Saline Drip Monitoring System

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Abstract- In hospitals, Saline is fed to patients to treat dehydration and thus improve their health. In current health care measures, whenever a saline is fed to any patient, the patient needs to be continuously monitored by a nurse or any caretaker. Almost in all of the hospital, a nurse or caretaker is responsible for monitoring the saline level continuously without any interruptions. Due to the negligence and inattentiveness towards saline completion by doctors, nurses or caretaker of the patients and lack of nurses with sufficient skills in hospitals and their excessive workload, a huge number of patients are being harmed in the hospitals. Hence to prevent the patient from getting harmed and protect their lives during saline feeding period, the saline level monitoring and control system have been developed.

Keywords- Sensor, IoT, Saline Drip IV Tube, Arduino, Float Sensor, Nurse.

I. INTRODUCTION

During recent years, due to the technologies advancements many sophisticated techniques have evolved for assuring fast recovery of the patients in hospitals. Need for good patient care in hospitals, assessment and management of fluid and electrolyte is the most fundamental thing required. Almost in all hospitals, an assistant/nurse is responsible for monitoring the electrolyte's bottle level. But unfortunately, most of the time, the observer may forget to change the bottle at correct time due to their busy schedule. To overcome this critical situation, an IoT based automatic alerting and indicating device isproposed where sensor is used as a level sensor or weight sensor. It is based on the principle that the sensor output changes when fluid level/weight is below certain limit.

II. LITERATURE SURVEY

Existing system: -In the current healthcare measures, professional nurses are responsible for managing, monitoring and providing care to patient receiving saline. Roller clamp is used for manually controlling the saline infusion rate at the hospitals. If roller clamp rolls in one way, it compresses the intravenous tube more tightly which make tube thinner and allow saline fluid to flow through at a slower rate. If it is rolled in other direction, it loosens or releases the saline tubing which makes the tube less thin and allows the saline fluid to flow through at a faster rate. In the present world, there is no such monitoring system which will reduce the dependency of the patients on the nurses, doctors and would also reduce the need for the nurses to go to patient's bed every time to check saline level status of each patient. Therefore, there is need for development of IOT based saline level monitoring system.

Comparison between the tools / methods/algorithms:

1. In current health care measures, nursing professionals are responsible for managing, monitoring and providing care to the patient receiving saline.
2. In today's world, there is no monitoring system that reduces patient dependence on nurses, doctors and every time the nurses will have to go to the patient's bed to check each patient's saline status. Therefore, the development of an IoT-based saline level monitoring system is required.
3. Currently the process is done manually.
4. Our project will automatically stop when the saline drip is empty.

III. SOFTWARE ANDTOOLS

Hardware: -

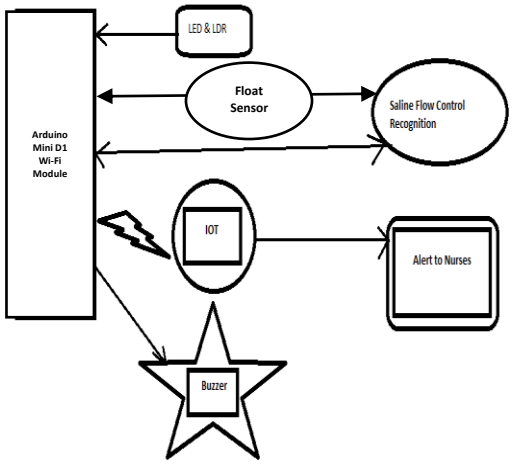
• Arduino D1 Wi-Fi: -WEMOS D1 is a WIFI development board based on ESP8266 12E. The functioning is similar to that of NODEMCU, except that the hardware is built resembling Arduino UNO.
The D1 board can be configured to work on Arduino environment using BOARDS MANAGER. So, it's not necessary to use a separate Arduino board, the D1 itself can be programmed on Arduino IDE. This is handy in using with IOT projects. Further many Arduino SHIELDs are compatible with the D1 board.
• LDR: -Can be used to sense Light. Easy to use on Breadboard or Perf Board Easy to use with Microcontrollers or even with normal Digital/Analog ICSmall, cheap and easily available. Available in PG5, PG5-MP, PG12, PG12-MP, PG20 and PG20-MP series
• LED: - The IR LED or Infrared LED has polarity i.e.it has a positive and negative pin. The pin which

is long is the positive pin (anode) and the pin which is short is the negative pin (cathode) as shown in the above IR LED pinout.

- Float Level Sensor:-Float Level Sensor are continuous level sensor that rises and falls as liquid levels change.
- Battery (6V 1.2amp/hr): -6 Volt 1.2 Amp 20 Hour Sealed Lead Acid Battery with F1 Terminals. Backup battery delivers a 24 charge.
- Servo Motor: - Servo motor is a type of motors whose output shaft can be moved to a specific angular position by sending it a coded signal. The servo motor will maintain the position of the shaft as long as you keep applying the coded signal. When you change the coded signal, the angular position of the shaft will change. A common type of servo provides position control. Servos are commonly electrical or partially electronic in nature, using an electric motor as the primary means of creating mechanical force.
- Buzzer: - Buzzer is an audio signalling device. Buzzer will alert the nurses, caretakers and doctors when saline reaches the critical level and for replacement of saline bottle

Software: - ARDUINO IDE, TuneIOT

IV. ARCHITECTURAL DESIGN

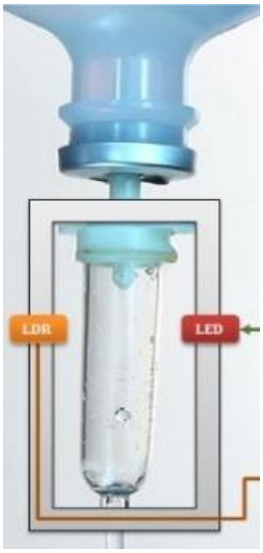


This proposed system will function for two different scenarios which are explained below as follows:

1) Saline reaches at critical level.

