

Intravenous Drip Monitoring System

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ABSTRACT

In Medical field, many devices to introduce a drastic change for monitoring the body measures like blood pressure, heart beat rate, diagnosis of heart attack symptoms and much more automatically with interdisciplinary nature. Health care system is becoming more valuable for these days. In this proposed system the IV fluid monitoring system automatically sends a message to the nurse through GSM technology. Our project is aimed to automatically turn off the flow of a liquid from the IV bag by using the solenoid valve. The pulse rate and the blood pressure of the patient is continuously monitored and displayed on the liquid crystal display (LCD). This technology reduces the work of the nurse instead of keep on watching of an IV Fluid system. One of the greatest advantages of our project is the ease interface with users which functionally can be managed by means of mobile application.

Keywords: Blood Pressure, Heart Beat Rate and Diagnosis of Heart Attack Symptoms.

1. INTRODUCTION

India is placed 154 position in healthcare among 195 developing countries in worldwide. According to the National Health Policy 2017 aims to raise public healthcare expenditure to 2.5% of GDP from current 1.4% with more than two-thirds of those resources going towards premier healthcare. It is still the largest employment source and a significant piece of the overall socio-economic development of India. Healthcare is highly central to India's progress. The growth of health facilities has been imbalanced India.

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Automation in healthcare is an emerging field unknown to us. In current era, there is no time for youngsters to concentrate on healthcare as it requires more time and work. In terms of business, it has much profit. By introducing automation, time and stress can be reduced in Nurse/Monitoring person. As we are moving to a future of health care, we have to save person health

There are many disadvantages in the healthcare system like infection control due to assessments of doctor, heart attack due to clot of Air embolism in backflow of blood in intravenous fluid, medication errors due to surgery and clinic respective. This project helps to rectify those problems and hopes youngsters to concentrate on healthcare as it as emerging field which is required for the future.

Intravenous therapy is the infusion of fluid substances directly into a vein. Intravenous simply means "within vein". IV system may be used to correct fluid imbalances, to deliver machines, for blood transfusion or as fluid

replacement to correct. This way is the fastest way to deliver medicines or fluids. Therefore, it is necessary to monitor treatment through IV therapy.

Our project is aimed in automating the intravenous fluid monitoring system using Arduino Uno R3. IV volume and fluid level can be precisely controlled. Also human can contact the system through GSM (Global System for Mobile communication) [1-21]. In IV fluid monitoring system is failed to disconnect the drip system to patient, Air-in line sensor will be activated. All most in all hospitals, assist/nurse is responsible for monitoring the IV fluid level system. But unfortunately, the observer may forget to change or stop the drip bottle at correct time due to their schedule. This may leads to several problems to the patients. Our project is overcome for this critical situation. This technology reduces the work of the observer.



Figure: Intravenous drip monitoring system

The user can communicate with the system through SMS (Short Message Service) which will be received by the GSM with the help the SIM (Subscriber Identification Module) card. The GSM sends this data to Uno which is also continuously receives the data from sensors in some form of codes [22-28]. After processing, Arduino Uno R3 gives the signal to the actuator which can allows volume of fluid to the required health automatically this data is displayed on the LCD (Liquid Crystal Display). Blood Pressure sensor, Heart beat sensor and Temperature sensor are interface to the Arduino Uno R3. The sensor signals will displayed on the LCD. GSM checks all the conditions and gives a detailed feedback to the user periodically. Intravenous drip system represents the fig 1.1

System is developed by using Arduino Uno R3, GSM module, sensors and actuators. It can receive and send messages through GSM module. Input parameters are fluid level sensors. Output parameters are Blood Pressure sensor, Heart beat sensor and Temperature sensor is displayed on the display. GSM can send and receive messages at a periodic time.

This is a rapid growth in healthcare system for past few years. Our project has two modes as auto mode and manual mode. This helps to automate the healthcare system completely and sends the periodical report through GSM. Generally, it works automatically in auto mode when GSM receives a signal it changes to manual mode. Output can be controlled for various combinations of inputs by Arduino Uno R3. Controller is receiving the data from sensors continuously and gives the signal to the program. After processing, this data is displayed on the LCD. This system can also send the details of the field to the human as SMS through GSM. According to the type of healthcare systems, this technology can be modified.

