IoT BASED INTRAVENOUS FLOW MONITORING SYSTEM

Anagha R, Ashwini S, Keerthana G, Monica M
Dept. of Computer Science, Sapthagiri College of Engineering, India.

Prof. Vindhya
Dept. of Computer Science, Sapthagiri College of Engineering, India.

Abstract- ***The Automated glucose stream control and observing framework is tied in with checking the progression of glucose consequently. At whatever point if patients got a lot of tiredness that time medical caretaker will put the glucose for the recuperation of patients. While putting the glucose bottle she just needs to control the progression of glucose amount. In the event that the glucose bottle got unfilled, medical caretaker ought to be there to supplant or evacuate the container. Incase nurse isn't there that time patients body blood will flow into the container in invert bearing. By utilizing this observing framework we can screen the glucose stream. In Glucose Monitoring System we will consider glucose bottle weight. For taking the weight of the bottle we use Weighing scale. As indicated by the weighing scale the flow will control the progression of glucose. On the off chance that the container got unfilled the stopper will close the valve so blood won't come backward into the bottle.***

Keywords- ***ARM7microcontroller, Solenoid Valve, Load sensor, Hall flow sensor, Medical application***

I. INTRODUCTION

Wellbeing observing frameworks incorporated into a telemedicine framework are novel data innovation that will have the option to help early discovery of strange conditions and counteraction of its genuine outcomes. Numerous patients can profit by constant wandering observing as a piece of a demonstrative technique, optimal maintenance of a chronic condition or during directed recuperation from an acute event or surgery. Indeed, even there is circumstance that the patients ought to be observed consistently for specific parameters. Electrocardiograph is a transthoracic interpretation of the electrical action of the heart over some undefined time frame, as distinguished by electrodes attached to the surface of the skin and recorded by a device outer to the body. So as to accomplish the function of the quantitative control in an assortment of stream frameworks, another sort of electronic valve with quantitative control is designed. The valve gathers stream flow signal from the impeller Hall flow sensor. Micro controller chip is utilized to figure the flow value and cumulate the absolute value. It's likewise used to control hand-off so as to ongoing control solenoid valve. In this paper we are interfacing a load sensor to the ARM micro controller, this load sensor will detect the heaviness of the synthetic concoctions and showed it on the LCD display . In the following stage we are giving a stream contribution to ml/sec, in one second a specific amount of synthetic ought to go to the outlet this will be constrained by a solenoid valve. This can be actualized in programmed stream control of glucose in hospitals, in physical vapour deposition, in substance supply control of plants which develops in water (hydroponics). The Drip bottle weight is estimated utilizing an electronic load cell and data about it will be sent to IoT server of the Hospital. But here for exhibition purpose we are sending the information to the fundamental android mobile App, through utilizing the Wi-Fi module. At the point when container gets a threshold level it lingerie to the Wi-Fi module and sends the information to the Doctor and hospital staff. Specialists can control the stream rate by sending orders from the mobile.

II. PROPOSED SYSTEM

In existing framework, observing of patients is done by manual procedure which may results to switch stream of blood during trickles process. At the point when bottle get unfilled and if health care faculties don't know about it, it might end up in reverse blood stream. Manual procedure can't accomplish exactness particularly in trickles bottle .Patients observing in late night is troublesome and communication among specialist and patient is less. The answer for the previously mentioned issue is, consequently close the valve without human administrator. The load cell is utilized to persistently screen the weightage of the saline container and it will be shown on the LCD display, when it arrives at the critical level a programmed message will be sent to hospital staff's through Android application. At the point when container gets to threshold level it lingerie to the hospital staff. Specialist can control the stream rate.

III. METHODOLOGY

The Glucose Monitoring System Consists of ARM, Load Cell, Solenoid Valve, Keypad,Relay, and ESP8266. Drip bottle weight is estimated utilizing an

electronic load cell and data about it will be sent to Doctor utilizing a WIFI Module. For exhibition purpose we are sending information to fundamental android Mobile App. At the point when bottle gets to threshold level it lingerie to specialist and hospital personnel. Specialist can control the stream rate by sending orders from mobile. At the point when the container weight gets totally vacant

ARM controller sends the order to Valve system with the end goal that it will be blocked and there will be no reverse blood stream. Temperature Sensor is utilized to screen the internal heat level after drip is infused to patient. On the off chance that the temperature recognizes low values, at that point additionally valve will be shut and it will be implied to specialists. Heartbeat sensor and temperature Sensors will be refreshed to doctors, by sending orders from mobile. At the point when the container weight gets totally vacant ARM controller sends the order to Valve instrument with the end goal that it will be blocked and there will be no converse blood stream. Temperature Sensor is utilized to screen the internal heat level after dribble is infused to understanding. In the event that the temperature distinguishes low qualities, at that point additionally valve will be shut and it will be implied to specialists. Flex Sensor associated with patient hand can peruse hand signal of a patient utilizing which we can atomize the switching of devices in the room.

