IOT BASED SALINE INFUSION MONITORING AND CONTROL SYSTEM

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ABSTRACT

During recent years, due to technological advancements, many sophisticated techniques have been evolved for assuring fast recovery of the patients in hospitals. The need for good patient care in hospitals, assessment, and management of fluid and electrolyte is the most fundamental thing required. All most in all hospitals and assist/nurses are responsible for monitoring the electrolyte bottle level. But unfortunately most of the time, the observer may forget to change the bottle at the correct time due to their busy schedule. To overcome this critical situation, an IoT based automatic alerting and indicating the device is proposed where the sensor used here is a level sensor or weight sensor. It is based on the principle that the sensor output changes when fluid level/weight is below a certain limit. When Fluid level/weight is low, it will alert the observer through the website at the control room indicates the room number of the patient for quick recovery. Hospital uses simple electrolytes bottles with no indication, it may create a problem for the patient because the reverse flow will start, blood starts to flow from the body towards the bottle. In, Hospital ICU, CCU, OT, requires such kind of automatic monitoring and indication system. The proposed system consists of a sensor used for monitoring the critical level of the saline liquid in the saline bottle and a mechanism that will stop the saline flow automatically after the saline bottle is completely empty.

Keyword : *Load cell, IoT , Node MCU, and etc….*

1. INTRODUCTION

This chapter contains an introduction to basic saline bottle setup and the necessity to automatically controlling it. Normally the roller clamp arrangement is used to control the flow of the saline to the patient. In emergency situations, the slider clamp is used to stop the flow of the saline. But in both cases, a nurse is required to perform the necessary action. Unfortunately, If the nurse did not notice the emptying of the saline bottle. Then the blood from the patient's body will start to flow back to the saline bottle. It will make the patient feel dizzy and it will also reduce the heartbeat which could also finally lead to death. In order to overcome this situation automatic saline infusion monitoring and controlling is required**.**

1.1 OBJECTIVE

The proposed system is an automatic alerting and indicating device. It uses the load cell as a level sensor. By weighing the saline bottle setup the total weight is identified and it is considered as 100%. When the saline bottle level is reduced to 50%, 25% and 10% it is indicated in the LCD which is connected to the Arduino and website through IoT. The flow will be automatically cut off when the level reaches 10%. And the nurse can turn off the flow at any time through the website. This prevents the upward flow of blood from the veins to the bottle.

1.2 EXISTING SYSTEM

In the present system, a caretaker or nurse is required for the continuous monitoring of the saline bottle level to overcome the returning of blood from the patient to the saline bottle. At present, we are using a roller clamp

mechanism for controlling the flow rate of the intravenous fluid into the patient's body. If the caretaker or the nurse didn't notice the draining of the saline bottle then it will lead to the reverse flow of blood from the patient to the bottle which is highly dangerous**.**

2. LITERATURE SURVEY

2.1 IR Sensor

The Saline is fed to the patient, once the saline reaches 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 and buzzer starts ringing for alerting the nurses and doctors in the hospitals. A time limit will be set for the ringing of the buzzer. An alert message is sent to the concerned nurses and doctors associated with the patient through the use of the internet. If the nurse attends the patient, then she should stop the buzzer and reset the whole system. If the nurse fails to attend the patient within the set time limit, the reverse flow of the blood into the saline bottle is stopped. For this, a spring-dc motor arrangement will be made. The clamp will be attached to spring, along with the compression and stretching of spring, the clamp will also move in forward and backward directions. Again the IR sensor, at the neck of the saline bottle will sense that the saline is totally consumed and the buzzer will again start ringing louder to notify the nurse that the saline is totally consumed and there is a requirement for replacement of saline bottle. The instructions for Arduino will be sent to DC motor and as per the functioning of DC motor the spring will be stretched and the clamp will move in the forward direction and pinch the intravenous tube and stop the reverse flow of the blood in the saline bottle.