2. OBJECTIVE OF THE PROJECT

The main objective of our system is to develop the Intravenous drip monitoring system by using Arduino controller. This project organizes:

- To achieve a low cost and safety healthcare in Intravenous drip system.
- To monitoring the fluid level by the sensor.
- To provide Ease of accessibility for observer/ Nurse.
- To ensure safety and health conditions by IV drip monitoring system.
- Temperature sensor helps to detect the patient conditions exactly.
- Heartbeat sensor helps to detect the pulse rate of patient.

3. EXISTING SYSTEM

In the existing system the level sensor is used to check the fluid level of IV system the sensed level of the fluid is converted into electric signal and send it to the microcontroller. If the set point is crossed, the buzzer alerts the patient ward so that the IV bag can be replaced or removed on time. Also, the pressure sensor detects air embolisms/blood clots in the catheter. AS a result the clot/embolism can be stopped from the patients vein. This in turn reduces several risks like cardiac arrest, etc.

The IV monitoring equipment consist of two sensors, one pressure sensor and one ultrasonic level sensor .The pressure sensor, placed just before the y injection site senses a pressure change create due to an air embolism. This signal is then sent to the controller present in the monitoring station. Based on the detection of embolism, an alarm is activates at the monitoring station for immediate action. The second input to the controller is the signal from the ultrasonic level sensor. It senses the level in the IV bag at regular intervals and sets off an alarm when the set point is reached. The monitoring station is alerted based on the signals of these two sensors.

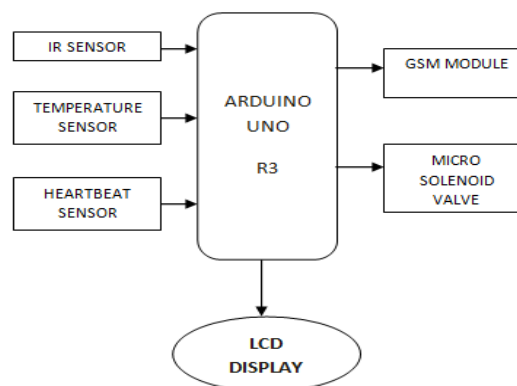
4. PROPOSED SYSTEM

Intravenous therapy is a medical procedure in which the liquid substances (medications) are directly entered into the vein through an IV tube and needle is inserted into the patients' vein. Now days, many automatic health monitoring devices are developed to ensure patients safety and to reduce the stress of the doctors. These sterile solutions (sodium and dextrose) containing necessary nutrients to support the human life which is injected into the patient's body through a tube attached to the needle. Due to lack of caring, many problems will arise such as blood loss, backflow of blood through an IV tube. To overcome this situation, our proposed system to develop the IV fluid monitoring system automatically sends a message to the nurse through GSM technology and automatically turned off the flow of a liquid from the IV system by using the solenoid valves.



Figure: Intravenous therapy

The pulse rate, temperature and the blood pressure of the patient is continuously monitored and displayed on the liquid crystal display (LCD). According to the pulse and blood pressure of the patient the flow of IV fluid is increases and decreases vice versa. This technology reduces the work of the nurse instead of keep on watching of an IV fluid bag. In the IV fluid system crossed the set point of the Arduino Uno R3, assist/nurse can get the alert through SMS which will be received by the GSM module with the help of the SIM card.



5. BLOCK DIAGRAM OF PROPOSED SYSTEM

The sensor sends a signal to the Arduino Uno R3. After processing, Uno sends the SMS to nurse station by GSM and gives the signal to the actuator which also automatically stop the flow of a fluid.

Project Definition

Nowadays, people have smart phone with them all the time so it makes sense to use these to control automation in healthcare system. An Automation system is been developed to control the electrical or mechanical appliances and the notice board digitally. Presented here is an automated device in which we can get a status of intravenous fluid system. So you need not get up to switch off the device while you are under important schedule. so that the IV bag can be replaced or removed on time. Also, the pressure sensor detects air embolisms/blood clots in the catheter. The automation circuit is built around the **Arduino Uno R3**. In the existing system the level sensor is used to check the fluid level of IV system the sensed level of the fluid is converted into electric signal and send it to the microcontroller. If the set point is crossed, the buzzer alerts the patient ward e stopped from the patient's vein. To overcome this situation, our proposed system to develop the IV fluid monitoring system automatically sends a message to the nurse through GSM technology and automatically turned off the flow of a liquid from the IV system by using the solenoid valves.

