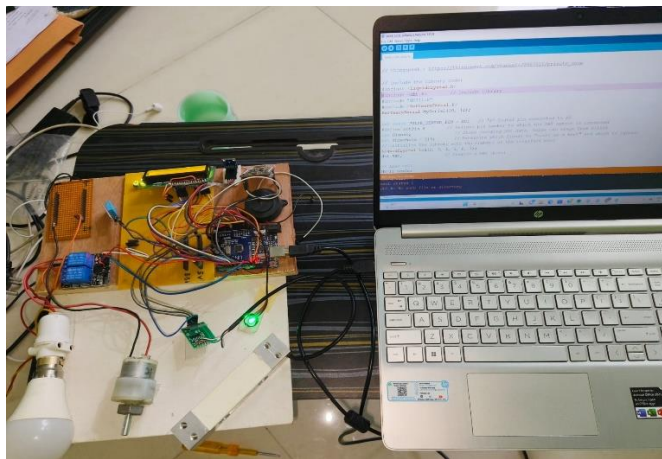


Fig.2



Fig.3

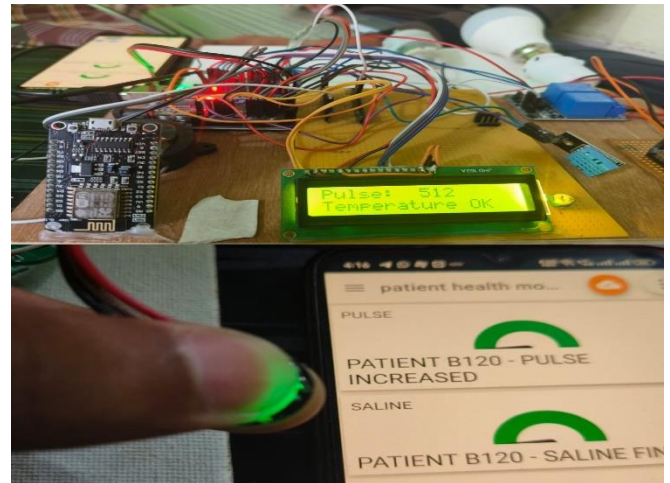


Fig.4

IV.FUTURE SCOPE

Health Monitoring System can be widely used remotely as well as in hospitals for monitoring patient's health from anywhere around the world. As it is a user-friendly cloud-based device and therefore can be used anywhere and anytime. The system can be further improved by adding Artificial Intelligence system components to facilitate the doctors and the patients. It can provide real-time data as well as store past medical records to make it easy for the doctors to predict and optimize critical clinical decision making regarding the health of patients. The system can also make Virtual patient data available through mobile devices which can help them to analyze their reports along with the doctors to be in sync with them.

V. CONCLUSION

The proposed system of health monitoring can be highly used in emergency situations as it can be daily monitored, recorded and stored in a database. Through our project doctors can also monitor patient health remotely using IoT. All the individual sensors like heart-rate sensor, temperature sensor etc give out the intended results.

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