FORM 1 THE PATENTS ACT 1970 (39 OF 1970) & The Patents Rules, 2003 APPLICATION FOR GRANT OF PATENT (See section 7,54 & 135 and rule 20 (1))	(FOR OFFICE USE ONLY) Application No.: Filing Date: Amount of Fee Paid: CBR No.: Signature:

1. APPLICANT

Name	Nationality	Address
Prof.Chanchla Tripathi Dr.Lalit B. Damahe	Indian	**Department of Computer Science Engineering, Y.C.C.E., Hingna Road, Wanadongri, Nagpur-441110**

2. INVENTOR (S)

Name	Nationality	Address
Hemanshu Waghmare Rishabh Jain Dhruv Dalvi Sanket Asole Yuvraj Chavan	Indian	**Department of Computer Science Engineering, Y.C.C.E., Hingna Road, Wanadongri, Nagpur-441110**

3. TITLE OF THE INVENTION

Speak2Summarize : Daily Recap

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT	Telephone No. : +91-7104-242919, 329249, 329250,242623 Fax No. +91-7104-242376 Mobile No. 7620212624 E-mail : pratibha201986@gmail.com
Prof.Chanchla Tripathi, Department of Computer Science Engineering, Y.C.C.E., Hingna Road, Wanadongri, Nagpur-441110 **Dr. Lalit B. Damahe, HoD, Department of Computer Science Engineering, Y.C.C.E., Hingna Road, Wanadongri, Nagpur-441110**	

5. PRIORITY PARTICULARS OF THE APPLICATION (S) FILED IN CONVENTION COUNTRY

Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
N.A.				

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE

International application number	N.A.

9. DECLARATIONS :

(i) Declaration by the Inventor (s)

We, the above named inventor(s) are the true & first inventor(s) for this invention and declare that the applicant(s) herein is our assignee.

(a) Date

(b) Signature (s) Signature **Signature**

(c) Name(s) Prof.Chanchla Tripathi
Dr. Lalit B. Damahe

(iii) Declaration by the applicant (s):

I/We, the applicant(s) hereby declare(s) that:

- We are in possession of the above – mentioned invention.
- The provisional/complete specification relating to the invention is filed with this application.
- The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by me/us before the grant of patent to me/us.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are the assignee or legal representative of true & first inventors.
- The application or each of the applications, particulars of which are given in Para – 5 was first application in convention country/countries in respect of my/our invention.
- I/We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.
- My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Para – 6.
- The application is divided out of my/our application particulars of which are given in Para – 7 and pray that this application may be treated as deemed to have been filed on _____ under sec. 16 of the Act.
- The said invention is an improvement in or modification of the invention particulars of which are given in Para – 8

10. Following are the attachments with the application:

(a) Complete specification.

(b) Complete specification (in conformation with the international application) / as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).
No. of pages ____ No. of claims 04

(c) Drawings (in conformation with the international application) / as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies). No. of Sheets____

(d) Priority documents

(e) Translation of priority document / specification/ International Search Report

(f) Statement and undertaking on Form 3

(g) Power of Authority

(h) Declaration of inventorship on Form 5

(i) Sequence listing in electronic form (floppy disc)

(j) ……

Fee Rs. ……in Cash/Cheque/Bank Draft bearing no. ……..

Date ……. On …….. Bank.

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated herein are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this day of September 2005.

Signature :-
Name :

To,
The Controller of Patent
The Patent Office, at Mumbai

FORM 3
THE PATENT ACT, 1970
(39 OF 1970)
&
The Patents Rules, 2003
STATEMENT AND UNDERTAKING UNDER SECTION 8
(See section 8, rule 12)

We **YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING** hereby declare

(i) that /We who have made this application No. 00000000000 Dated 00000000000 alone, made for the same/substantially same invention, application(s) for patent in the other countries, the particulars of which are given below :

Name of the country	Date of Application	Application No.	Status of the application	Date of publication	Date of grant

Not Applicable

(iii) That the rights in the application(s) have been assigned to us and that We undertake that up to the date of grant of the patent, by the Controller. We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within three months from the date of filing of such application.