2) Nurse fails to attend the patient to replace the saline bottle.

In the 1st scenario, after getting consumed by the patient, saline reaches the critical level which is sensed by the IR sensors. This sensed output is sent to the micro-controller 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 ringing of the buzzer. An alert message is sent to the concerned nurses and doctors associated with the patient through the use of internet. If the nurse attends the patient, then she should stop the buzzer and reset the whole system. If she fails to do so, then 2nd scenario takes place



In the 2nd scenario, 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 offspring, 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 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 functioning of DC motor the spring will be stretched and the clamp will move in forward direction and pinch the intravenous tube and stop the reverse flow of the blood in the saline bottle.

V. RESULT

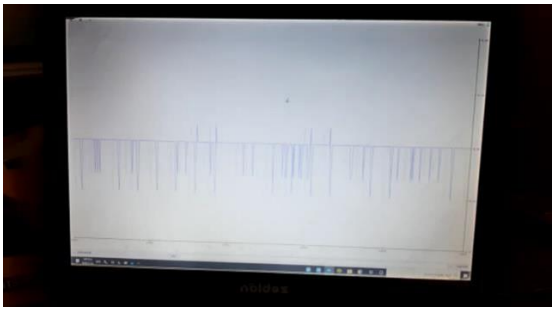


Fig1. Output from IR LED and LDR

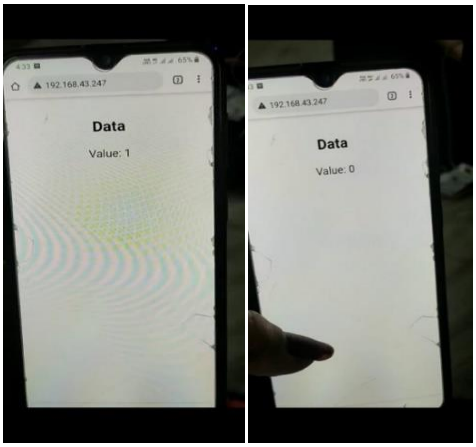


Fig2. Output of float sensor on website

VI. 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. This system will help nurse and staff to improve their work speed and performance all information will be digitalized. This proposed system will reduce the manual effort. It requires very less human intervention as the system is completely automated. This eventually helps reduce human errors. By implementing such a system, patients will also be rest assured, which in turn will help them get well more quickly.

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VIII. REFERENCE

[1]. Priyadharshini.R, Mithuna.S, VasanthKumar.U, KalpanaDevi.S,Dr. SuthanthiraVanitha.N "Automatic IntravenousFluid Level Indication System for Hospitals" International Journal for Research in Applied Science &EngineeringTechnology (IJRASET) Volume 3 Issue VIII, August 2015 Pg.no : 427-432.

[2]. S. Tawade, M.S. Pendse, H.P. Chaudhari "Design and Development of Saline Flow Rate Monitoring System UsingFlow Sensor, Microcontroller and RF ZigBee Module" International Journal of Engineering Research and GeneralScience(IJERGS) Volume 3, Issue 3, MayJune, 2015 Pg.no: 472-478.

[3].PattarakamonRangsee,PaweenaSuebsombut,PhakphoomBoonyanant"Low-Cost Saline Droplet Measurement System using for Common Patient Room in Rural Public Hospital" Joint International Conference on Information and Communication Technology, Electronic and Electrical Engineering (JICTEE) Janurary 2014 IEEE 2014.

[4]. C.C. Gavimath, Krishnamurthy Bhat, C.L. Chayalakshmi, R.S. Hooli, B.E. Ravishankera"Design and developmentof versatile saline flow rate measuring device and GSM basedremote monitoring device" International Journal ofPharmaceutical Applications(IJPA) Volume 3, Issue 1, 2012, Pg.no: 277-281.

[5]. R.Aravind, Syed Mustak Ahmed "Design of family health monitoring system using wireless communication", International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 9, September 2013.

[6]. V.Ramya, B.Palaniappan, AnuradhaKumari "Embedded patient monitoring system" International Journal of Embedded Systems and Applications (IJESA) Vol.1, No.2, December 2011.

[7]. D.Janani, J.Prathibanandhi, P.MeenakshiVidya, K.S.Sujatha "Wireless Saline Bottle Level Indicator for Hospitals", Compo soft an International Journal of Advanced computer Technology.

[8]. Lei Yu, Yang Lu, XiaoJuan Zhu,‖ Smart Hospital based on Internet of Things‖, JOURNAL OF NETWORKS, VOL.7, NO. 10, OCTOBER 2012, Page No.1-8.

[9]. Manoj Kumar Swain, Santosh Kumar Mallick , Rati RanjanSabat ‖ Smart Saline Level Indicator cum Controller‖, International Journal of Application or Innovation in Engineering & Management (IJAIEM), Volume 4, Issue 3,March 2015,Page No.1 and 3.

[10]. 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

IX. PLAGARISM CERTIFICATE