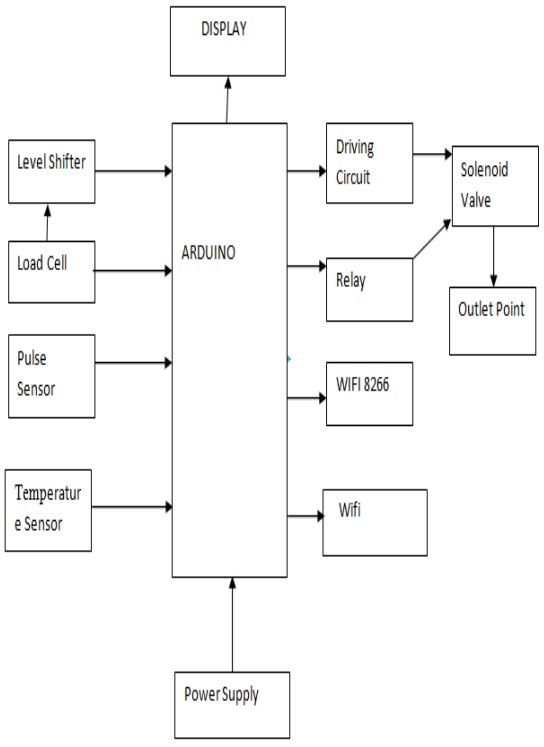

Fig 1:block diagram of intravenous flow monitoring System

Fig 2: modle of intravenous flow monitoring system

The fig 1 shows the block diagram of proposed system. The LPC2141/42/44/46/48 arm microcontrollers are based on a 16-bit /32-bit ARDUINO CPU with real time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32KB to 512KB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. Due to their tiny size and low power consumption,LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, access control and point of sale. Serial communications interfaces ranging from a USB 2.0 full speed device, multiple UARTs, SPI, SSP to I2C-bus and on chip SRAM of 8KB up to 40KB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. LCD displayoffers high flexibility to use. Lora uses license-free sub gigahertz radio frequency bands like 169MHZ, 433MHZ, 868MHZ and 915MHZ. Flex sensors that change in resistance depending on the amount of bend in the sensor.

IV.SYSTEM SPECIFICATION

In the proposed system, by the weight of the saline bottle, the level of liquid can be estimated so that when the liquid reaches to its minimum level, ESP 8266 WiFi communicator is used to send alerts to end subscribers. Below we describe the working of each module :

1) **ARM7 Micro Controler:** The Arm7 embedded microcontroller center is an individual from the Advanced RISC Machines (Arm) group of broadly

useful 32 Bit chip, which offer elite and very lower power utilization. The Arm design depends on Reduced Instruction Set Computer (RISC) standards, and the guidance set and related interpret component are a lot less difficult than those of micro programmed Complex Instruction Set Computers.

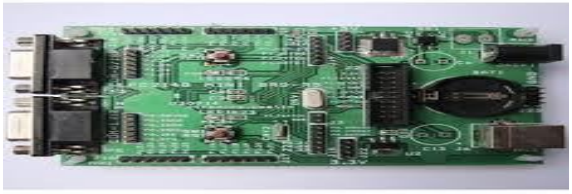

fig 3: arm micro controller

2) **LOAD SENSORS:** The fig 4 shows a Load sensor is a device which measures the weight of objects such as vehicles. If the weight of a vehicle is beyond the threshold value (here 1.5kg), the gate is closed. Thus preventing the entry of heavy vehicles into the bridge.

fig 4: load sensors

3) **SOLENOID VALVE:** The fig 5 explains the Electronic valve is an electro mechanical device in which the solenoid uses an electric current to generate a magnetic field and thereby operate a mechanism which regulates the opening of fluid flow in a valve.

Fig 5 : solenoid valves

4) **LCD DISPLAY:** The fig 6 explains an LCD is a small low cost display. It is easy to interface with a microcontroller because of an embedded controller. This controller is standard across many displays which means many micro-controllers have libraries that make displaying messages as easy as a single line of code. It offers high flexibility to users

Fig 6 : LCD display

5) **FLEX SENSORS:** The fig 7 describes the Flex sensors that change in resistance depending on the amount of bend in the sensor. They are usually in the form of a thin strip from 1" -5" long. They convert the change in bend to electrical resistance the more the bend, the more the resistance value. Flex sensors are used in gaming gloves, auto controls, fitness products, measuring devices and etc.Flex sensors are analog resistors.

Fig 7: Flex sensor

6) **TEMPERATURE SENSORS:** The fig 8 shows LM35 which is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature. The LM35 temperature sensor measure temperature more accurately than using a thermistor

Fig 8: temperature sensor

7) **ESP 8266 WIFI COMMUNICATOR:** The fig 9 shows the ESP8266 which offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor. It has integrated cache to improve the performance of the system in such applications and to minimize the memory requirements microcontroller-based design with simple connectivity through UART interface or the CPU AHB bridge interface. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any microcontroller-based design with simple connectivity through UART interface or the CPU AHB bridge interface.

