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SMART BOTTLE SYSTEM FOR HEALTH CARE

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Abstract: Now-a-days saline level monitoring is done manually by hospital staff. They usually have to check the level of the bottle in regular intervals and to identify problems while electrolyte entering into the body. But it sometimes causes risks of blood reverse flow. So, there is a need for a design which automates the saline monitoring system. So, our aim is to design a ready-made portable system for such bottles. Ready-made wearable sensors on the sides of the bottle can detect the level/weight of fluid inside the bottle and stop the flow of saline when there is a need to stop fluid flow like high pulse rate or saline bottle becomes empty.

Keywords: Saline, level monitoring, ready-made portable system, abnormal pulse rates.

I.INTRODUCTION

The doctor-population ratio in India is 1:1456 where there is a need for automation in medical services which led to our innovation. During recent years, due to the technological advancements many sophisticated techniques have been 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. To overcome this critical situation, a IOT based automatic alerting and indicating device is proposed where the 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 a certain limit. When Fluid level/weight is low or any hazardous situation raises, it will alert the observer through the display or/and mobile phone at the control room indicates the room number of the patient for quick recovery.

A. Problem Statement

In the hospitals the nurses or doctors usually have to check level of bottle in regular intervals and to identify problems while electrolyte entering into the body. But, it sometimes cause risks of blood reverse flow. So, there is a need of design which automates the saline monitoring system.

B. Literature Survey

Saline, one of the most popular intravenous (IV) therapies plays a major role in the management of patients who are critically ill. Surveillance of saline bottle level is very important because when the bottle is emptied and the needle is not removed from the vein then the blood flows outward into the bottle. In hospitals, the nurses or caretakers are responsible for monitoring the saline bottle level. Mostly, due to negligence and any unusual condition, the exact timing of removing the needle from the patient's vein is ignored which causes a serious casualty and may lead to death as well. Furthermore, remote monitoring is a need to provide telehealth services. To prevent the accident due to the ignorance of caretakers and to provide remote surveillance in telehealth services, we have proposed the cost-effective smart saline level monitoring device which includes the combination of sensor and Internet of Things (IoT) technologies. The load sensor converts the weight of the bottle to a specific voltage. The ESP32 microcontroller 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, we have used MQTT-S publish/subscribe protocol which runs over TCP. This proposed monitoring system fulfils the reliable delivery of messages to the subscribers which is very important for healthcare.

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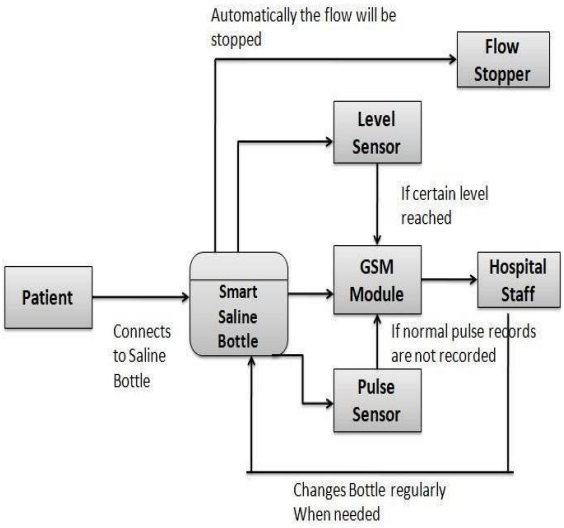
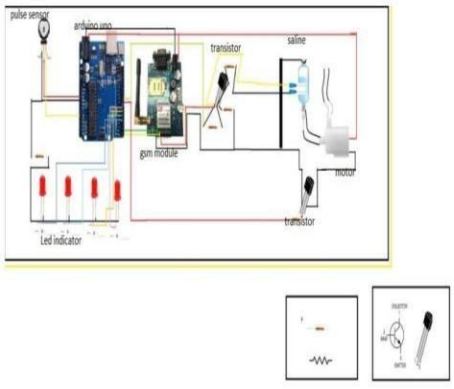
I. PROPOSED SYSTEM A.FLOW CHART



B.Proposed Idea

To design a ready-made portable system for saline bottles Ready-made wearable sensors on the sides of the bottle can detect the level/weight of fluid inside the bottle and stop the flow of saline when there is a high pulse rate. This system also informs the pulse reading of the patient to his/her respective care taker like nurse, doctor etc., and when the pulse rate is high or level of saline goes down it automatically stops the flow of saline. Such a device will create assurance of non-harm condition to patients.