Working principle

The automation circuit is built around the **Arduino Uno R3**. The pulse rate, temperature and the liquid level of the patient is continuously monitored and displayed on the liquid crystal display (LCD). According to the pulse and blood pressure of the patient the flow of IV fluid is increases and decreases vice versa. This technology reduces the work of the nurse instead of keep on watching of an IV fluid bag. In the IV fluid system crossed the set point of the Arduino Uno R3, assist/nurse can get the alert through SMS which will be received by the GSM module with the help of the SIM card.

Typical functions are

- Automatic mode
- GSM control for healthcare system
- Flow control off by solenoid valve
- Display the patient conditions

Automatic modes

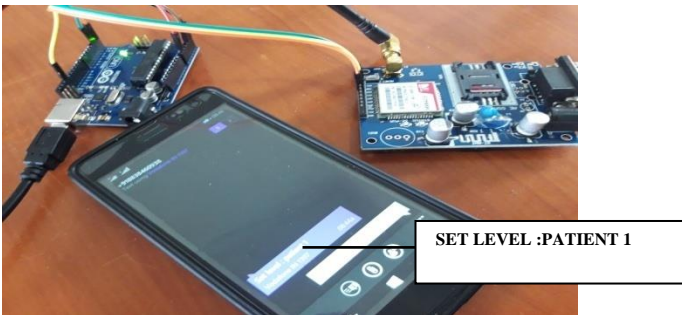
The automatic control mode which is consists of GSM mode and flow control mode by which the user can important schedule. The mode selector which helps to nurse with alarm mode for set point value, for controlling the appliances and digital notice board.

GSM control for healthcare system

This module use the control of both the electrical appliances and the digital notice board in which the controller send the SMS, they were reached the predefined set value.



(i) At normal mode of GSM module



(ii) At set level of GSM module

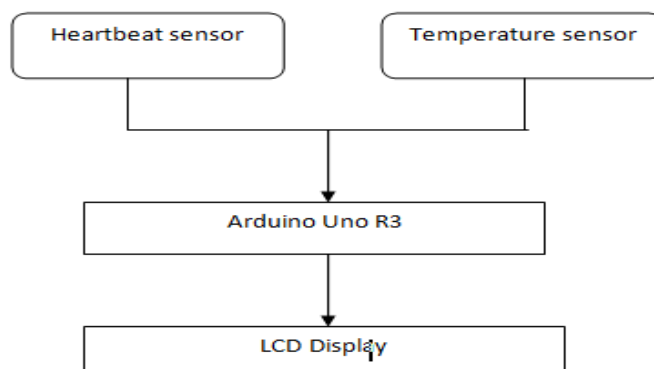
The SMS received by the nurse/assist number. GSM module is interface with the arduino controller with the above following conditions through program

Flow control OFF by solenoid valve

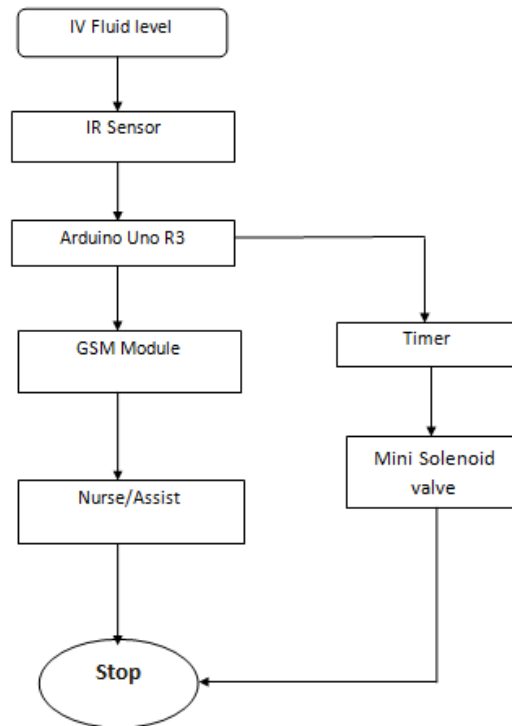
The solenoid valve is used to cut off the fluid drip system. In health care system the observer/nurse can important schedule to do not monitor the fluid system. They were cut off a fluid through the instruction of build program in Arduino Uno R3.

Display the patient condition

The heartbeat rate, temperature and liquid level of the patient is continuously monitored and displayed on the LCD. They were automatically displays the following conditions through a controller.



6. DATA FLOW DIAGRAM



7. RESULT

This automation system with GSM and solenoid system is developed for the healthcare system of the human beings. The control system can be the better in time consumption, the system can easily control the hardware by use the arduino controller. This project provides the advantages for nurse/assists in healthcare system and control of notice board generally.

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