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SMART SALINE LEVEL MONITORING SYSTEM USING IOT

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ABSTRACT:

This project is used to monitor the patient's saline level of the bottle and avoids blood flow outward from vein with the help of sensors and IOT technology. The smart saline level monitoring device includes the combination of sensor and Internet of Things (IoT) technologies. This project contains load sensor and ultra-low power low cost Arduino Uno microcontroller. The load sensor converts the weight of the bottle to a specific voltage. The IOT module (ESP8266 – 12E) generates and publishes a specific message based on the voltage received from the sensor. To publish and present the messages to the devices (e.g. smartphone, tablet, laptop etc.) of subscribers like doctors, nurses or caretakers, there is a MQTT-S publish protocol, which runs over TCP. And also alert the caretakers, doctors or nurses through buzzer.

KEYWORDS:

SALINE LEVEL, IR SENSOR, ARDUINO UNO (ATMEGA328P), IOT (ESP8266 NODU MCU).

INTRODUCTION:

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 IR sensor is used as a level sensor. IR sensor output voltage level changes when intravenous fluid level is below certain limit. The comparator continuously compares the IR output with predefined 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 web page or App. When the saline drops down to a certain low level then an notification 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 a Smartphone based app or computer based web page at attendant or nurse room. If the nurse fails to attend the patient immediately then a sensor block the arrangement is done. This suppresses and flattens the saline tube. This prevents the upward flow of saline from the veins to the bottle.

LITERATURE SURVEY:

Innovative use of IoT technology in healthcare provides not only benefits for doctors and managers to access many different data sources, but also challenges in accessing heterogeneous IoT data, especially in the mobile environment in real-time IoT application system. The big data collected by IoT devices creates the problem for IoT data interests. The purpose of the review is to visualize existing technology in location-based healthcare services and make use of this technology for development in future discoveries. In addition, the study helped us understand the many flourishing and existing health technologies such as ECG, EMG monitoring through Android apps, using different protocols to transfer data like MQTT, TCP / UDP, OCN-authenticated technologies, WLAN etc. we analyse the wireless health monitoring system of human temperature and heartbeat patients. The hardware is implemented and the output is studied. The traditional methods used for health care are becoming obsolete due to population increase. Today's healthcare system requires manual care and its heavy tasks, which is time consuming. Innovative health monitoring systems with less human intervention are needed, which will be available at low cost in rural and urban areas. Engineering technologies are being coupled with the medical field to solve this problem.
The critical level which is sensed by the IR sensors. This sensed output is sent to the microcontroller which scans the database for retrieving the contented information.
The detection of saline drop rate is quite reliable. Implemented framework comprises of different sensors and devices and they are interconnected by means of remote correspondence modules. The sensors data is been sent and received From nurse or doctor end utilizing Internet connectivity which was enabled in the Node MCU module-an open source IoT plat-form. This system is used to observe the condition of patient. The data can be viewed on the Thing Speak app or any web page. The nurse can observe all the levels, or the range that is performed. Generally saline bottle contains 500ml solution. In general the critical limit is set as 70ml. As soon as the saline level reaches the critical limit, the voltage changes and the IR sensor senses it. Now the IR Transmitter passes this voltage change signal to IR receiver. IR receiver signals the Arduino micro-controller about this condition. The Arduino micro-controller sets the notification to the App or a web page.

EXISTING SYSTEM:

Initially, this might be inferred as an event. But the consequences are harmful. Just after the saline finishes, blood rushes back to the saline bottle due to difference in blood pressure and pressure in the empty bottle. By means of this the nurse can monitor the amount of saline even from the control room. An automatic saline level monitoring consists of Level sensors which are used to determine the status of liquid in the bottle whether it is normal or warning status. The detection of saline drop rate is quite faithful. The output obtained from the sensor is processed to check whether the saline bottle is empty. When the level of saline goes below a threshold level, the alarm sound will be produced.
The main objective of system is to provide authentic, accessible, easy and economic system for saline level monitoring. The saline is inserted into blood by considering certain characteristics like heart rate, blood pressure, body temperature, pulse rate and body weight of patient. As the saline goes below the threshold level, it is necessary to change the saline bottle. An automatic saline level monitoring consists of IR sensors which are used to determine the status of liquid in the bottle whether it is normal or warning status. The notification can be sent to the nurse on her mobile. This system

which can automatically monitor the saline flow rate by using microcontroller. It can wirelessly send the data to nurses or doctors' computer and display the results in the form of saline droplet rate, number of droplets coming from saline bottle, saline solution given to the patient in ml and remaining time to empty the saline bottle with the help of serial port test software.