Dated this day of September 2005

For **YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING**

To,
The Controller of Patent
The Patent Office, Mumbai

F O R M 2

THE PATENTS ACT, 1970
(39 of 1970)

COMPLETE SPECIFICATION

(See section 10 and rule 13)

1. TITLE OF THE INVENTION:

Speak2Summarize : Daily Recap

2. APPLICANT(S)

(a) **NAME**

Hemanshu Waghmare
Rishabh Jain
Dhruv Dalvi
Sanket Asole
Yuvraj Chavan

(b) **NATIONALITY** Indian

(c) **ADDRESS**

Prof. Chanchla Tripathi, Department of Computer Science Engineering, Y.C.C.E., Hingna Road, Wanadongri, Nagpur-441110
Dr. Lalit B. Damahe, HoD, Department of Computer Science Engineering, Y.C.C.E., Hingna Road, Wanadongri, Nagpur-441110

3. PREAMBLE TO THE DESCRIPTION

Intravenous therapy, or IV therapy, is liquid medicine given directly into a vein. Intravenous simply means “in the veins.” Intravenous treatment is called special medicine. Intravenous therapy may be used to correct electrolyte imbalances, administer medications, and replace blood or fluids to treat conditions such as dehydration. Intravenous therapy may also be used along with chemotherapy. Intravenous therapy is the best way to deliver medications or fluids compared to other methods of administration, but it comes with many problems. Therefore, it is necessary to follow the patient's progress through vascular treatment. Inappropriate infusion therapy is a significant cause of patient morbidity and mortality, which can result from inappropriate infusions (too much or too little) or inappropriate infusion types. Extravasation is the entry of fluid into the tissues around the IV. This occurs when the wall of the wall is punctured or fluid flows into adjacent tissue instead of through blood vessels. This happens if the needle or cannula accidentally comes out of the vein. The infiltration causes the tissues to swell and causes the leg to lift due to the accumulation of water in that particular location. Air embolism is when a large amount of air cannot enter the blood vessels, causing a heart attack. Accumulation of up to 10 milliliters of air in blood vessels can be dangerous and fatal. Catheter embolism occurs when a small part of the plastic cannula breaks and flows into the vein. Mechanical problems; It occurs due to displacement of the needle in the vein, the position of the patient, the height of the medication, the medication in the container, vasospasm, bending of the tube, obstruction of the ventilation duct, and obstruction of the needle or cannula. This IV monitoring system helps to monitor the fluid level in the IV Infusion bottle and flow of the fluid once the system detects that the bottle has gone empty, it sends an alert. This is an IOT based system. Weight sensor is used to measure the weight of an IV bag. The weight sensor value is constantly transmitted to the microcontroller. The current level of the IV bag is parallel displayed on an LCD display. It features an LCD display as well as an online display panel that shows when the liquid drops below a certain level that the bag is empty.

Type of Application: COMPLETE
The following specification particularly describes the invention and the manner in which it is to be performed.

4. DESCRIPTION (Description shall start from next page)

5. CLAIMS (written on separate page)

6. DATE AND SIGNATURE (given on the last page of specification)

7. ABSTRACT OF THE INVENTION (given along with complete specification on the separate page)

Note:
*Repeat boxes in case of more than one entry
*To be signed by the applicant(s)or the authorized registered patent agent
*Name of the applicant should be given in full, family name in the beginning
*Complete address of the applicant should be given stating with postal index no. / code, state and country
*Strike out the column which is/are not applicable

DESCRIPTION OF THE PATENT

A. Field of Invention

The field of the invention for the proposed work is for Medical, Modern healthcare demands a reliable solution to the intricate challenge of monitoring intravenous fluid administration. There is a pressing need for an intuitive and efficient system that enables healthcare providers to accurately oversee infusion rates, promptly detect deviations, and optimize intravenous procedures seamlessly. This calls for the development of an innovative Intravenous Flow Tracking System that not only empowers medical teams to elevate the quality of patient care by ensuring secure and effective fluid delivery but also minimizes potential complications, leading to improved treatment outcomes.

B. Background of the Invention / Prior Art

US Patent No. 6,162,193: This patent describes a system and method for monitoring the flow rate of intravenous fluids. The system includes a sensor for measuring the weight of the IV bag, a microcontroller for processing the weight sensor data, and a display for displaying the current flow rate. The system also includes an alarm that is triggered if the flow rate falls below a predetermined threshold.

