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IOT Based IV Bag Monitoring, Controlling and Alerting System

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ABSTRACT:

The "IOT Based IV Bag Monitoring, Controlling, and Alerting System" is a smart solution designed to make sure patients receive their intravenous (IV) fluids accurately, especially when hospitals are busy or during emergencies like the COVID-19 pandemic. This system uses special sensors on IV bags that constantly send information about the fluid's flow rate, volume, and temperature to a central computer system. This system is like a watchful eye that helps healthcare workers keep track of many IV drips at once.

If there's any problem, like the fluid flowing too fast or too slow, the system quickly alerts the healthcare team. It also allows them to make adjustments remotely, ensuring the IV fluids are just right for each patient. This technology is a big help during busy times, reducing the chance of mistakes and letting healthcare providers focus on other important tasks. Ultimately, it improves patient safety by preventing issues that can arise from mistakes in IV fluid administration.

INTRODUCTION:

The IoT-based IV Bag Monitoring, Controlling and Alerting system addresses these challenges. It uses various sensors to monitor the fluid level and detect bubble formation in the IV bag. An ultrasonic sensor can measure the fluid level by sending sound waves and calculating the time it takes for the waves to bounce back. A light sensor can detect bubble formation, which is crucial as air bubbles in the IV line can lead to complications such as air embolism. The data from these sensors is sent to a microcontroller, which processes the information and sends alerts to healthcare professionals if the fluid level drops below a certain level or if air bubbles are detected. These alerts can be sent in real-time through an IoT platform, ensuring timely intervention and reducing the risk of complications. Moreover, the system can also control the flow of fluid based on the data received from the sensors. This feature further enhances the accuracy and consistency of IV therapy, leading to improved patient outcomes.

The implementation of this system can significantly improve patient safety and care. It ensures the accurate and timely administration of IV fluids, reducing the risk of complications. Additionally, it can alleviate the workload of healthcare professionals, allowing them to focus on other aspects of patient care. By automating these tasks, the system can improve the accuracy and consistency of IV therapy, leading to better patient outcomes. It can also reduce the workload of healthcare professionals, allowing them to focus on other aspects of patient care. Moreover, the system's real-time monitoring capabilities mean that healthcare professionals can intervene promptly if the fluid level drops below a certain level or if air bubbles are detected. This can help prevent complications and ensure that patients receive the best possible care. In conclusion, the "Smart IoT-Based IV Bag Monitoring and Controlling" system represents a significant advancement in healthcare technology. By harnessing the power of IoT, it has the potential to enhance patient safety, improve the efficiency of healthcare delivery, and ultimately contribute to better health outcomes.

LITERATURE SURVEY:

1. Intravenous drip monitoring System for smart hospital using IOT

Ms. Sincy Joseph, Ms. Navya Francis Ms. Anju John, Ms. Binsi Farha Btech Students, Computer Science and Engineering Vimal Jyothi Engineering College Chemperi

This project aims at creating a device which will not only monitor but also control the drip rate and provide alarms when needed. This project aims at creating a device which will not only monitor but also control the drip rate and provide alarms when needed. The device will fulfil the following challenges by enabling easy adjustment of the drip rate for a given fluid or set of fluids, which you can simply enter as volume to be infusion, time at which it must be injected, drop factor and required droplet speed. To make it easier to access, the drop rate will be constantly monitored and reported. Regardless of changes in fluid concentration, composition, gravitation or the liquid content within the reservoir or other parameters, the drop shall continue to be constant. An alarm (audible and visual) will be triggered whenever the drip chamber becomes full, drip is stopped, variations in set rate (speeded up or

slowed down), pre-set reservoir level reached, reservoir low or empty, battery low, etc. In order to avoid the occurrence of air embolisms and other complications, the drip will be interrupted automatically before the reservoir is filled or when a prior set level has been reached.

2. IoT based drips monitoring system in hospitals

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The term "The Internet of Things" refers to a network of physical objects including all appliances, cars, buildings and other structures that have been integrated with sensors, software or electronics enabling it to communicate and retrieve data from one another. The development of the Internet of things has been stimulated by a convergence of different technologies such as real time analytics, machine learning, commodity sensors and embedded systems. The nurse or members of the family should be closely monitoring patients every time they are injected with saline. Often, the nurse has forgotten to replace her saline container when it's entirely empty because of a busy schedule, inattention or an increased number of patients. Due to a difference in blood pressure and the pressure inside the empty saline container, blood returns to the saline bottle shortly after the saline has finished This would lead to the blood from their veins flowing backwards into a saline bottle. This may lead to decreased haemoglobin levels in the patients, and they can also experience a lack of blood Red Cells RBCCs which causes them to become tired. Therefore, in order to reduce the patient's reliance on caregivers or nursing staff, it is necessary to set up a saline level monitoring system.

