22CSL51-IOT & Cloud

Computing

Saline Bottle Monitoring System Using IoT

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# Problem Statement :

During recent years, due to the technological advancements many sophisticated techniques has 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. All most in all hospital, an assist/nurse is responsible for monitoring the electrolytes 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, a IoT based automatic alerting and indicating device is proposed 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. When Fluid level/weight is low, will alerts the observer through the display or/and mobile phone at the control room indicates the room number of the patient for quick recovery.

# Idea:

Design an IoT-based system using sensors to automatically monitor the fluid (electrolyte) levels in hospital bottles and instantly alert the nursing staff or control room when the fluid drops below a critical threshold, ensuring timely intervention and preventing health risks to patients.

# Proposed Solution:

**IoT-Based Smart Monitoring System**  
 A smart system using weight or level sensors is deployed to monitor IV fluid bottles in real-time.

* **Automatic Alert Mechanism**  
   When the fluid level drops below the predefined threshold, the system automatically sends an alert.
* **Accurate & Timely Response**  
   Ensures timely bottle replacement, reduces nurse workload, and improves patient safety.
* **Scalable for Multiple Patients**  
   Can monitor and alert for multiple beds/rooms in parallel using Arduino/ RaspberryPi and cloud connectivity.
* **Dual Notification Mode**

Alerts sent via : Control Room Display , Mobile Notifications with patient room/bed details

# Components Used:

* Arduine UNO
* Ultrasonic sensor
* Wi-Fi Module
* Buzzer
* LED
* Breadboard
* Jumper wires
* Power suply

# Connections (Tinkercad Simulation):

* Ultrasonic sensor – vcc to 5v, GND to GND , Trig to D9 , Echo to D8
* Buzzer - +ve to D7,-ve to GND
* LED – Anode to D6 , Cathode to GND
* Arduino – Connection to pc via USB for power and serial monitoring

# Code Summary:

If (flex sensor analog value > threshold):

Turn ON buzzer

Turn ON LED

Else:

Turn OFF buzzer

Turn OFF LED

# Working:

# Flex sensor detects the bend or deformation of the saline tube or bottle Bending the sensor simulates low fluid level or improper positioning. •Arduino continuously reads the sensor value in real-time. • If the reading crosses a set threshold (indicating a critical condition):   → Buzzer and LED turn ON to alert medical staff. • If the reading is below the threshold (normal condition):   → Buzzer and LED remain OFF. • Works in real-time to ensure instant alerts and quick medical response. • Enhances patient safety by preventing saline backflow or delay in replacement.

# Result:

✅ The buzzer and LED are automatically turned ON, indicating a critical condition such as backflow, empty bottle, or disconnection.  
✅ If the sensor value is within normal range, the system remains silent, ensuring efficient monitoring without false alerts.  
✅ The response time of the system was real-time (within milliseconds), making it suitable for hospital environments.

# Conclusion:

The IoT-based Saline Bottle Monitoring System provides an effective and low-cost solution to continuously monitor the saline level and prevent risks such as backflow or dry IV lines. By using a flex sensor (or a simulated alternative), Arduino, LED, and buzzer, the system ensures real-time alerts to medical staff when the saline level drops below a critical point.