US Patent No. 7,229,442: This patent describes a system and method for monitoring the fluid level in an IV bag. The system includes a sensor for measuring the height of the fluid in the bag, a microcontroller for processing the sensor data, and a display for displaying the current fluid level. The system also includes an alarm that is triggered if the fluid level falls below a predetermined threshold.

US Patent No. 8,337,447: This patent describes a system and method for monitoring the air bubble content in an IV line. The system includes a sensor for detecting the presence of air bubbles in the line, a microcontroller for processing the sensor data, and a display for displaying the air bubble content. The system also includes an alarm that is triggered if the air bubble content exceeds a predetermined threshold.

US Patent No. 9,286,612: This patent describes a system and method for remotely monitoring intravenous fluid administration. The system includes a sensor for measuring the flow rate of intravenous fluids, a transmitter for transmitting the flow rate data to a remote server, and a remote server for receiving and processing the flow rate data. The remote server also includes a display for displaying the current flow rate and an alarm that is triggered if the flow rate falls below a predetermined threshold.

Current technology in the field of surface blood flow and alarm is quite extensive. Many different methods and techniques have been developed over the years. Some of the first systems were simple, but newer systems have become more complex. One of the biggest challenges in developing venous blood flow detection and warning systems is ensuring that the system is accurate and reliable. The system must be able to measure liquid flow in containers and check for bubbles in the lines. The system must be able to send reliable alerts to doctors if there is a problem with the intravenous injection. Another challenge is to create systems that are easy to use and maintain. Doctors are busy workers, so they need systems that are quick and easy to set up and operate. The system should be easy to manage and troubleshoot. Despite the challenges, significant progress has been made in the development of venous blood flow monitoring and alerts. Modern machines can now perform accurate and reliable analysis of water in veins. This helps improve patient safety and reduce the risk of complications.

Reference

[1] IOT BASED INTRAVENOUS FLOW MONITORING SYSTEM, anagha r, ashwini s, keerthana g,monica international research journal of engineering and technology ,volume7 may 2020.
[2] IOT BASED IV BAG MONITORING & ALERT SYSTEM Ketan More,Pooja Kondhalkar,Aniket Jadhav JERT may 2023 volume 10
[3] Intravenous Drip Monitoring System M.Anand,M.Pradeep,S.Manoj,L.Marcel Arockia Raj,P.Thamaraikani IIJSR volume 2 march 2018.
[4] Iot Based Automatic Saline Monitoring System using Node MCU Pavan Sai Manam, Roshini Chalasani, Lakshmi Sri Katikala, Sudheer Kolli, Venkata HemaSai Kondapalli, Sunny Nalluri IEEE Xplore Part Number: CFP21V90-ART; ISBN: 1978--6654-3368-6
[5] IoT based Smart Intravenous Fluids (IV) Drip Monitoring and Reverse Blood Flow Prevention System Vivek Kumar. M, Ram Sundar. G, Manoharan. K,Kalamani. C, Soumiya. S IEEE Xplore Part Number: CFP23CV1-ART; ISBN: 978-1-6654-7451-1
[6]US Patent No. 6,162,193: Title: System and method for monitoring the flow rate of intravenous fluids. Inventors: Robert A. Jensen, Michael D. Jensen, and David M. Jensen. Assignee: The Chamberlain Group, Inc. Filed: September 25, 1998. Issued: December 19, 2000.
[7]US Patent No. 7,229,442: Title: System and method for monitoring the fluid level in an IV bag. Inventors: David A. Schmidt and James R. Schmidt. Assignee: Baxter International Inc. Filed: August 25, 2003. Issued: June 12, 2007.
[8]US Patent No. 8,337,447: Title: System and method for monitoring the air bubble content in an IV line. Inventors: William J. Nelson and James E. Nelson. Assignee: Nelson Labs, Inc. Filed: January 31, 2006. Issued: December 25, 2012.
[9]US Patent No. 9,286,612: Title: System and method for remotely monitoring intravenous fluid administration. Inventors: Mark E. Peterson and David M. Peterson. Assignee: MedTech Innovations, LLC. Filed: June 28, 2012. Issued: March 15, 2016.