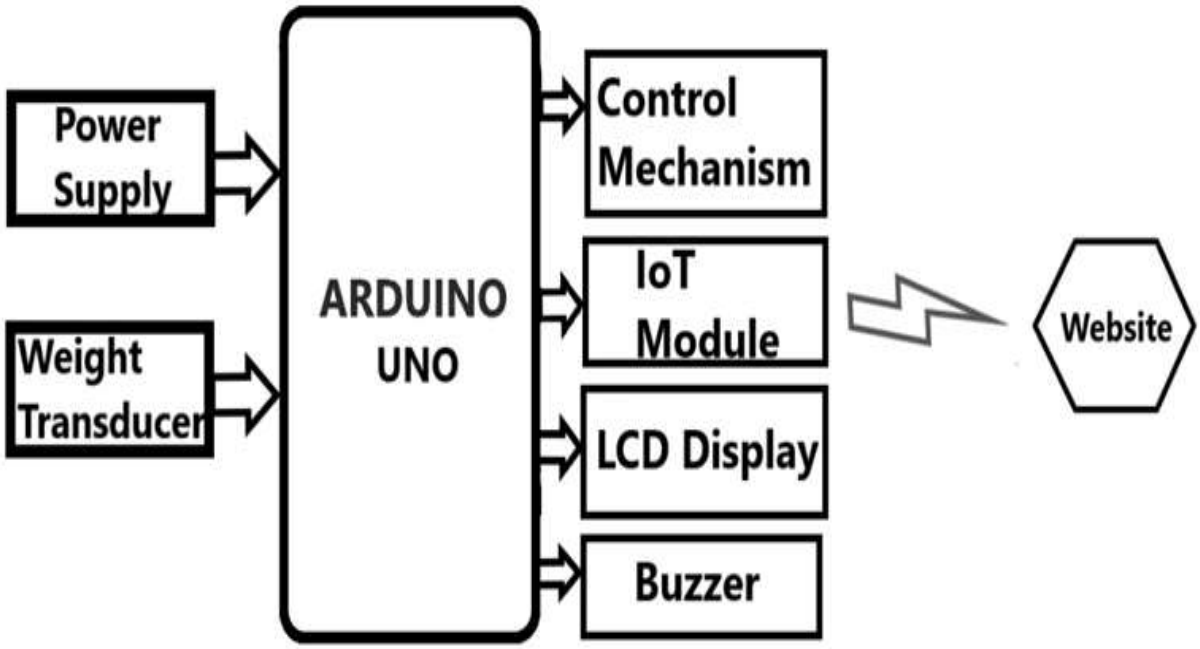
2.2 Bluetooth Module

The proposed system eliminates continuous sight monitoring of the patient by nurses or doctors. Here the IR sensor is used for detecting the level of the saline bottle. The critical level is set at 70ml. Generally, the saline bottle contains a 1000ml solution. When the saline solution is above 70ml then green led will blink and when the saline solution falls below 70ml or the critical level then red led starts blinking and the buzzer will start ringing so that it will be easy for nurses or patient's relatives to understand the exact position of remaining saline solution in the bottle. CC2500 wireless module acts as a transreciever. The transmitter is used to transmit the data via a microcontroller to the receiver. The receiver is connected to a computer or laptop. TTL to USB converter is used to obtain information on a computer or laptop so that the nurse, as well as the doctor, can recognize the saline level with the help of a serial port test window which is displayed on a computer or laptop. The Bluetooth module is used to send the data wirelessly and the results are displayed with the help of Bluetooth terminal application. Due to the use of wireless modules, it is easy for nurses as well as doctors to check the saline level without going to a patient's bed.

3. PROPOSED SYSTEM

In the proposed system we are measuring the level of the saline bottle by Non invasive method. It uses the load cell as a level sensor. By weighing the saline bottle setup the total weight is identified and it is considered as 100%. When the saline bottle level is reduced to 50%, 25% and 10% it is indicated in the LCD which is connected to the Arduino and website through IoT. The flow will be automatically cut off and the buzzer will alert when the level reaches 10%. And the nurse can turn off the flow at any time through the website. This prevents the upward flow of blood from the veins to the bottle.

