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IV DRIPS AND HEALTH MONITORING SYSTEM

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Abstract: Hospital saline bottle monitoring is part of this project's activity. The Arduino AT Mega 328, load cell, HX711 amplifier, LED, and GSM are all compromised in this framework. Section. This project will employ a load cell and amplifier to convert weight to voltage in order to measure the remaining saline bottle, taking into account the challenges faced by the patients and nurses in finishing the saline (drips) bottle. Three times a day, using LED bulbs in the patients' rooms and through calls and messages to every nurse on duty, indications and alerts will be given to the nurses for their comfort.

Index Terms **-** Arduino, Internet of Things, GSM Sim 800a,Saline monitoring

I. INTRODUCTION

The key to happiness and well-being for humans is improved health. The foundation for ensuring that happiness is patient safety, which is the absence of harm to the patient that might have been avoided while receiving medical attention. There is some degree of risk or uncertainty at every stage of the caregiving process. It is the intelligence that needs to be carefully ingrained to avoid needless risk when monitoring. There is a proportional rise in mortality with population growth. Saline intravenous fluids (IVs) are used by doctors to heal wounds, provide medication, and keep patients alive during various treatments or surgeries. These days, technology is constantly evolving across all industries, producing amazing tools and resources that improve, expedite, and ease our lives. Everyone is pursuing a digital transformation these days. .. Naturally, the services provided by the healthcare industries will also undergo a significant transformation. as a result of which the manner in which patients are served will shortly to alter, and the results will be heavily focused on the end product. An improperly monitored IV might potentially lead to blood reflow after it is empty, posing a risk to the patient.

1.1 Automatic Drip Monitoring Is Necessary

Therefore, the implementation of automatic saline monitoring systems in hospitals becomes necessary. Automated salinity monitoring is necessary.

1. Patient data accessibility.
2. Makes it possible to provide patients with care of a higher caliber.
3. Stops blood from flowing backward into the IV tube.

II. LITERATURE SURVEY

I) In smart drip infusion monitoring system, uses trickle implantation observing framework for use in hospitals. The framework comprises of adrip infusion, sugar level observing gadgets and a monitoring screen. The mixture observing gadget utilizing a pressure sensor (MPX10GP) technology module can identify the trickle implantation rate and a vacant imbuement arrangement sack, and after that, this information is sent to the monitoring screen put at the medical caretaker's station by means of the radio frequency (nrf24L01). The monitoring screen gets the information from trickle implantation observing gadgets and after that shows graphically them. When pressure sensor value reaches the threshold value, control valve will close which stops immediately flow of fluid without any air flowing patient's vein. This system may not be accurate because some medicines might also be injected to saline bottle which may cause variation in pressure.

II) Current health care organization requires manual caretakers and their heavy duties become a social problem in the modern world which is an extremely time-consuming job. We are proposing a system in which remote drip infusion monitoring and control system has been developed for hospitals. The system contains numerous Infusion monitoring devices, control system, and a central monitor. The infusion monitoring device using an IR sensor which can detect or sense the drip infusion rate(drops per minute), remaining time, an empty infusion solution bag at particular critical set level and also show remaining infusion capacity displayed on central monitor and this information will be sent wirelessly to the crucial or central monitor placed at the nurse's control room and also from central monitor, nurses can control the drip infusion rate. The central monitor receives the data from several infusion monitoring or supervising devices and then displays all the information tabular form to the host PC. The proposed system eliminates continuous on vision/sight monitoring of the patient by nurses. But this system might also go unnoticed by the nurses if they are absent in the place where the central monitor is fit.

III) In Automatic low cost saline monitoring system, it mainly focuses on providing advanced saline level monitoring system. The idea is to provide cost effective, reliable and automatic saline flow monitoring system which can be easily implemented in any hospital and can be easy for doctors as well as nurses to monitor the saline flow from a distance. The proposed system eliminates continuous on sight monitoring of patient by nurses or doctors. Due to the use of microcontroller ATMEGA 328, wireless module CC2500, Bluetooth module and IR sensors. The drawback of this system is that, IR sensors are very much sensitive to obstacles that may appear on their way and Bluetooth module will have a low range communication.

III. PROBLEM STATEMENT

3.1 Existing System

The current IV drip monitoring system usually consists of a mix of human observation and sporadic inspections by medical personnel. Setting up the IV drip, determining the infusion rate depending on the patient's condition and recommended therapy, and routinely checking the drip chamber to guarantee appropriate flow are all the responsibilities of nurses or other qualified staff. They might also keep an eye out for any indications of difficulties or unfavorable responses while the patient is receiving the infusion. This method is not without flaws, though, as it is highly dependent on human inspection and is therefore prone to mistakes or oversights. Furthermore, there may be gaps in surveillance due to variations in monitoring frequency based on other priorities and the workload of healthcare personnel. As a result, there is a growing recognition of the need for more sophisticated and automated monitoring solutions to enhance the safety and efficacy of IV therapy. These advancements may include the integration of smart infusion pumps equipped with advanced sensors and algorithms for real-time monitoring, as well as the implementation of electronic health records systems to track infusion parameters and alert healthcare providers to any deviations from the prescribed protocol. By leveraging technology to augment existing monitoring practices, healthcare facilities can mitigate risks associated with IV therapy and improve patient outcomes.

