IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

IV BAG MONITORING WITH PATIENT MONITORING SYSTEM USING IOT

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ABSTRACT

During recent years, we have seen much technological advancement which help to take better care of patient's health and assure them fast and safe recovery. The most basic item necessary is competent patient care in hospitals, as well as proper management of fluid and electrolytes. In hospital almost all patients, mainly ICU patients, have to regulate the volume of fluids and electrolyte into the bloodstream 24X7 which is done using drip. These drips need regular monitoring or changing to maintain constant flow of fluids or to prevent any infection to patients. Though this system is simple, overcrowded hospitals and the risk of deficiency of nurses can put patients at health risk which can deteriorate patients' health more aggressively or in worse case it can lead to death. Almost in all hospitals, nurses or the hospital staff are responsible for monitoring the drip level. But unfortunately, because of their hectic schedule, the observer may forget to change the bottle at the appropriate time. During the pandemic, hospitals were overrun with patients, and nurses were unable to do manual regular checks on the drip conditions and drip level of every patient, even after working extra shifts. Many patients even died due to not being able to get proper care from nurses. The next step in providing more effective and easy healthcare is to automate such vital procedures. To overcome this critical situation, we are proposing an IoT (Internet of Things) based Drip Monitor System using Arduino UNO which eases the process of measuring and solves the issues of bubble formation in drip

Keywords: ICU patients, Monitor System, deteriorate patients and Internet of Things.

1. INTRODUCTION

This project proposes a method for hospitals to efficiently monitor drip infusion levels. Our proposed system consists of an Ultrasonic sensor to detect the level of fluid and a light sensor to detect any bubble formation in the IV infusion bag. A control mechanism can alert the nurses or doctors if the fluid levels in the IV infusion bag drops down a certain level to prevent air embolism and avoid reverse flow of blood. After that it's up to the nurse if he/she wants to continue or change the IV bag. This project significantly improves the overall efficiency of the hospital personnel. Our main aim of this project is to provide a reliable, cost effective and automatic drip monitoring system which anyone can implement or operate easily without any problem. Since necessary presence or regular monitoring of patients is not required, the proposed method will greatly benefit hospital staff. It also prevents any chance of human error caused due to overflow in the hospital. This idea not only provides an automatic & reliable way to monitor the fluid percentage in patients IV drip but also to detect air bubble formation which causes risk to patient's health.

2. LITERATURE REVIEW

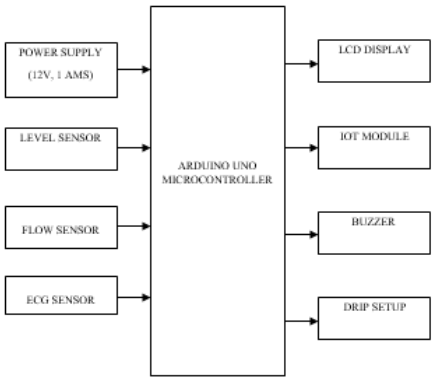
IOT BASED DRIP INFUSION MONITORING SYSTEM

During recent years, we have seen much technological advancement which help to take better care of patient's health and assure them fast and safe recovery. The most basic item necessary is competent patient care in hospitals, as well as proper management of fluid and electrolytes. In hospital almost all patients, mainly ICU patients, have to regulate the volume of fluids and electrolyte into the bloodstream 24X7 which is done using drip. These drips need regular monitoring or changing to maintain constant flow of fluids or to prevent any infection to patients. Though this system is simple, overcrowded hospitals and the risk of deficiency of nurses can put patients at health risk which can deteriorate patients' health more aggressively or in worse case it can lead to death. Almost in all hospitals, nurses or the hospital staff are responsible for monitoring the drip level. But unfortunately, because of their hectic schedule, the observer may forget to change the bottle at the appropriate time. During the pandemic, hospitals were overrun with patients, and nurses were unable to do manual regular checks on the drip conditions and drip level of every patient, even after working extra shifts. Many patients even died due to not being able to get proper care from nurses. The next step in providing more effective and easy healthcare is to automate such vital procedures. To overcome this critical situation, we are proposing an IoT (Internet of Things) based Drip Monitor System using Arduino UNO which eases the process of measuring and solves the issues of bubble formation in drips.

IOT BASED DRIPS MONITORING SYSTEM IN HOSPITALS

Saline, one among the foremost popular intravenous (IV) therapies plays a serious role within the management of patients who are critically ill. Surveillance of saline bottle level is extremely important because when the bottle is emptied and therefore the needle isn't faraway from the vein then the blood flows outward into the bottle. In hospitals, the nurses or caretakers are liable for monitoring the saline bottle level. Mostly, thanks to negligence and any unusual condition, the precise timing of removing the needle from the patient's vein is ignored which causes a significant casualty and should lead to death as well. Furthermore, remote monitoring may be a got 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 mixture of sensor and Internet of Things (IOT) technologies. We have built this system by using load sensor and ultra-low power low cost Arduino micro controller. The load sensor converts the load of the bottle to a selected voltage. The ESP8266 micro controller generates and publishes a specific message based on the voltage received from the sensor. To publish and present the messages to the devices of subscribers like doctors, nurses or caretakers. This proposed monitoring system fulfils the reliable delivery of messages to the subscribers which is very important for healthcare. Automatically, saline bottle valve will be closed with human intervention.

3. BLOCK DIAGRAM



4. WORKING PRINCIPAL

In this proto type project. We propose a method for hospitals to efficiently monitor drip infusion levels to patients using sensor node and IOT technology. Here we implement the level sensor and flow sensor in drip infusion. To monitor the drip level and flow in the infusion. Flow sensor in used to monitor the drip flow. If the drip gets stop the flow due to nerve get blocked or injection may get damaged. So that patient gets some inconvenient (like hand get bulge or some think else). If any think get abnormal means sensor will alert through buzzer and notification will sent through IOT module with help internet. To mqtt app. The level sensor is used to monitor the drug level in the drip bottle. For this process we will set in 3 level (low, medium, high) once the drug 90% below the level of drip bottle it will alert through buzzer and notification will sent through IOT module with help internet to duty nurse or doctors and lcd display is used to display current status to patient and attender who are with patient.

5. HARDWARE REQUIRED

Power supply
Level sensor
Flow sensor
ECG sensor
Arduino microcontroller
LCD display
Buzzer
IOT module
Drip Setup

6. SOFTWARE REQUIRED

Arduino ide
Proteus testing tool
Embedded C

7. INTERNET OF THINGS (IoT)

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure. Experts estimate that the IoT will consist of about 30 billion objects by 2020. It is also estimated that the global market value of IoT will reach $7.1 trillion by 2020.The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities. “Things", in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, cameras streaming live feeds of wild animals in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring, or field operation devices that assist fire fighters in search and rescue operations. Legal scholars suggest regarding "things" as an "inextricable mixture of hardware, software, data and service".

8. CONCLUSION

This study proposes an IoT-based monitoring and control platform for IV infusion setup. The suggested work decreases the amount of time and effort required to monitor the infusion setup and allows for wireless monitoring. It helps in ensuring there is zero margin of error as improper administration of drip can lead to many problems. It also improves clinical efficiency, safety and patient experience in hospitals and makes home care possible for many patients. The use of an ultrasonic sensor simplifies and expedites system implementation because it eliminates the need to calibrate the system for different fluids. LDR is used to detect bubble formation of the fluid which eliminates the risk of arterial air embolism which can cause heart attacks, stroke or respiratory failure. This system may be quickly installed on the stand where the drip bottle is hung, making replacing the bottle simple without having to bother about all the gear.

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