II. SYSTEM DESIGN



Hospital Staff usually have to check level of bottle in regular intervals and to identify problems while electrolyte entering into the body. But, it sometimes cause risks of blood reverse flow . So, there is a need of design which automates the saline monitoring system.

Motor is connected to the saline bottle which is for controlling the flow of the fluid. GSM module is used for communicating with hospital staff in the form of messages in case of any less saline level in the bottle and abnormal pulse results. Arduino UNO is for achieving IOT services. Two resistors are used. One is for capturing results of saline and the other one is used to control motor based on saline.

Four LED lights indicate different pulse levels. One is used for indicating low pulse level and other one is for normal and the rest is for high pulse level indication. In addition to this, it also sends messages to staff when abnormal pulse results. Thus, the system is designed in such a manner to reduce manual monitoring of saline infusion and also reduce fatal risks.

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There are several steps to be followed for using this:

- Initially users have to attach the smart saline bottle to the patient.
- Ensure that power supply is adequate for running the motor.
- Configure the recipient's mobile number into the GSM module.
- Also, the second recipient's mobile number also needs to be configured if the first person is not responding.
- Basic messaging feature of recipients' mobiles is checked.
- After getting messages regarding saline level and pulse readings, one can change saline bottle or saline flow into the body to be stopped.
-

III. IMPLEMENTATION

Implementation is an important phase where the development of the proposed system is based on the decisions made previously in the design and system requirement phase.
We have divided our project into 5 modules.

- Level detection module
- Pulse detection module
- LED indicator
- Alert message module
- Flow stopper module

A.) Level detection module:

- This module is used to check the level of the saline bottle.

B.) Pulse detection module:

- This module is used to identify the patient's pulse readings whether they are normal or exceeded.
- For checking the pulse here we use the Pulse sensor
- Pulse sensor is a well-designed plug- and-play heart-rate sensor for arduino.
- The sensor clips onto a fingertip or earlobe and plugs right into arduino

C.) LED indicator:

- This is used to indicate the level of pulse using LED lights.

D.) Alert message module:

- When the level of saline bottle is below the limit mark or abnormal pulse results, then GSM will send message to doctor.
- The acronym GSM stands for global system for mobile communications.
- Gsm modem can be used to develop embedded applications like sms control, data transfer, remote control and logging.
- In our project, the gsm is used to send the alert messages to nurses, doctors, etc.,

E.) Flow stopper module:

- Flow meters can be used to measure quantity of water passing through liquid pipes. .
- Flow meters have special circuits with actuators through which we can control the water flow.
- Major constraints of flow meters are accuracy, precision and resolution.

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V.) CONCLUSION:

When saline is injected into a patient's body, the problems faced by the patients are reduced by using our product. The manual effort on the part of the nurses is saved. It will be advantageous at night as there will be no such requirement for the nurses to visit patient's beds every time to check the level of the saline in the bottle an alert notification will be sent to the nurses or guardians when saline reaches the critical level. It also proposes a system which automatically monitors the saline flow by using the flow controller. In this application it will also provide the pulse rate of the patient, so that based on the pulse rate the saline flow will take place. When the pulse rate is above normal condition then the flow controller will automatically stop the flow of saline. This automatic saline level monitoring system will provide more flexibility to doctors, thereby the patients caring is enhanced. Hence it saves lots of time for a doctor or nurse who is on duty. It will save the life of the patients. It can be reused for the next saline bottle. The system is reliable, cost effective, and convenient for nurses. This application has been successfully computed and was also tested successfully by taking "test cases". The application is developed using Arduino software.

VI.) FUTURE ENHANCEMENT:

In future enhancement, we will add the dynamic attendance system so that it can alert another faculty to take the position of that absent faculty. Furthermore, we will try to make the total product into a single chip so that embedded code is placed into that single chip and air bubble detection detection module.

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