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# Literature Survey on -Smart Patient Monitoring Aid with Gesture Analysis based Cognitive Abilities

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**ABSTRACT—** One of the main challenges faced by nurses and attendants in hospitals is to ensure that the saline bottle remains at the appropriate level. If the saline level is not regularly checked, it can cause a backflow of blood, which can put the patient's life at risk. To address this issue, an IoT-based saline level indicator has been proposed. The system uses a load cell attached to the top of the stand and a hook attached to the bottom of the load cell to measure the level of the saline bottle. When the level drops below a certain threshold, a sensor sends an alert to the controller, which activates an indicator within the room. The nurse can then use an IoT-enabled mobile app to check the status of the saline bottle. In addition, monitoring the patient's body temperature, blood oxygen level, and pulse rate can help caregivers to better monitor the patient's overall health. To prevent the backflow of blood towards the saline bottle when the level drops, the solenoid valve can be modified accordingly.

**KEYWORDS—**Internet of Things, Saline Monitoring,Health care,Reverse Blood flow, ESP8266.

## I. INTRODUCTION

The healthcare industry is facing rising costs, and the number of diseases is increasing. IoT-enabled devices are gaining popularity as they can reduce human effort in repetitive tasks. Low-cost IoT solutions can help reduce the cost of healthcare by eliminating the need to hire additional staff to perform routine tasks. In hospitals, when a patient requires liquid nourishment, saline solution is used. Continuous monitoring is necessary during the injection process, but this can be challenging in many facilities, and patients may be overlooked. When the saline bottle is almost empty, there is a risk of blood backflow from the patient's body, which can cause significant harm. To address this problem, we developed a smartphone app that can remotely monitor a patient's health. This solution is suitable for both ordinary and comatose patients in healthcare facilities. By using IoT technology, we can improve patient safety and reduce the workload of healthcare staff.

## II. LITERATURE REVIEW

The paper "IoT Based Automatic Saline Monitoring System Using Node MCU"[1] proposes a system in the healthcare industry that uses IoT technology to monitor saline levels in IV bags. A wireless sensor network sends data to the cloud for analysis as part of the system. If any anomalies in the saline levels are detected, an alert is sent to healthcare providers. The paper emphasises the system's advantages, such as its low cost, ease of installation, and scalability. The authors also discuss the system's implementation using the Node MCU and present experimental results to validate the system's effectiveness. Finally, the paper suggests that project have potential to reduce errors in monitoring patient and can provide rapid medical help.

To develop and test the proposed system, the paper "Smart Saline Level Monitoring System Using ESP32 And MQTT-S"[2] employs a quantitative research methodology. The authors created a system for monitoring saline levels in IV bags using the ESP32 and MQTT-S protocols. The system consists of ultrasonic sensors that measure saline levels and send the information to a server via MQTT-S. Several experiments were carried out by the authors to assess the system's effectiveness and accuracy. To validate the system's performance, they collected data on saline levels in IV bags and analysed it statistically. The authors also emphasize the benefits of the proposed system, such as its low cost and ease of use. According to authors, they have reduced the margin of error in monitoring patient.

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To develop and test the proposed system, the paper "Saline Water Level Monitoring Using AWS"[3] employs a practical implementation approach. The authors use IoT technology to create a system in the healthcare industry that monitors saline levels in IV bags. Sensors in the system measure saline levels and send the data to the AWS IoT platform for analysis. The authors also go over the AWS services they use to implement the system, such as AWS IoT, AWS Lambda, and Amazon S3. The authors tested the system's accuracy, reliability, and scalability as part of several experiments to validate its effectiveness. We can conclude form this paper that this system will help us to provide patient with good medical help.

To develop and test the proposed system, the authors employ a quantitative research methodology [4]. They created a system for monitoring and controlling saline levels in IV bags using IoT technology and a microcontroller-based platform. The authors tested the system's accuracy, reliability, and scalability as part of several experiments to validate its effectiveness. They also collected and analysed data on saline levels in IV bags using statistical methods to validate the system's performance. The authors came to the conclusion that the proposed system is cost-effective, accurate, and simple to use, and that it has the potential to improve patient care in the healthcare industry.

