“INTRAVENOUS DRIP AND HEALTH MONITORING WITH ALARM SYSTEM”

Abstract

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 far away 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 care takers.This proposed monitoring system fulfills the reliable delivery of messages to the subscribers which is very important for healthcare. Automatically, saline bottle valve will be closed without human intervention.

Introduction

Internet of Things (IOT) is that the network of physical objects comprising of all the devices, vehicles, buildings and therefore the other items embedded with electronics, software and sensors which enables these objects to collect and exchange data among each other. The Internet of things has evolved thanks to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Whenever a saline is fed to any patient, he/she must be constantly monitored by a nurse or any relatives. Most often due to negligence, inattentiveness, busy schedule and more number of patients, the nurse may forget to change the saline bottle as soon as it is totally consumed. Just after the saline finishes, blood rushes back to the saline bottle due to difference in blood pressure and pressure inside the empty saline bottle. This may cause reverse flow of blood to saline bottle from their vein. These results in the reduction of hemoglobin level of patients and may also lead to shortage of red blood cells (RBC’s) in the patient’s blood causing tiredness.Therefore, there is a need of developing a saline level monitoring system which will reduce the patient’s dependency on the nurses or caretakers to some extent. In this system, Arduino based automatic alerting and indicating device.Load cell output voltage level changes when intravenous fluid level is below certain limit. The saline drops right down to a particular low level then an alarm generated to alert the nurse that the saline fed to the patient is over. The difference of weight is used to sense the amount of saline present in the bottle and alert through sms. If the nurse fails to attend the patient immediately then a motor arrangement is done which suppresses and flattens the saline tube. This prevents the upward flow of saline from the veins to the bottle.

Motivation

IOT enables with electronics, software and sensors which enables these objects to collect and exchange data among each other. The Internet of things has evolved thanks to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Load cell monitors changes when intravenous fluid level is below certain limit. The saline drops right down to a particular low level then an alarm generated to alert the nurse that the saline fed to the patient is over and health monitoring conditions.

Problem Statement

The problem identified is due to negligence, inattentiveness, busy schedule and more number of patients, the nurse may forget to change the saline bottle as soon as it is totally consumed. Just after the saline finishes, blood rushes back to the saline bottle due to difference in blood pressure and pressure inside the empty saline bottle. This may cause reverse flow of blood to saline bottle from their vein. These results in the reduction of hemoglobin level of patients and may also lead to shortage of red blood cells (RBC's) in the patient's blood causing tiredness. Our solution is to detect the fluid level and other health parameters of patient without intervention of nurse to reduce the workload of nurses in hospitals.