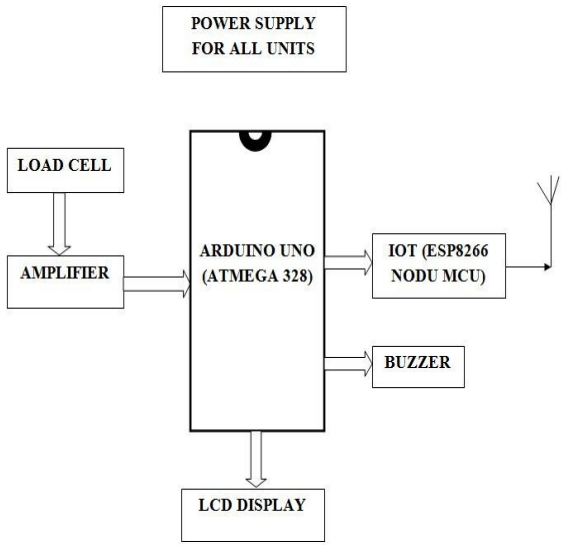
PROPOSED SYSTEM:

In the process of medication, it is a common practice to treat patients with saline for dehydration and other medical ailments to improve the health condition of the patients. When fed with saline continuous observation of nurses is mandatory in monitoring the level of the saline. There are many cases where patients are being harmed due to the staff inattentiveness, as their absence does not notice the completion of saline level in the container. This arise the problem of back flow of blood immediately after the completion of saline in container. Hence to protect the patient from getting harmed an IoT based saline level monitoring system has been developed. The proposed model incorporates a sensor which continuously detects the saline drops. Whenever the sensor does not detect the drops for a certain interval it alerts the staff of the hospital with the buzzer, helping to monitor the safety of the patients.

Saline has a PH of 5.5 (primarily because of broke down carbon dioxide) making it acidic. Professional doctors or nurses are responsible for the patient taking intravenous solutions. When a patient is treated with the saline, as of now there exists no automated system which detects the completion of saline in saline bottle. This paper also concentrates in controlling the outflow flow of blood into the empty saline bottle and it is not just restricted in informing the nurses about its completion.

In the present health care systems nurses are responsible for taking care of patients. They are the one who monitors the saline level and uses roller clamp for controlling the flow of saline manually. When the clamp is rolled in upward direction it compresses the tube and stops or slows the saline rate. If it is rolled in downward direction it releases the tube and increases the fluid rate. In the present world there exists no system which will reduce the dependency of nurses in monitoring the saline levels. Thus there is a need for development of automatic saline level monitoring system.

BLOCK DIAGRAM:



WORKING PROCESS:

The proposed system eliminates continuous visual monitoring of the patient by nurses from distinct places. The entire project works on the principle of Beer-lamberts law. In figure 1, the amount of transmitted light from the LED to the photodiode depends upon the electrolyte in the saline bottle. The voltage across the photodiode is monitored every millisecond. Threshold levels of voltage are calibrated on Arduino Uno by programming. Blynk application receives and sends data through mobile. The change in threshold level

activates the alarm at the nurse station at the 100 ml mark. However, at the 50 ml mark, a message will be sent to the nurse station as well as a saline tube is clamped through a solenoid plunger to prevent it from air embolism. Table 1 below shows the briefing of the actions taken. The utilization of a remote patient monitoring system based on a patient saline level observation at a minimal cost. This system can be used at night time also when nurses might not be awake. The IoT-based system is cost-effective as well it uses the minimum hardware possible. The major difficulties faced in this project were the clamping circuit mechanism of the saline tube and the testing of different sensors. On the whole, IoT adds a new dimension in the healthcare industry for patient monitoring. Hence, this system is guaranteed to be sensible and user-friendly to be used in rural hospitals.

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 more 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 their vein.

In this system, IOT based automatic alerting and indicating device where IR sensor is used as a level sensor. IR sensor output voltage level changes when intravenous fluid level is below certain limit. The comparator continuously compares the IR output with predefined threshold. When the transceiver output is negative then the Ardiuno controller identifies that the fluid level is too low and it alerts the observer by buzzer. [2] discussed about Nanorobots Control Activation For Stenosed Coronary Occlusion, this paper presents the study of nanorobots control activation for stenosed coronary occlusion, with the practical use of chemical and thermal gradients for biomedical problems. The recent developments on nanotechnology new materials allied with electronics device miniaturization may enable nanorobots for the next few years. 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. [4] proposed a novel method for secure transportation of railway systems has been proposed in this project. In existing methods, most of the methods are manual resulting in a lot of human errors. This project proposes a system which can be controlled automatically without any outside help. [8] discussed about a project, in this project an automatic meter reading system is designed using GSM Technology. The embedded micro controller is interfaced with the GSM Module. This setup is fitted in home. The energy meter is attached to the micro controller. This controller reads the data from the meter output and transfers that data to GSM Module through the serial port.

RESULT:

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. 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 micro controller. 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.

CONCLUSION:

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.

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