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Iot Based Intravenous Fluid Mointoring and Alert System

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ABSTRACT –In recent year's technology is very advanced and groundbreaking. Advances in technology result in the better care of the patient in the hospital and fast recovery of the patient. In the medical system, the process of patient care and monitoring is very tired. In the private hospital nurse may remember and take care of the fluid system but in the government system there is no proper treatment and care is designed for that IOT intravenous fluid monitoring and alert system are developed. The medical doctor and nurse are very busy sometimes, so they can'tmonitor every patient. This type of thing may cause a problem in the healthcare sector or the patient life also. In healthcare, it is very mandatory to do proper care of the patient in an accurate manner. For example, in the hospital,many works required continuously monitoring like injecting intravenous fluid bags. If the intravenous drip is not injected on time then they cause many problems like blood loss and backflow of fluid. To solve this type of issue in healthcare, a system is proposed which is called an IOT-based intravenous fluid monitoring and alerting system. In the system, glucose bottle weight is considered, and to measure the fluid weight the weighing scale is considered. The weight systems easily control the flow of liquid. The data that is recorded is sent to the nurse so that he/she can monitor the patient easily.

Keywords – Intravenous Fluid, Internet of things, Arduino, Weight Sensing.

I. INTRODUCTION

It is observed that human is happy if their health is good. So in healthcare, it is mandatory to take care of the patient. In healthcare, patient safety is on priority. In healthcare, at every point, there is some certain level of harm. To provide security in healthcare an intelligence system is proposed which reduces the unwanted risk in healthcare. Mortality is also increasing due to the increase in the population. In healthcare, the doctor uses an intravenous fluid in every surgery and therapy. Nowadays technology provides many tools and techniques so that the life of humans makes very easy and comfortable. In the modern period, all things are digitally transformed. Healthcare also makes many dramatic changes in its services. Healthcare used IOT-based intravenous fluid monitoring and alert system by which the IV can be monitored easily because if the IV is not monitored in the right way then it caused blood loss and it is very dangerous for the patients.

II. IMPLEMENTATION OF SYSTEM – A LITERATURE REVIEW

At the peak of covid 19, the healthcare professionals found them very helpless because due to a large number of patients they are not able to monitor and care for all patients. During this time intravenous therapy is used with the help of IoT to provide full care and easy treatment to the patient. Intravenous techniques are used for the fluids delivering, medications, and the nutrition directly to the person's vein. This therapy is majorly used for rehydration and to provide the nutrients to the patient so that the speed of recovery is improved.Drip infusion-monitoring system uses trickle implantation for observing framework, which is a new technology that tends to be used in hospitals. Here it has a sugar level monitoring tool and a monitoring screen. The mixture-monitoring

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gadget uses a trickle implantation rate measured by the pressure sensor. After that, the information will be sent to the monitoring screen, which shows information graphically. The control valve will close whenever the pressure sensor value reaches the threshold value. After this step, the flow of fluid refers to be stopped immediately without any airflow in the patient's vein.

The healthcare departments need manual caretakers to take care of the patients. Caretakers need to check the bottles time by time. Therefore, this project is the solution to this time-consuming problem. It has an IR sensor, which discerns the rate of drip Infusion rate/ drops per minute and remaining time. It also shows the remaining infusion capacity displayed on the monitor screen. The main monitor accepts the data from several infusion monitoring or supervising devices and then shows all the information in tabular form to the host PC.

1. In the IoT-based intravenous fluid monitoring and alert system, the trickle implantation framework is used. The drip infusion system, weighting system, monitoring system, and alert system are used in this framework.
2. In the current situation, the hospital requires a high number of caretakers so it seems that it is a very time-consuming job. To solve this type of monitoring problem a system is created in which drip is monitoring and also control system is proposed. This system consists of various monitoring and controlling devices. In this proposed system the IR sensor is used by which the infusion rate of the drip is easily detected. In this system, all the information is sent to the central monitor system with the help of a wireless network. Nurse in the hospital can easily monitor the system.
3. The main aim of the system is to provide an informative and technology-based device in healthcare that helps nurses to care for their patients. The proposed system is very cost-effective and reliable and is mainly used in big hospitals.

III. COMPONENT REQUIRED

A. Arduino Uno

It has an Arduino Uno board. The Board is equipped with ATmega328P and an 8-bit AVR microcontroller chip; It is the heart of the Arduino Uno board. There are 14 digital input-output pins. Out of 14, six can be used for PWM outputs, and another six have analog input pins to read the analogy sensor. They have all of a GPIO pin.