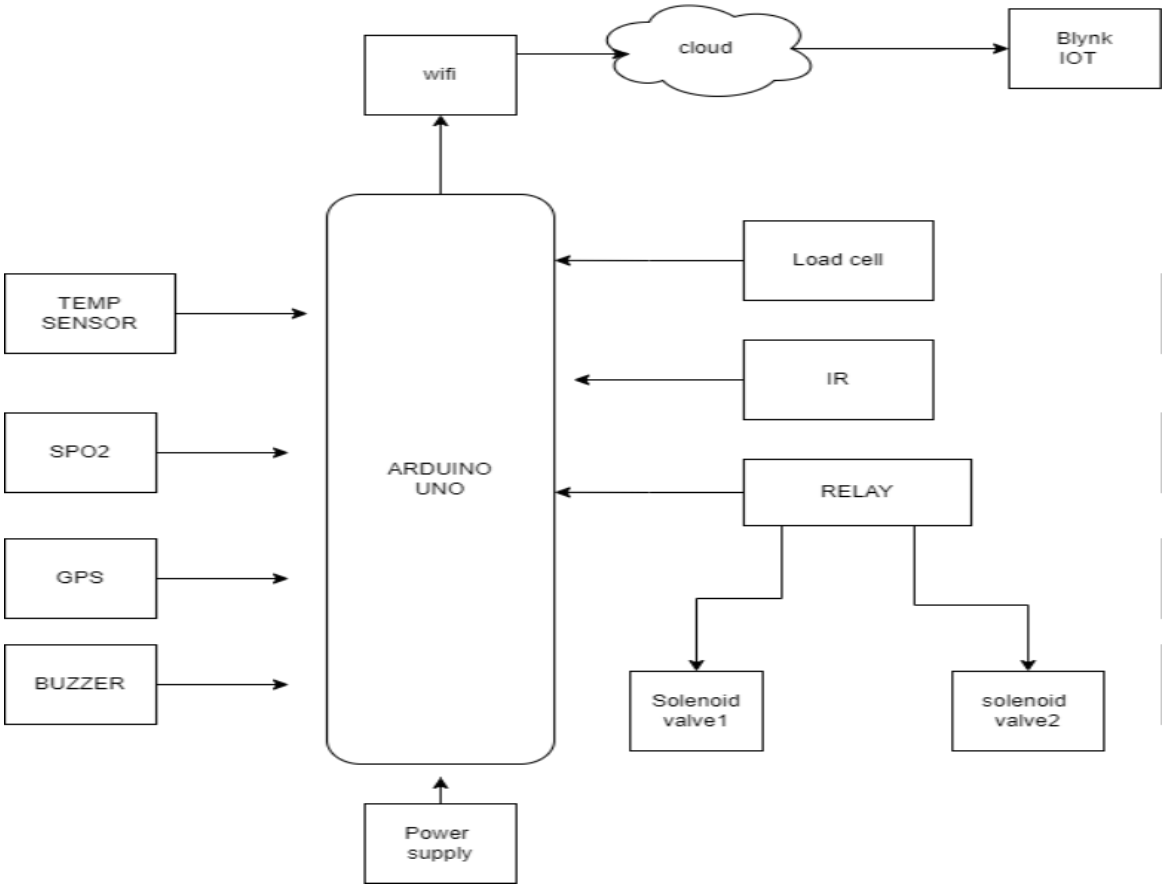
Proposed Solution

As the entire proposed system is automated, it requires very less human intervention. It will be advantageous at night as there will be no such requirement for the nurses to visit patient's bed every time to check the level of saline in the bottle since an alert notification will be sent to the nurses, doctors, caretakers when saline reaches the critical level. It will save the life of the patients. It also proposes the system which can automatically monitor the saline flow by using micro controller. The system also includes patient monitoring system in order to monitor patients heart-beat, oxygen level, temperature saline level monitoring through mobile application. The GPS will locate the exact location of patient hospital details to respective ones, and saline bottles are automatically monitored using weight cell thresholds according to relay system will turn on for refilling of saline bottles. The system is reliable, cost effective and convenient for nurses. It can be reused for the next saline bottle. The system helps nurses to monitor the saline flow from a distance. It is mainly advantageous at night timing as there is no need for nurses to go to patient's bed to check the level of saline in the bottle.

Objectives

- To provide easy access of patient data.
- 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 system with patient health conditions monitoring which includes the mixture of sensor and Internet of Things (IOT) technologies.
- To monitor patients temperature, pulse rate ,oxygen level through iot and create alert in case of risks.
- To provide exact location, GPS module is used for Quick access of patients in case of any risk.
- To create message alerts to the devices of subscribers like doctors, nurses or caretakers.
- To provide continuous monitoring of saline bottles using solenoid valves for inlet of saline .

System Architecture



Hardware and Software Requirements

Hardware Modules:

- Arduino UNO
- Temperature Sensor
- Pulse sensor
- Oxygen level sensor
- Relay
- Solenoid valves
- Load cell
- GPS
- Buzzer

Software Modules:

- Arduino IDE software
- Embedded C/Arduino C programming
- Android App(Blynk App)

Possible Output

The successful system is built for continuous monitoring of patients conditions. Various readings will be taken for better accuracy.The complete kit comprising of various sensors.The entire kit functions properly based on the program in the Arduino UNO. Initially, the sensors were able to read the variations in weight of the saline bottle and monitoring of health parameters like heart beat, oxygen level, temperature.The following will be complete kit comprising of various sensors load cell, GPS module, and a solenoid valve interfaced with Arduino.A smart phone is also used via wifi through ESP8266 module to monitor all the values in a screen which can be recorded for further usages.

Conclusion and Future Enhancement

The future scope can include GSM module to send sms alerts to doctors and guardian of patients. The control system can be the better in time consumption, the system can easily control the hardware by use of any real time systems. An automated drip monitoring system will thus be very much accurate due to 1kg load cell. It will help us monitor patients at regular intervals of time through different alerts. And continuous monitoring of health parameters of each patient will be monitored through iot by doctors through various sensors. It will also keep the nurses free from haste and panics. It is very beneficial and cost effective. Moreover this will never go unnoticed since alert is given to multiple mobile phones via messages ,alerts through iot application.

References

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