METHODOLOGY:

1. Planning:

The objectives, scope, and schedule of the project shall be determined during the planning phase. A detailed project plan, which includes roles and responsibilities, shall be prepared in order to ensure the successful implementation of a project.

2. Identify & define the required software and hardware resources for a project:

In order to ensure that the software and hardware requirements are aligned with the project's goals and functionalities, this stage also includes identifying and detailing the necessary software and hardware resources for the project.

3. PCB design:

PCB design refers to the process of creating the layout for the Printed Circuit Board, which is a critical component of the project. It's about identifying the circuits, components, and connections on a board.

4. Implementation & coding:

The development of software components related to this project such as the password reset system and an android application shall be covered by implementation and coding. In order for the system to function as it should, this phase brings software and hardware together.

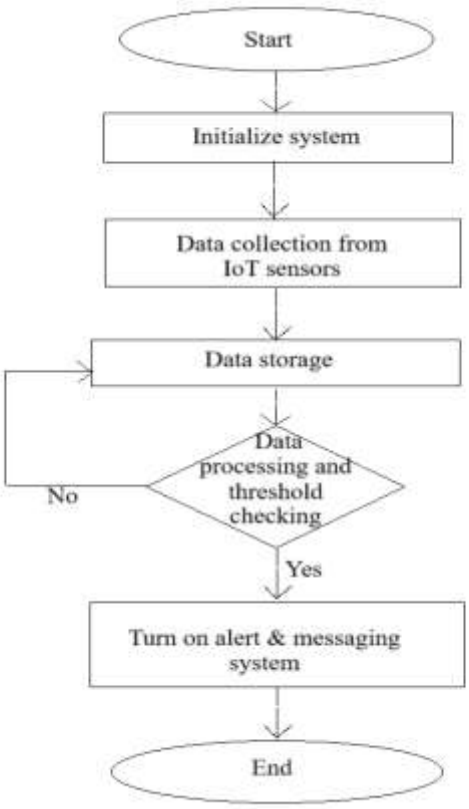
5. Testing:

It is essential that the integrated system's functionality, safety, and reliability are verified in the testing phase. In order to ensure a strong system, entails rigorous testing, issue identification, and resolution.

6. Development and maintenance:

The project will transition to the development and maintenance phase once it has successfully been tested and deployed. This requires continuous monitoring and collection of data, as well as improvements in the context of actual use. It is accompanied by the creation of user documentation and a roadmap for future support and updates.

FLOW CHART:



SYSTEM IMPLEMENTATION:

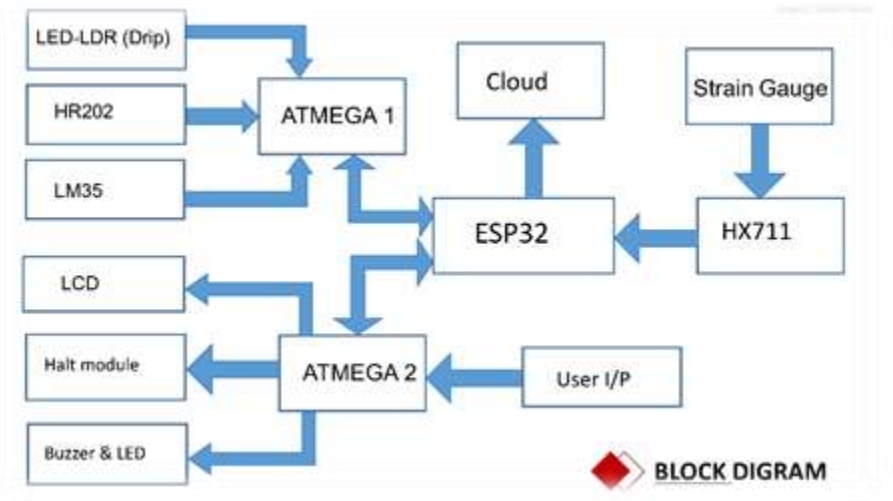


Fig: Block Diagram of the proposed system.

Figure shows the Block Diagram the IoT-Based IV Bag Monitoring Controlling and Alerting System.

Data acquisition: The IV bag's weight is continuously measured by the weight sensor, which transmits the information to the MCU.