3.2 Proposed System

The Arduino AT Mega 328, GSM module sim 800a, 1 kg load cell, and HX711 amplifier are the main components of this system. The load cell amplifier and a load cell will be mounted on the saline stand. HX711. To measure the weight of the saline bottle, it will be hung in the middle of the load cell. The patient's room will have an Arduino Uno. When the bottle is filled to 40% with saline, the Arduino will turn on and light an LED lamp at the front of the patient's room that is red to signal an emergency. Anyone walking by the room will be able to recognize the situation and alert the nurses in this way. Afterwards, Arduino will notify GSM Sim 800a, which is used to send a message to all of the on-duty nurses' mobile phones alerting them to the need to replace the saline bottle, when the saline level reaches 20%. As a result, the nurses will have more time to replace the bottle appropriately. When the saline level falls below 10% and requires urgent consideration, nurses and doctors will receive a call alert as the last word.

IV. METHODOLOGY

Interfacing weight and flow sensor with Arduino. HX711 will calculate the initial amount of glucose weight. Flow sensor will record the flow of bottle. When the flow reaches certain threshold value, solenoid valve will stop the flow. In turn, buzzer also will be alarmed and status will be updated in application . The IOT device collects data from the subject body and IV bag through the sensors and transmit data along Bluetooth to the application. The application is where all the data can be monitored and analysed at real time using the Mobile app. The fluid level is detected by load sensor. If the fluid level goes to an empty state it will give alert to the nurse Mobile Application. This application serves as a comprehensive platform for monitoring, analyzing, and managing patient data in real-time. Additionally, the system incorporates a fluid level detection feature using the load sensor, which promptly alerts the nurse through the mobile application in the event of an empty IV bag, ensuring timely intervention and uninterrupted patient care.

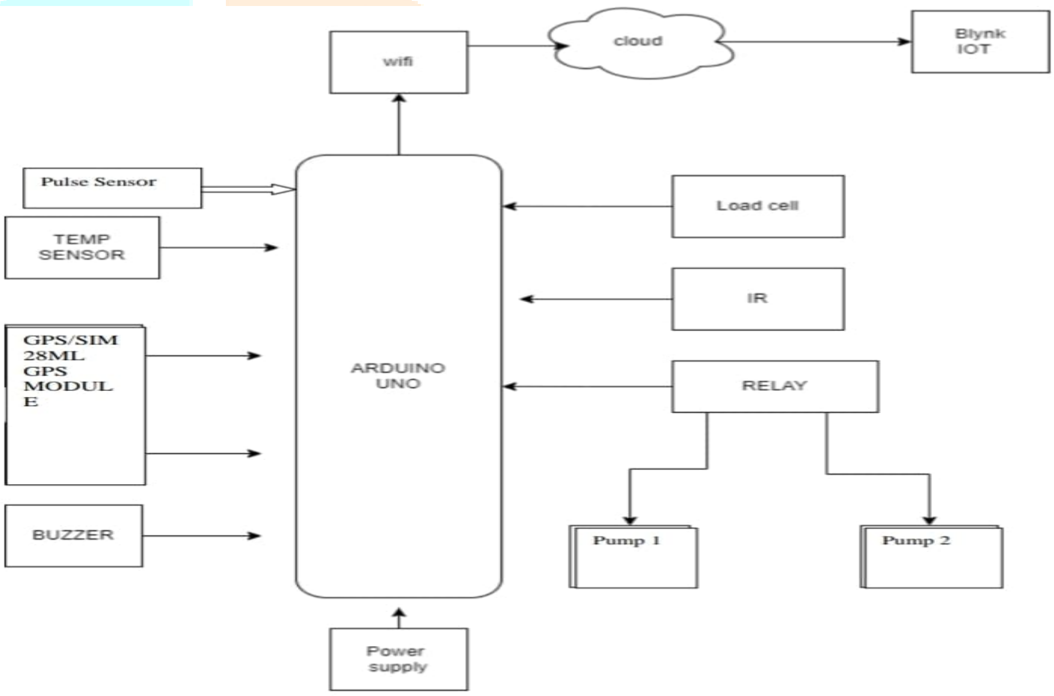


Fig : Block Diagram

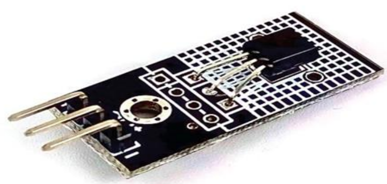
V. COMPONENTS

1.ARDUINO UNO : Arduino is a tool for controlling Electronics. Arduino is a Microcontroller based open source electronic prototyping board which can be programmed with an easy to use Arduino IDE.As any computer it has Internal CPU, RAM , Io's Interface. Arduino consists of both physical programmable circuit board and a piece of software or IDE.T he Uno is one of the more popular boards in the Arduino family and a great choice for beginners. Famous Micro-controllers manufacturers are Microchip, Atmel, Intel , Analog Devices and more etc. It can Communicate with a computer via serial connection over USB.