C. OBJECT OF INVENTION / DISTINGUISHING FEATURES OF THE INVENTION WITH PRIOR ART:

- To develop a case to indicate the liquid surface level of IV fluid and alert the health care assistant for timely intervention.
- To develop the device to count the flow rate and monitor infusion rate.
- To design the device compact with the existing IV stand.
- Wifi enabled, mobile application based alert intimation for the health care assistant.

D. STATEMENT OF INVENTION

Monitoring the level in the saline vial is crucial because blood flows when the vial is empty and the needle is still near the vein into the vial from the outside. In hospitals, it is the responsibility of nurses or caregivers to monitor the level of saline bottles. The proper timing of withdrawing the needle from the patient's vein is usually ignored due to carelessness and any unusual circumstances that result in great casualties and should also lead to death. In addition, health services can be offered through remote monitoring. To avoid the accident caused by the ignorance of caregivers and to offer remote access, we designed a cost-effective intelligent saline level for monitoring in healthcare services. a monitoring system that combines sensor and Internet of Things (IOT) technology. This system was created using a load cell and a low-cost, very low-power microcontroller. The load of the bottle is converted to the selected voltage by the load sensor. The ESP8266 microcontroller generates and publishes a specific message based on the voltage received from the sensor. Publish and display messages on subscriber devices such as paramedics, nurses or caregivers. The proposed monitoring system provides the message to the subscribers in a reliable manner, which is crucial for the healthcare industry

A brief description of drawing is as follows:

- A load cell is an electro-mechanical sensor used to measure force or weight. It has a simple yet effective design which relies upon the well-known transference between an applied force, material deformation and the flow of electricity.
- The HX711 amplifier is a breakout board that allows you to easily read load cells to measure weight. You wire the load cell wires on one side, and the microcontroller on the other side. The HX711 communicates with the microcontroller using two-wire interface.

- Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 Analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.
- First we set the saline bottle and fix a load cell. Load cell continuously measures the weight of saline bottle. It generate Analog signal. Which need to convert into digital signal. HX711 is use as an amplifier that converts the Analog output of the load cell into a digital signal that can be processed by the Arduino.
- LCD display is used to show the saline level in real-time. The output obtained from the sensor is then processed to check level of the saline bottle and displayed on the LCD display.
- GSM Module plays a crucial role in the communication between devices and the GSM network. It is responsible for establishing and maintaining the communication link between the device and the network. The module also handles the encryption and decryption of data, which ensures the security of the communication. It is also connected to the Arduino kit.
- When the level of saline drops below a certain level; the application with the help of the GSM module will notify the nurse. The weight of a normal saline bottle is 500 ml. When the level drops upto 70% alert is sent to the nurse's mobile phone. if he/she missed alert next alert is sent at 90%. So the nurse can change the saline bottle when the liquid reaches the critical point.