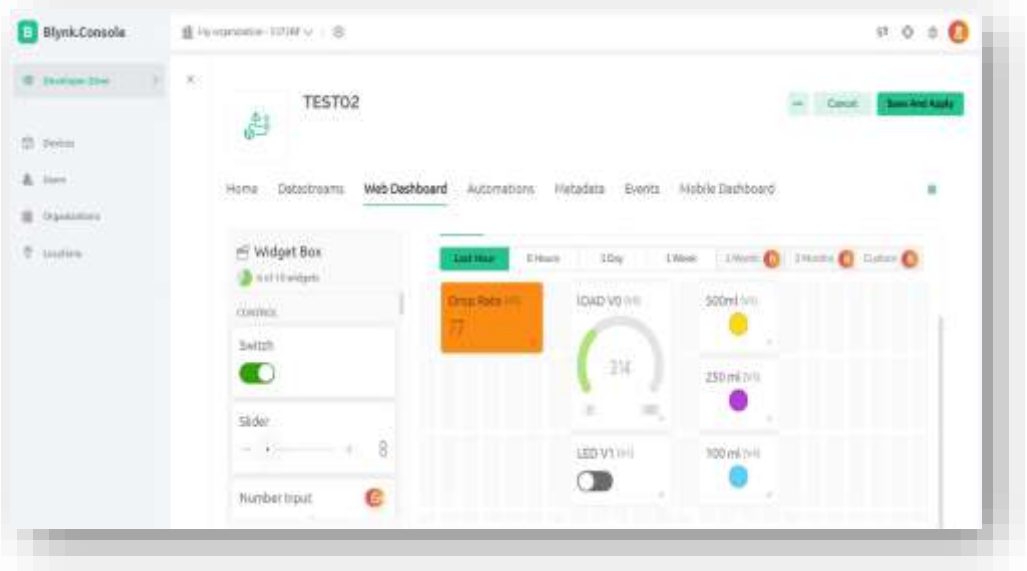
Data processing: Using the weight information and pre-programmed parameters, the MCU determines the remaining fluid volume and infusion rate.

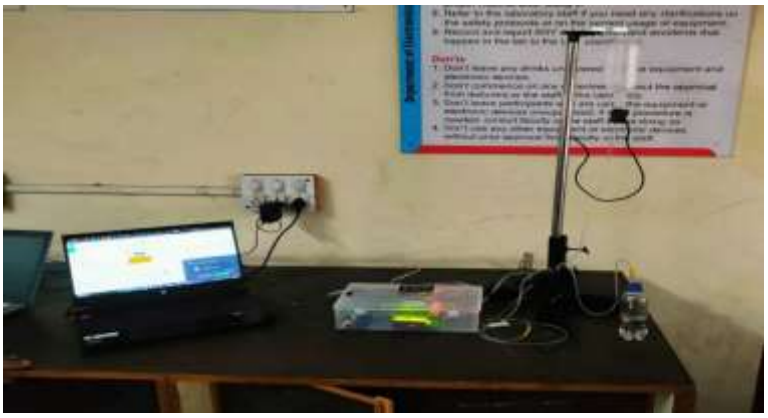
Data Transmission: The MCU sends the processed data to a cloud platform or central server, along with the remaining volume, infusion rate, and any alerts.

Monitoring and Alerting: When predetermined thresholds are exceeded, the central platform or cloud system monitors the received data and sends out notifications. Healthcare providers then receive these warnings through email, SMS, or a special dashboard.

Optional Infusion Rate Control: In certain sophisticated systems, the MCU has the ability to regulate the IV pump in real-time by analyzing data.

RESULT:





Prototype of IoT-Based IV Bag Monitoring Controlling and Alerting System

CONCLUSION:

The IoT-Based IV Bag Monitoring Controlling and Alerting System has been successfully designed and implemented. The system is able to accurately and reliably monitor the IV therapy parameters in real-time and generate alerts if any of the monitored parameters deviate from the prescribed treatment plan. The system is also able to prevent blood backflow into the IV bag. The system has been evaluated in a pilot study and the results have been very promising. The system was found to be very accurate and reliable in monitoring the IV therapy parameters and generating alerts. The system was also found to be easy to use and maintain. The system has the potential to improve patient safety and reduce the workload on healthcare providers. The system can help to ensure that patients receive the correct dosage of IV fluids and that they are alerted if any problems occur. In conclusion, the "IoT-Based IV Bag Monitoring Controlling and Alerting System" system represents a significant advancement in healthcare technology. By harnessing the power of IoT, it has the potential to enhance patient safety, improve the efficiency of healthcare delivery, and ultimately contribute to better health outcomes.

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