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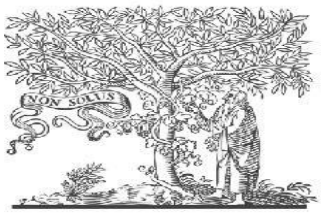

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IoT Based Smart Saline Bottle for Healthcare

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ABSTRACT

In recent years, the hospitals have evolved their sophisticated techniques for enhancing the patients' quick recovery. In the hospital, good patient care is crucial, and the regular monitoring of fluid and electrolyte status, primarily using a saline bottle, is a must. Throughout every hospital, the nurses are responsible for monitoring the saline bottle and changing the saline bottle. But sometimes in their busy schedule the nurses forgot to check the saline bottle. And it may cause health problems to the patient. To address this issue, we've designed an IoT-based autonomous alerting and notifying system that makes use of sensors, and indicate the nurses about the level of the electrolyte.

Keywords: Alerting System, Electrolyte Bottle, Load Cell, Arduino Uno, Weight Sensor.

1 INTRODUCTION

The basic need in any hospital irrespective of the kind and infrastructure is the electrolyte bottle. It does not have any indication and it may also create problem for patient when the bottle become empty and the flow is not stopped. By which reverse flow will may start i.e., the blood flow from patient body to saline bottle. For hospital ICU, CCU, NICU most of the departments of hospital required such monitoring and indicating device.

The device works on the idea that when the fluid weight drops below a given threshold, the sensor output changes. First of all we give certain limit to the device for saline bottle, if the fluid is below that limit, we get message to our mobile and if fluid level is still decreasing to like 10ml we get buzz sound from the device. By this we can notify the nurses to change the saline bottle for a particular patient.

1.1 RELATED WORK

According to King University Online-sponsored article that was published on March 12, 2019[1]. As the number of patients under a nurse's care rises, so does the quality of their medical therapy decreases. Unsafe staffing

counts have been correlated with increased patient mortality. Nursing staff and effectiveness of treatment are proportional to patients' perceptions of their hospital care. As the number of people with the disease grows, increases the nurse work and becomes hectic and the chance for good care of the patient can't be available. The major and basic need for nearly every patient is the electrolyte bottle. The requirement of technology in this field is indispensable.

2 EXISTING SYSTEM

A nurse or a person related to the patient need to stay near the patient to ensure the completion of the saline bottle. When you have an electrolyte bottle attached it becomes a gravity fed closed system. Once the electrolyte bottle empties that part of the tube hanging down over the side of the bed now has no force of gravity working on it. Therefore, blood can come back out of your arm down into the tube, which tends of back flow of blood. The human requirement and risk is more in existing system. It increases when there were a lot of patients. And at the time of pandemic, the nurse should take care of the patients as the persons related to the patient were not allowed. There the technology takes a major role while we implement the IoT based smart saline bottle for health care.

3 PROPOSED SYSTEM

The electronic components in the proposed system are Arduino Uno, LCD (16 X 2), Load Cell, Hx711 module, buzzer, GSM 900A.

Different wires in Load cell: Excitation+(E+) is red, Excitation-(E-) is black, Output-(O-), Signal- (S) + is green, Output+ (O+), Signal+ (S+) + is white.

A load cell is a electronic device that transforms mechanical force, usually the weight of objects, into a measured electrical output. We read the information that is the saline bottle's quantity from the load cell using the arduino, the hx711 amplifies the signal received by the load cell because the signal is very faint so for the arduino to actually be able to read. So we need to amplify using hx711.Thus the hx711 is connected to the arduino.The 16*2 LCD display which is connected to the arduino displays the information about the saline bottle's volume.

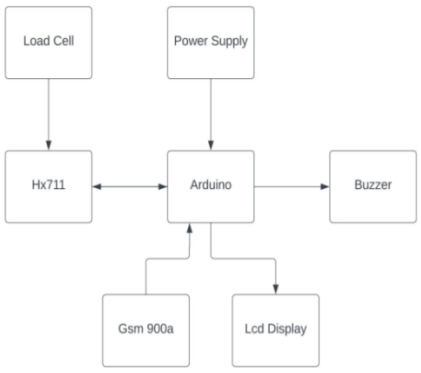

Fig 1: Block Diagram of System Design

The buzzer is connected to the arduino. According to the code written in the arduino, the buzzer makes a sound when the saline bottle's volume is below 25ml. The buzzer again alters the nurse when the level

decreases to 10ml. The specialized Global System for Mobile Communication (GSM) module is intended for wireless radioactivity monitoring using the Short Messaging Service (SMS).It is connected to the arduino and alerts the nurse or hospital management by delivering a message displaying the saline bottle's level and the patient's assigned bed number.

4 IMPLEMENTATON

The electronic components are connected according to the block diagram. The code is written using Arduino Software in C programming language. After selecting the port and board that is arduino, the code is compiled and dumped into arduino from arduino software using USB to TTL converter. The TTL converter converts any standard full duplex USB port to a 5V TTL signal in either direction, the USB is connected to personal computer.

Providing the power supply to the arudino, and clicking the reset button, the system starts working and the LCD display displays a message about placing the saline bottle. Once the bottle is positioned on the load cell, the initial weight of the bottle will be shown on the LCD. When the water reduces, the weight gets updated in the display. And when the weight is below 25ml, the staff gets a message regarding the bed number and saline level. And a buzzer sound will be produced. The buzzer sound will be produced again when the level is below 10ml.Thus the staff can know the situation of the patient and give them appropriate treatment.

4.1 Output Screenshots

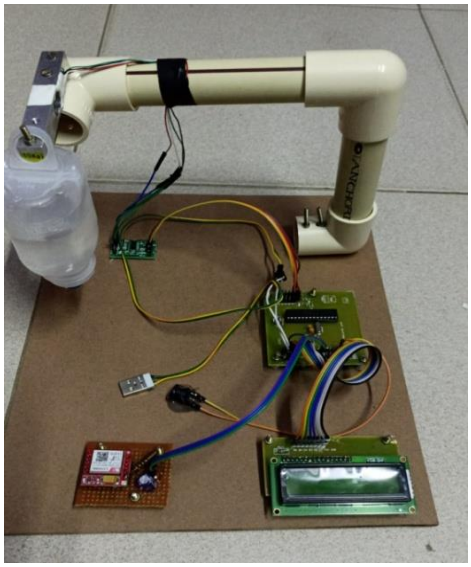

Fig 2: Whole Setup

Fig 3: Initial weight of the bottle

Fig 4: Threshold reached

Fig 5: Final Display

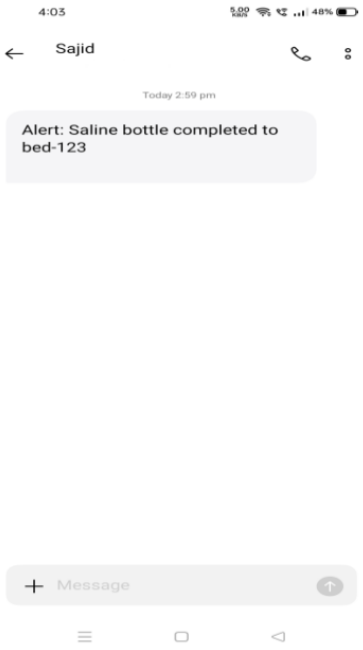

Fig 6: Message Output

5 CONCLUSION

The project makes the treatment to the patient more effective. It alerts the staff about the patient electrolyte bottle level when it reaches threshold limit by sending a message to them and by providing an alert sound. Thus the staff can know the condition of the patient and provide appropriate treatment.

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