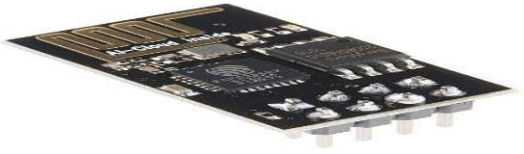

Fig 9: ESP 8266 wifi communicator

8) EMBEDDED C: Individual bits can be accessed Data is taken from external devices. Hence no need of standard input functions. Char data type is used to save memory. It is platform specific unlike C. Instead of <STDIO.H>,<LPC214A.h>is used, which enables the compiler to include the architecture of the controller. Embedded C language is most frequently used to program the microcontroller embedded software is computer software, written to control machines or devices that are not typically thought of as computers, commonly known as embedded systems.

V.LITERATURE SURVEY

1. Electronic valve module includes a normally closed solenoid valve and a relay . Measurement module uses the impeller Hall flow sensor, which connect to the counter of the control module in order to collect and process the pulse signal.
2. The load cell is used to continuously monitor the weightage of the saline bottle and it will be displayed on the LCD display, when it reaches the critical level an automatic message will be sent to a hospital staff's Android app.
3. The load sensor is fixed on saline hanger and bottle is hung on it. This sensor converts the varying weight of the bottle into different voltages. The output voltage from the load sensor is fed in the ESP32 WiFi chip.
4. The pressure in the dripping IV solution is detected by pressure sensor, connected to motor enhances the controlling of the dripping solution, wirelessly transferred from the patient's room to nurse station using nRF24L01 module effectively.
5. a high-performance electro-hydraulic proportional valve controller is designed and developed by using embedded-computer technology. This controller possesses a, simplified structure, high quality and an economical and flexible performance.
6. The valve collects flow pulse signal from the Impeller Hall flow sensor through the Load sensor. This load sensor will sense the weight of the glucose and display edit on the LCD display and sends the data to the Hospital staff's Android app.

VI.EXPERMENTAL RESULTS

Through this project it is able to Measure the Drip bottle weight monitoring using a load cell, and also we can set the Flow control using the electronic valve and hall flow sensor which is very much helpful in looking after the patients in the hospitals for the observations specially during the night time. And it also controls the reverse blood flow of the patient when glucose level is zero and shows all the data on the LCD display, and also checks the body temperature of the patient through the temperature sensor which is placed on the patients hand, and if patient wants fan ON/OFF ,then through the flex sensor which is placed on the patients finger, he or she can operate just bending the finger then that can ON/OFF the fan in the room. All these details will be Display it on the LCD display as shown in Fig.5 and sends all the data through the Wi-Fi module of Hospital faculty's Android App as shown in Fig.10.

Fig 10: android app

fig 11: LCD display

VII.CONCLUSION

This paper overcomes the consequences that occurs due to negligence of monitoring the IV flow. Using proposed monitoring, one can monitor the level of saline bottle from a distant position which will aid in building smart health care system. Affordable, precise and efficient system that undoubtedly works in a smooth manner. Electronic valve with Quantitative control system, in order to realize for flow control in drip, as a small, compact and advanced technology in the medical field. Here the continuous flow of medicine through drip to the patient is automatically controlled for three different flow rates 25 %, 50%, 75% of the IV cannula pipe. This can be done by measuring the level of medicine through the drip and is compared with set point and flow of medicine is stopped when it reaches the desired critical point. Here IOT replaces manual switches by software like user friendly mobile apps so that doctors can control flow rate by sitting at place. IOT concept models can be implemented for remote destinations like villages. Doctors can sit in a different city, different floor of a building, or in their house and patient can be anywhere, monitoring and flow rate controlling can be done. Using same IOT concepts one doctor can monitor several patients report on the mobile app or computer screen so one doctor can monitor several patients.

VIII.REFERENCES

[1]. Fan Yang, Yu Wang "Research of the New Electronic Valve System with Quantitative Control" IEEE Third Global Congress on Intelligent Systems, 2012.
[2]. Electronic Valve with Quantitative Control System for Medical Application, Sneha shetty, Dr. Vijayakumar, International Journal of Scientific Development and

Research (IJSDR).
[3].Smart Saline Level Monitoring System using ESP32 And MQTT-S,Debjani ghosh,Ankit Agarwal, IEEE 20th international conference health networking.
[4]. Smart Drip Infusion Monitoring System for Instant Alert– Through nRF24L01, Ramisha Rani K , Shabana N , Tanmayee, Loganathan S, Dr.Velmathi G,2017,IEEE.
[5]. Research on Embedded Electro-hydraulic proportional valve Controller, Lu Quan Sen, Bao Hong, Li Jun,2009
[6] IOT BASED ELECTRONIC VALVE FOR QUANTITATIVE CONTROL OF SALINE FLOW AND PATIENT MONITORING, Amith Raj , Bhavana , NarasimhaMurthy , Sneha, Nirmalkumar S Benni ,2019
[7] V.Ramya, B.Palaniappan, Anuradha Kumari "Embedded Patient Monitoring System" International Journal of Embedded Systems And Applications (Ijesa) Vol.1, No.2, December 2011
[8] "Solenoid-operated valve control under adverse mechanical conditions such as vibrations or shocks" by Barleanu.A, Faculty of Automation & Control Engineering, University of Lasi,Romania published in 16th International Conference on System Theory,Control and Computing (ICSTCC) held between 12-14 Oct'2012.