We can give Arduino and external power using an AC to DC converter or battery or, we can connect Arduino to the computer through a USB cable.

Arduino Uno controls the sensors, processes the data, and then forwards it to the Firebase website via the ESP8266 Wi-Fi Module.

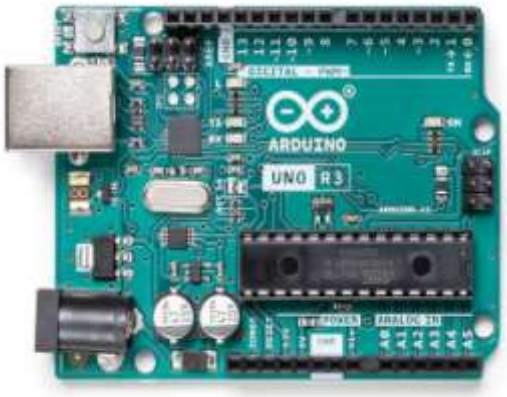

Figure 1 ARDUINO UNO

B. HC SR-04 Ultrasonic Sensor:

The sensor gets used in non-contact sensing. The ultrasonic sensor has these specifications:

- An operating voltage of DC 5 V
- An operating frequency of 40 kHz
- An operating current of 15mA
- It has a measuring angle of 15 degrees and a distance range of 2 to 400 cm
- The dimensions of the ultrasonic sensor are 45x20x15mm.
- It consists of two transducers, one of which acts as a transmitter, and the other acts as a detector.

It starts working when a pulse minimum of 10 microseconds is applied to the Trigger pin. The signals are transmitted through the air and do not affect by sunlight or black material. As a result, It accurately notices the fluid level in the drip bottle.

Figure 2 ULTRASONIC SENSOR

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C. LDR (Light Dependent Resistor)

The principle on which the LDR works is that whenever the light falls on the device, the resistance goes down and allows the current to pass through it.

It is a light-sensitive device. Here the resistivity factor depends on the electromagnetic radiation received. The resistance is adjustable to make the circuit less or more light-sensitive. LDR sends the resistivity factor to Arduino to perform other commands based on the value. It detects the amount of light that passes through the fluid then the data is sent to the Arduino.

D. ESP8266 Wi-Fi Module

It provides Wi-Fi connectivity to the Arduino Uno and to mobile to share and receive data, commands, and results. With the help of this, we can command Arduino Uno to specific tasks using mobile applications.

It has specifications like:

- Convenient to give commands or operate Arduino Uno by user
- Less expensive
- Compatible with many devices.

The ESP8266 Wi-Fi Module is used to set a network between Arduino Uno and the ThingSpeak website. It uses the API Key for the process.

Figure 3 WI-FI MODULE

E. Thing Spreak Website:

It is an IoT service platform that uses an API key for the procedure. It collects the data and sends it to the cloud, the whole process is private.

MATLAB is used to analyze and visualize data. A trigger is sent to the device to take action based on the analysis of the data collected. Wi-Fi module sends the data to the Ultrasonic Sensor, then the cloud analyzes and visualizes data in real-time, and as a result, the graphs, and relations are generated.

The website uses popular IoT protocols, which are in demand from third-party resources. It combines the data from multiple channels for more sophisticated analysis. Now, the commands are ready to be sent to the nurses based on the data For, if the IV is less than a certain percentage, the alert message will be sent, or if bubbles are formed in the IV bag.

i. Need for Automatic Drip Monitoring

Following are the reason why we need an automatic drip monitoring system:-

1. With the help of IoT based intravenous fluid management system, patient data is easily accessed.
2. It is used mainly for patient health and patient care.
3. The backflow of blood is prevented by this method.

IV. CONCLUSION

This study is about the IoT-based Intravenous fluid monitoring and alerting system. With the help of the suggested solution, monitoring in the healthcare system is made very easy. This system can easily reduce the time and the effort that is mainly required in the monitoring of the patient in healthcare. The system that is suggested improves many things like the safety of patients, clinical efficiency is improved by this system, and also the experience of the patient in the hospital is increasing. The system that is suggested is easily installed with the IV bags and stands and after the fluid is over in the bottle we can easily change the drip without any changes in the installed system. In the hospital by using this system nurse is free from monitoring a large number of people at the same time by remembering all the time and medicines. The system that is developed is very cost-effective and beneficial in the healthcare industry. In this system, the notification is sent on the nurse's mobile phone about the drip or fluid status.

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