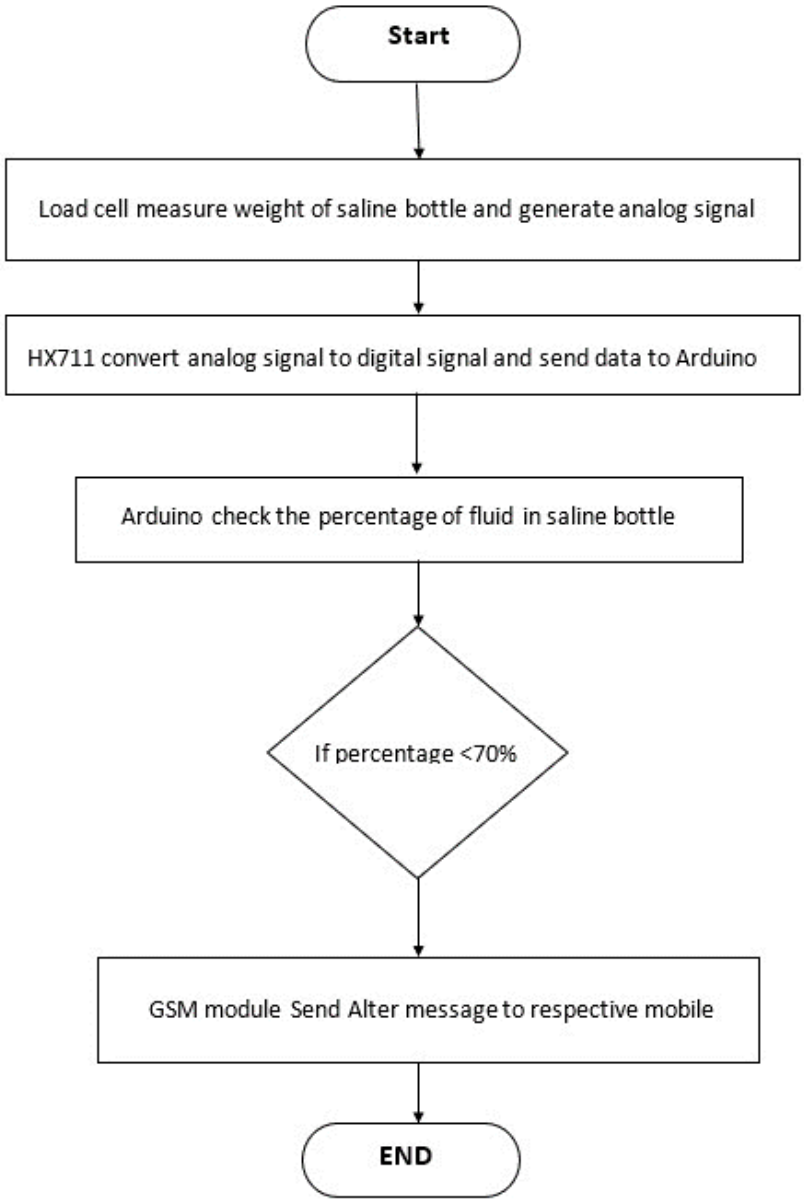


Fig: - 1 Flow diagram