To develop and test the proposed system, the paper "Design and Development of Smart Saline Level Indicator for Healthcare Using IoT" [5] employs a practical implementation approach. The authors use IoT technology to create a system in the healthcare industry that monitors saline levels in IV bags. The system consists of ultrasonic sensors that measure saline levels and send the data to the cloud for analysis via the MQTT protocol. The authors also go over the various IoT components they use to build the system, such as the microcontroller-based platform, ultrasonic sensors, and MQTT protocol.
The methodology used in the paper involves the following steps:

1. System Design: The authors design the system by selecting appropriate components such as the microcontroller-based platform, ultrasonic sensors, and MQTT protocol. They also develop the hardware and software components required for the system.
2. Prototype Development: The authors develop a prototype of the system by assembling the components and testing the system's functionality.
3. Data Collection: The authors collect data on the saline levels in IV bags using the developed system. They utilize statistical methods to analyses the data and validate the system's accuracy and reliability.
4. System Testing: The authors test the developed system by monitoring the saline levels in IV bags in real-time settings. They evaluate the system's effectiveness in terms of accuracy, reliability, and scalability.
5. System Evaluation: The authors evaluate the developed system based on its performance in real-world settings.

For monitoring the saline, a liquid level switch contactless sensor is used. This sensor is fixed to the saline bottle. The sensor produces different voltages continuously. In this model two sensors are used; one is attached at top and other at bottom. The bottom sensor alone can make the decision. The readings are then sent to nodeMCU and the message is send using MQTT protocol and ESP8266WIFI module mounted on nodeMCU. Messages like Full, Alert and Critical are sent to nurses and caretakers. It sends full if bottle is 90% filled, alert when it is 80% empty and will send critical when it is 90% empty. Here, in this project LLSCS sensor was used which is preferred over load cell. Readings provided by loadcell are affected by the external factors but this is not the case with the LLSCS.

The paper "Internet of Things Based Smart Hospital Saline Monitoring System" [5] proposes an IoT-based system for monitoring saline levels in IV bags. To create a cost-effective and scalable system, the system makes use of a microcontroller-based platform, ultrasonic sensors, and IoT protocols. The authors highlight the system's advantages, such as its low cost, ease of installation, and real-time monitoring. The system measures the saline levels in IV bags using ultrasonic sensors. Using the MQTT protocol, the data is then sent to the cloud for analysis. If any anomalies in the saline levels are detected, the system sends an alert, allowing healthcare providers to act quickly. The authors evaluated the effectiveness of the developed system in terms of accuracy, reliability, and scalability in real-time settings. They also contrasted the proposed system with existing systems, emphasising its advantages. The authors also discuss the system's future scope and suggest areas for future research.

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## III. CONCLUSION AND FUTURE WORK

An IoT-based electrolyte monitoring device can reduce the manual labor of nurses by automating the process of monitoring the electrolyte level in hospital patients. This system requires minimal human interaction, allowing nurses to attend to other tasks while ensuring that patients' electrolyte levels remain at safe levels. The device issues an alarm notice to nurses, physicians, and carers when the electrolyte level exceeds the critical level, potentially saving patients' lives. The automated system also provides clinicians with more flexibility, leading to improved patient care and saving time for nurses and doctors on duty. Additionally, the technology can transmit data to nurses and physicians' mobile devices to alert them to any anomalies in the patient, requiring a secure password for access. The saline monitoring system not only tracks the saline level but also regulates the drop rate as needed. In the future, the system could be enhanced to monitor multiple patients' saline levels remotely using a single web application. This technology is reliable, cost-effective, and user-friendly for nurses.

It is very important to consider the advantages of Patient Monitoring over traditional ways of monitoring patient. Some of these advantages are:

1) Real-time monitoring: A patient level monitoring system can monitor a patient's vital signs and other health indicators in real-time. This means that doctors and nurses can quickly detect any changes in a patient's condition and take appropriate action immediately.

2) Improved accuracy: Traditional methods of monitoring patients, such as periodic checkups or manual recording of vital signs, can be prone to errors. A patient level monitoring system can eliminate these errors and provide accurate and reliable data.

3) Increased efficiency: With a patient level monitoring system, healthcare professionals can monitor multiple patients simultaneously, without having to physically visit each patient. This can increase efficiency and save time, allowing healthcare professionals to focus on other important tasks.

4) Early detection of complications: A patient level monitoring system can detect early warning signs of complications, such as infections or other adverse events, before they become serious. This can allow healthcare professionals to intervene early and prevent serious complications.

5) Improved patient outcomes: By providing more accurate and timely monitoring, a patient level monitoring system can help improve patient outcomes. Patients can receive appropriate care and treatment more quickly, which can lead to better health outcomes.

Overall, a patient level monitoring system can provide many advantages over traditional methods of monitoring patients, including improved accuracy, efficiency, and patient outcomes.

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