3.1 PROPOSED BLOCK DIAGRAM



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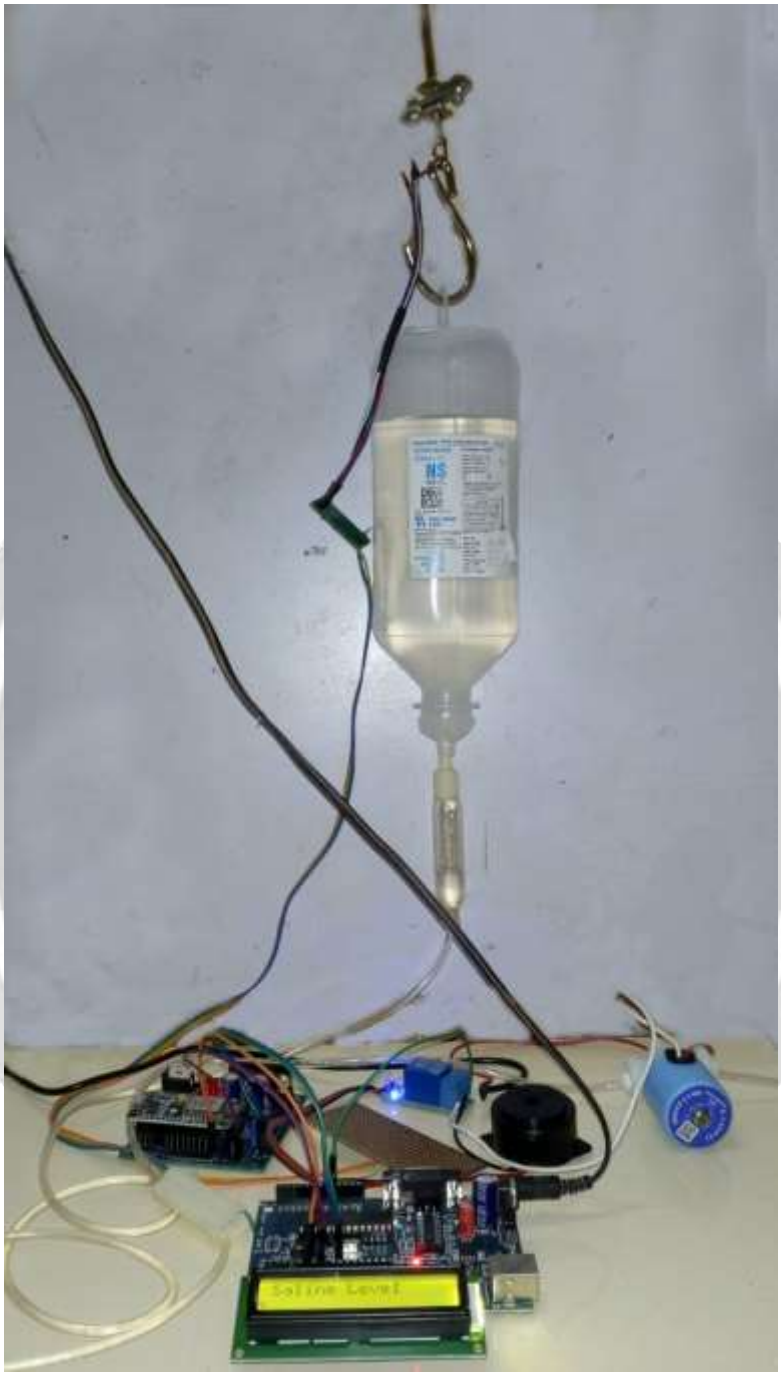
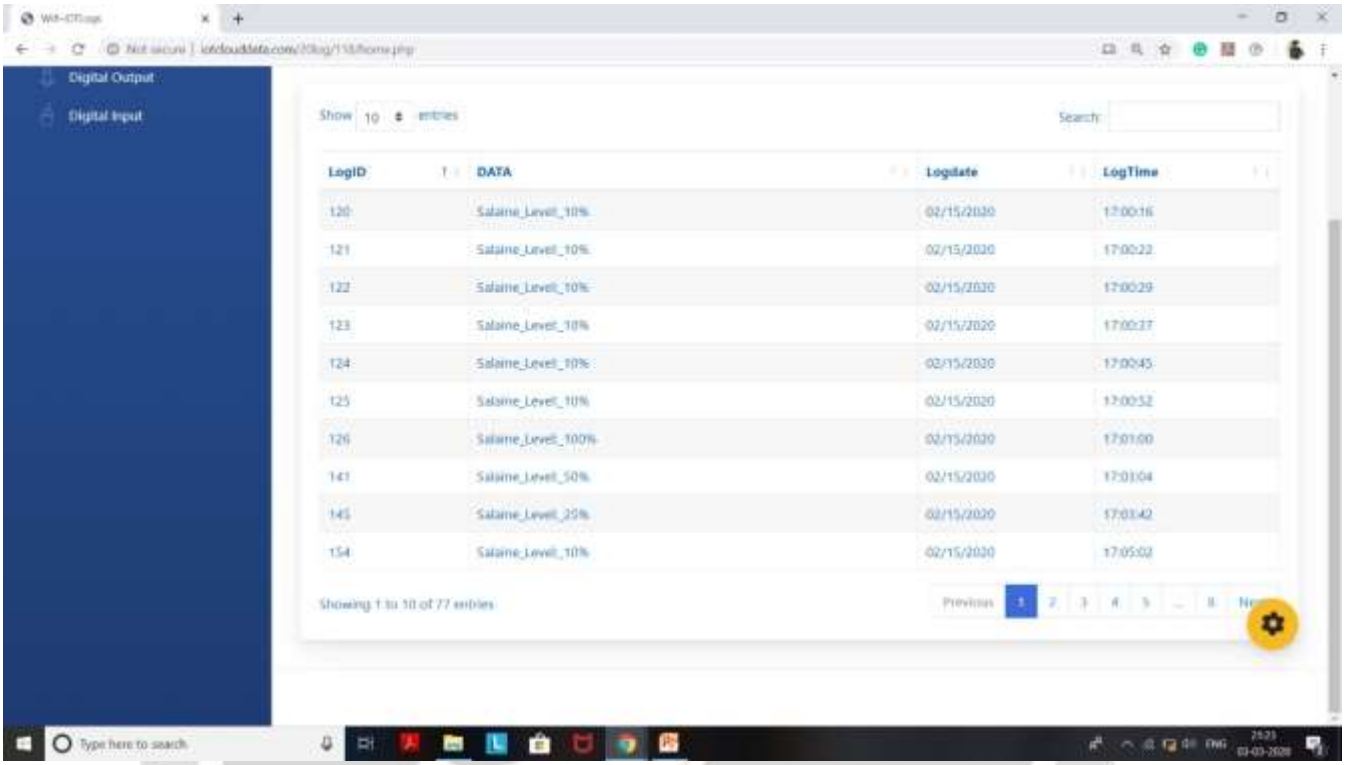
3.2 BLOCK DIAGRAM EXPLANATION