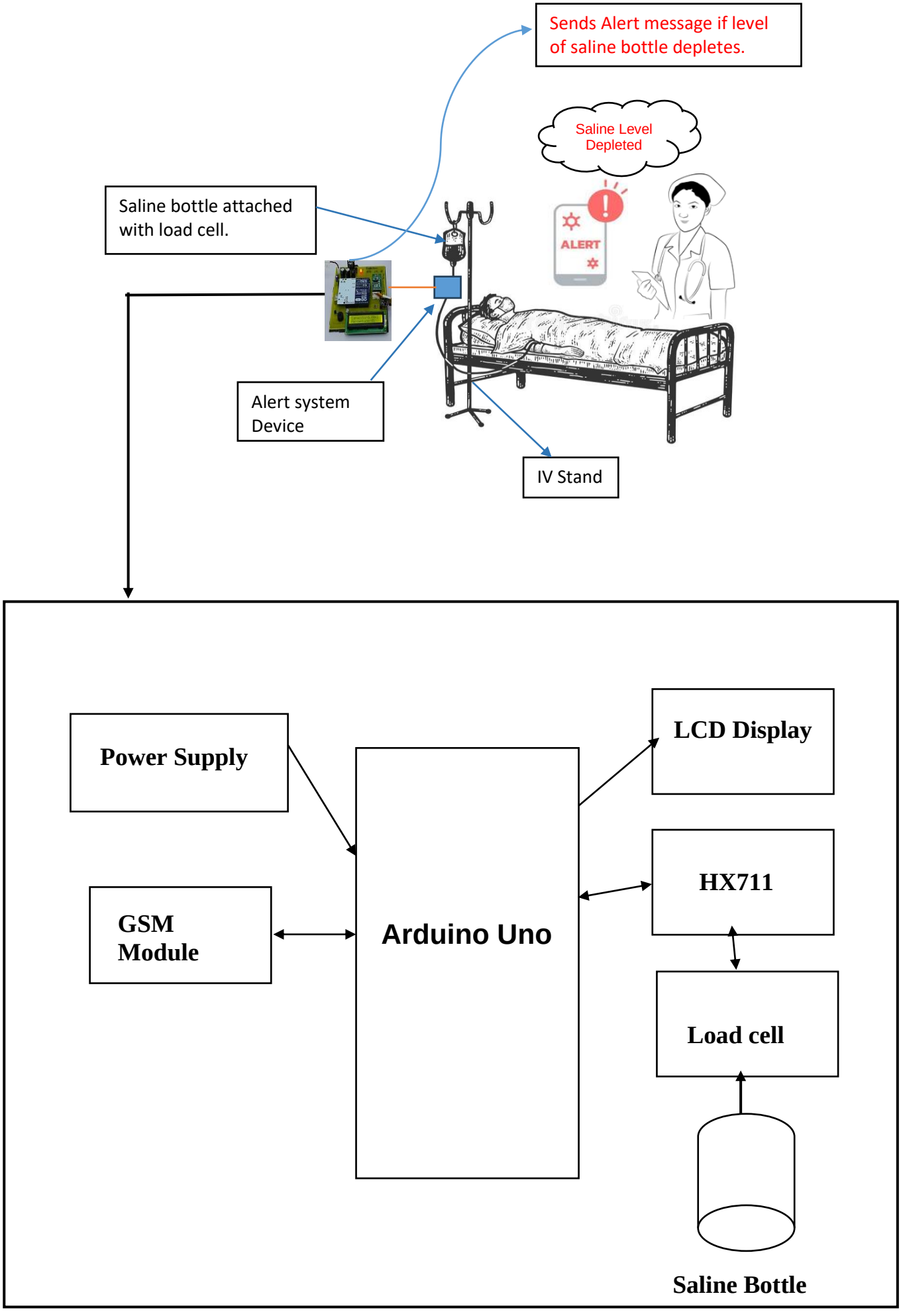
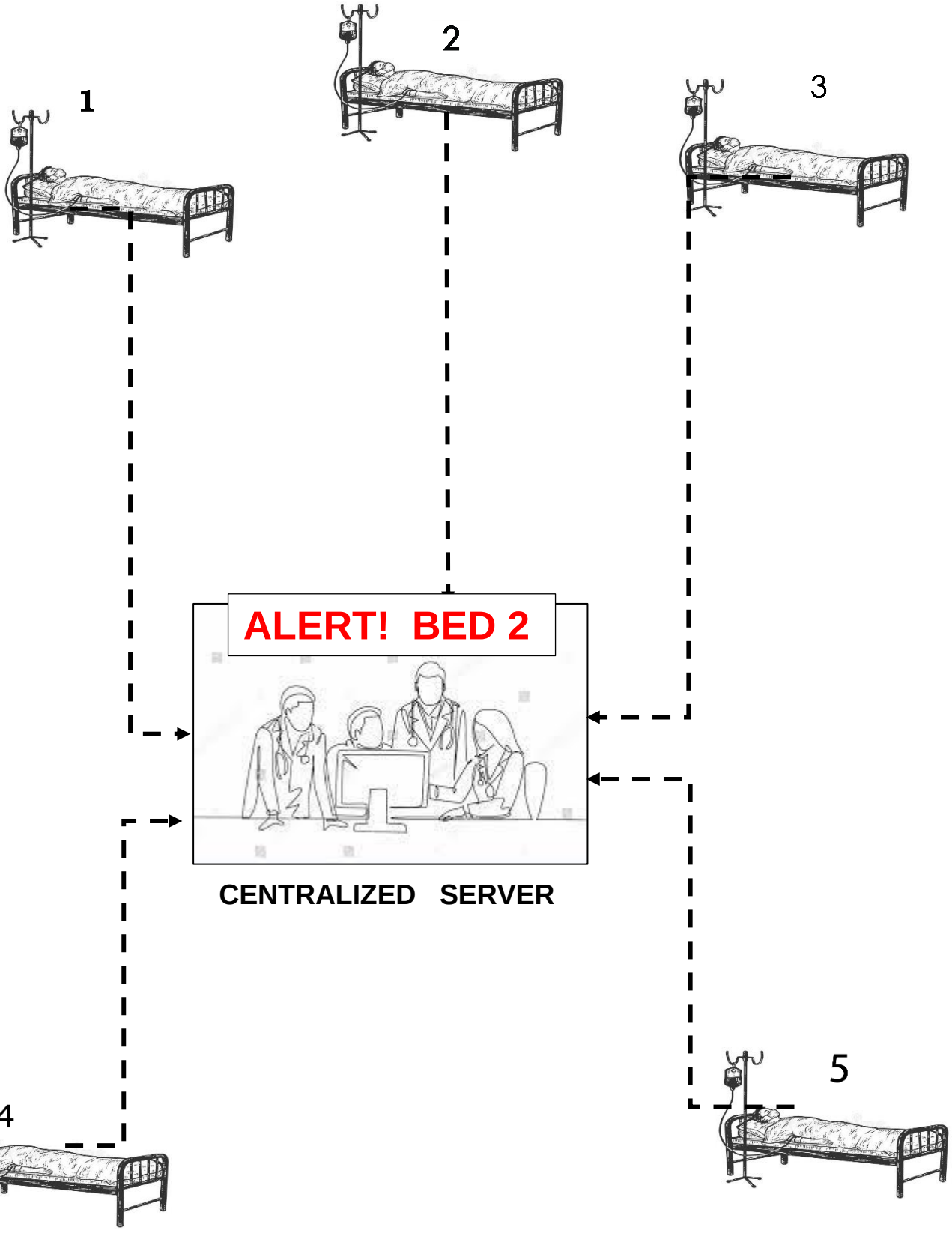