2.LOAD CELL: The HX711 Dual-Channel 24 Bit Precision A/D weight Pressure Sensor is a Load Cell Amplifier breakout board; for the HX711 IC that allows you to easily read load cells to measure weight. By connecting the module to your microcontroller you will be able to read the changes in the resistance of the load cell; and with some calibration. You'll be able to get very accurate weight measurements. This can be handy for creating your own industrial scale, process control, or simple presence detection. The HX711 Weighing Sensor uses a two-wire interface (Clock and Data) for communication. Any microcontroller's GPIO pins should work and numerous libraries have been written making it easy to read data from the HX711.

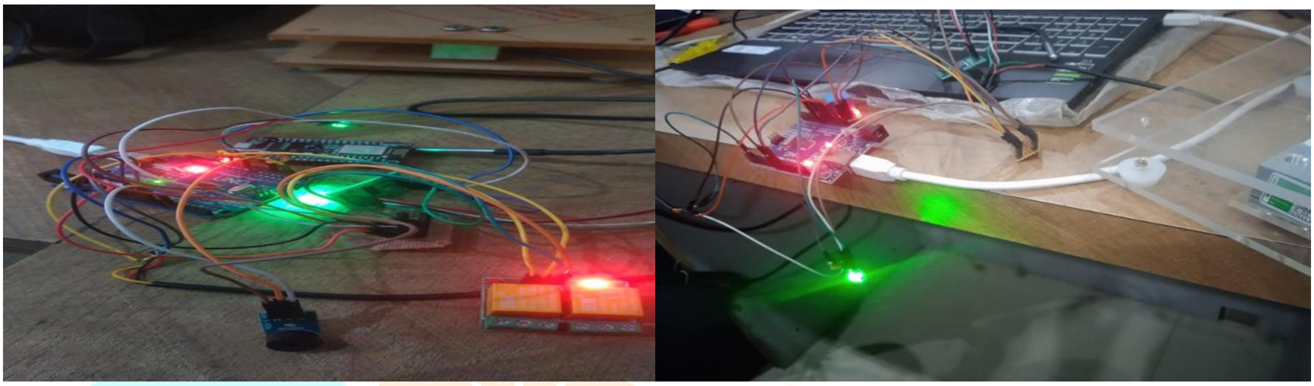
3.PULSE SENSOR : An alternate name of this sensor is heartbeat sensor or heart rate sensor. The working of this sensor can be done by connecting it from the fingertip or human ear to Arduino board. So that heart rate can be easily calculated. Integrating a pulse sensor into the system adds another layer of patient monitoring and safety. The pulse sensor, interfaced with the Arduino, continuously measures the patient's heart rate and provides real-time data on cardiovascular health. This vital information enhances the overall assessment of the patient's condition, allowing healthcare providers to promptly identify any abnormalities or distress

4.TEMPERATURE SENSOR: A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. There are many different types of temperature sensors. Some temperature sensors require direct contact with the physical object that is being monitored (contact temperature sensors), while others indirectly measure the temperature of an object (non-contact temperature sensors).



VI. RESULT

The smart saline level monitoring device aims to prevent accidents and potential fatalities resulting from the negligence or oversight of caretakers in managing saline administration. The automatic closure of the saline bottle valve without human intervention can significantly enhance patient safety. 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.



VII. CONCLUSION

Because of the load cell, an automatic drip monitoring system will consequently be quite accurate. With various notifications, it will assist us in keeping an eye on patients at regular intervals. Additionally, doctors will use a variety of sensors to continuously monitor each patient's health indicators using IoT. Additionally, it will prevent panic and hurry in the nurses. It is both incredibly economical and advantageous. Furthermore, since notifications are sent to numerous mobile phones via SMS and iot applications, this will never go ignored. The IV therapy parameters can be precisely and consistently monitored by the system in real-time, and it can produce alarms in the event that any of the monitored parameters diverge from the recommended course of treatment. The IV therapy parameters can be precisely and consistently monitored by the system in real-time, and it can produce alarms in the event that any of the monitored parameters diverge from the recommended course of treatment. Additionally, blood backflow into the IV bag can be avoided by the device. A pilot study was conducted to examine the technology, and the findings were quite encouraging. It was discovered that the system, which monitors the IV therapy parameters and generates alarms, is incredibly accurate and dependable. It was also shown that the system was simple to maintain and operate. Both patient safety and the amount of work that healthcare providers have to do could be enhanced by the system.

VIII. REFERENCES

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