In this process the weight of the saline bottle is measured by the load cell it gives analog value. The analog to digital conversion is done by load cell amplifier (HX711) and the digital value is given to the microcontroller the level can be seen from website and also from LCD display. When the saline level reaches 10% the flow will be automatically cut off and the buzzer will alert the nurse. The flow can also be stopped from the website at any time.

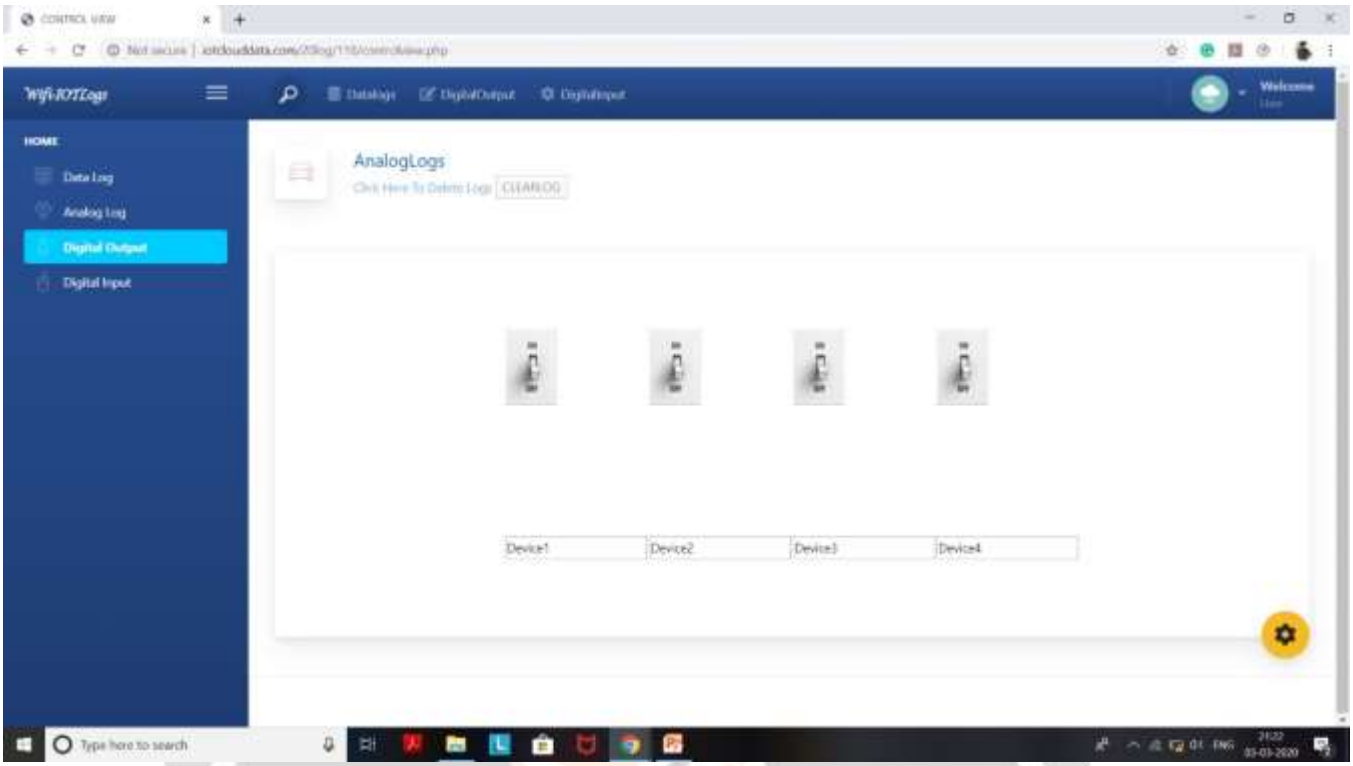
3.3 HARDWARE RESULT



3.4 SOFTWARE RESULT



125	Salaine_Level:_10%	02/15/2020	17:00:52
126	Salaine_Level:_100%	02/15/2020	17:01:00
141	Salaine_Level:_50%	02/15/2020	17:03:04
145	Salaine_Level:_25%	02/15/2020	17:03:42
154	Salaine_Level:_10%	02/15/2020	17:05:02



4. CONCLUSIONS

The proposed frame work for IoT Based Saline Infusion Monitoring and Control System makes use of Arduino and Node mcu. The system is used to monitor the saline level and it automatically stops the saline flow to the patient when the saline level reaches 10% of its total volume.

5. REFERENCES

[1]. Shyama Yadav, Preet Jain "Real time cost effective e-saline monitoring and control system" International Conference on Control, Computing, Communication and Materials (ICCCCM) February 2016 IEEE 2016.

[2]. Mansi G. Chidgopkar; Aruna P.Phatale Automatic and low cost saline level monitoring system using wireless bluetooth module and CC2500 transreceiver International Journal of Research in Engineering and Technology (IJRET) Volume: 04 Issue: 09 September-2015 Pg.no:274-276.

[3]. R. Vasuki, Dennis and Hem Priya Chander Designing a portable monitoring device to measure the drips rate International Journal Biotechnology Trends and Technology (IJBTT)volume1 Issue3Nov-Dec2011Pg.no:29-35.

[4]. Pooja Kanase, Sneha Gaikwad "Smart Hospitals Using Internet of Things(IoT)"International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 03 | Mar-2016 Pg.no:1735-1737.

[5]. R.Aravind, Syed Musthak Ahmed"Design of Family Health Care Monitoring System Using Wireless Communication Technology" International Journal of Advanced Research in Computer and Communication Engineering Volume 2, Issue 9, September 2013 Pg.no: 3666-3671