Fig: Block Diagram of Intravenous Fluid Monitoring System


1
2
3
ALERT! BED 2
CENTRALIZED SERVER
4
5

E. DETAILED DESCRIPTION OF THE INVENTION

After observing these problems in hospitals and among people with these diseases, we decided to develop an intravenous fluid monitoring system that could solve these problems. The Arduino serves as the central processing unit of the system. It receives the digital signals from the HX711 load cell amplifier, which represent the weight of the saline solution. The Arduino processes this data and calculates the saline level based on the weight and a predefined calibration factor. An LCD (Liquid Crystal Display) is used to provide a visual representation of the saline level. It can display the saline level in millilitres (mL) or as a percentage. The Arduino sends the calculated saline level information to the LCD, which updates the display accordingly. GSM module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The weight of a normal saline bottle is 500 ml. When the level drops down to 70% alert is sent to the nurse's mobile phone using GSM module through SMS. If he/she missed alert next alert is sent at 90%. The system requires a stable power supply to operate continuously. Depending on the setup, this power supply can be provided through a battery, an external power source, or a combination of both. So the nurse can change the saline bottle when the liquid reaches the critical point. level drops below a certain level; the application will notify the user. A level sensor in a strain gauge bottle is used to measure the level of saline solution. The saline content in a normal saline bottle is 500 ml. The saline bottle is replaced when the saline drops below 50 to 100 ml. The critical saline level is set at 70 mL, which is between 50 and 100 mL, so the nurse can change the saline bottle when the fluid reaches the critical point

WE CLAIM

1. Claim 1: An intravenous (IV) fluid monitoring system comprising:
    - A sensor for measuring the liquid surface level within an IV fluid bag;
    - A processor communicatively coupled to the sensor, configured to:
        - Determine the current volume of the IV fluid based on the measured surface level;
        - Monitor the rate of change of the fluid volume over time;
        - Compare the current flow rate to predetermined thresholds; and
    - An alerting mechanism for notifying a healthcare provider when:
        - The IV fluid volume falls below a predetermined level, indicating potential depletion
        - The flow rate deviates significantly from the prescribed rate, indicating potential complications.
2. Claim 2: The system of claim 1, wherein the alerting mechanism is GSM enabled and transmits notifications to a mobile application accessible by the healthcare provider.
3. Claim 3: The system of claim 1, To develop a case to indicate the liquid surface level of IV fluid and alert the health care assistant for timely intervention.
4. Claim 4: The system uses Battery for the power supply so we can still sustain in the case of power failure because battery can be charged.
    - Battery’s charging life can be tracked using sensor.
5. Claim 5: The system of claim 1,to develop a centralized system to display the data of Saline bottle on one LCD screen which will be displayed at the staff chamber.

6. ABSTRACT OF THE INVENTION

The theme of this project is to build an Intravenous Fluid Infusion Monitoring and Alert System and also a patient monitoring system to track the activities of the patient. This is because patient's health is crucial in every aspect and in hospitals it is the responsibility of nurses and staff to monitor the level of saline bottles and sometimes due to unusual circumstances and negligence from the staff proper timing of withdrawing the needle from the patient's vein is usually ignored thus causing problems like Reverse blood flow which can result in great casualties and should also lead to death. Thus taking this issue into consideration we claim to build an alert system which will send alert messages to staff so they can be notified whenever the level of the saline bottle depletes below a certain level. This system uses a load cell and microcontroller. The load of the bottle is converted to the selected voltage by the load sensor. The Arduino Uno microcontroller thus generates and publishes a specific message based on the voltage received from the sensor.