

SMART FLUID LEVEL MONITORING AND CONTROLLING SYSTEM

R Radhakrishnan¹, J.Ramesh²,

Assistant Professor,

Department of Electronics and communication Engineering¹,

Department of Electrical and Electronics Engineering²,

St. Anne's College of Engineering & Technology, Panruti.

rocky.radha@gmail.com¹

rameshbluesky@gmail.com²

Abstract:

In all over the world the technology is growing at a very high speed. Human lives become much more dependent on electronic devices. In hospitals, fluid or saline fed to patients to treat dehydration and thus improve their health. Almost in all of the hospitals, a nurse or caretaker is responsible for monitoring the saline continuously without any interruptions. Due to the negligence and inattentiveness towards saline completion by doctors, nurses or caretaker of the patients and lack of nurses with sufficient skills in hospitals and their excessive workload a huge number of patients are being harmed in the hospitals. Thus, innovative health and fluid level of patient monitoring systems are being developed with less human intervention, which will be available at low cost in rural and urban areas. The proposed system comprises of sensors which will act as a level indicator for monitoring the critical level of fluid in the fluid bottle and control infusion drop rate from using motor mechanism to increasing and decreasing the fluid drop rate. This proposed system can be utilized efficiently in homes as well as hospitals.

Keywords —Saline, Fluid level, Patients.

I. INTRODUCTION

Internet Of Things (IOT) is becoming more and more important in daily lives. Automation of the surrounding environment of a modern human being helps to increase the work efficiency and saves time. Data sharing can now be enabled by several types of smart-devices, e.g. smart-watches, tablets, smart-phones and others these are the possibility to connect to the internet. In addition, by exploiting on-line cloud platforms, data can be accessed by everyone, at any time and from any place. These portable smart-devices play an increasing relevant role in IOT systems, there the small dimension, light-weight, low costs and great number of integrated sensors. During the last few years, IOT research has evolved widely in the field of healthcare. Different types of sensors are able to simultaneously monitor different physiological parameters and to share the measured data by exploiting wireless connections. Saline is fed when the patient's body is dehydrated. The nurses can check saline droplet status of each patient's bed without walking around the patient's room every hour.

A constant monitoring of the saline level in the bottle required. If the empty saline bottle is not replaced immediately then the pressure difference between the patient's blood pressure and the empty saline bottle causes reverse flow of blood into the saline. It generate the bubbles on the human blood stream, it cause death. In hospitals the constant person required to manually monitor the level of fluid bottle. This is not comfortable in all times, especially during night times. This system also avoids a fatal risk of air bubbles entering the human's blood stream. For overcoming this problem introducing a fluid monitoring system based on IOT. This device will send the status to the host unit and show the results. The patients are quickly recovered by using this system. Also healthcare industries are one of the users. This monitoring system can be applicable in small, medium and large size of hospitals and also useful for during homecare.

II. PROBLEM STATEMENT

During recent years, due to technological advancement many sophisticated techniques have been evolved for ensuring fast recovery of the patient in hospital. This system avoids the fatal risk of air bubbles entering the patient's bloodstream, which is serious threat as air bubbles in blood can cause immediate death. Needs for good patient care in hospitals, assessment and management of fluid and electrolyte is the most fundamental thing required. Almost in all hospitals, an assistant/nurse is responsible for monitoring the electrolyte's bottle level. But unfortunately most of the time, the observer may forget to change the bottle at the correct time due to their busy schedule. Due to the negligence and inattentiveness towards fluid completion by doctors, nurses or caretaker of the patients and lack of nurses with sufficient skills in hospitals and their excessive workload, a huge number of patients are dying and are being harmed in the hospitals. Hence to prevent the patient from getting harm and protect their lives during fluid feeding period. We are going to develop the smart fluid level monitoring and control system [6].

III. OBJECTIVES

- To detect the critical level of fluid bottle using level sensor.
- To make the system that automatically stop the flow after emptying of fluid bottle using motor mechanism to increasing and decreasing drop rate which is controlling through mobile phone.
- Provide cost effective and automatic fluid level monitoring and controlling system which can effortlessly implemented in any hospitals.

IV. EXISTING SYSTEM

The implemented framework comprises of different sensors and devices and they are interconnected by means of remote correspondence modules [3].

The sensors data is been sent and received From nurse or doctor end utilizing Internet connectivity which was enabled in the Node MCU module-an open source IOT platform.

This system is used to observe the condition of patient. The data can be viewed on the Thing Speak app or any web page. The nurse can observe all the levels, or the range that is performed.

V. PROPOSED SYSTEM

An IOT based automatic alerting and indicating devices is proposed where level sensor is used. The sensor is detecting the level of fluid and controlling the drop rate of the fluid. The sensor output changes, when fluid level/weight is below certain limit. When fluid level is low, will alerts the observer through the LED display or/and mobile phone at the control room. When fluid level is maximum to complete the bottle data can sent to nurse and when the fluid level is minimum to complete the indication and alert directly sent to the doctor and then they are recovering the patients immediately. The alerting system is not a sound indication but it's given as voice alerting.

5.1 Transmitter and Receiver

It will decrease the chances of patient's hazards and increase the accuracy of healthcare in hospitals. The proposed system create assures of non-harm conditions to patients and helpful to monitoring of data and data can be stored in the database and it will be useful in future.

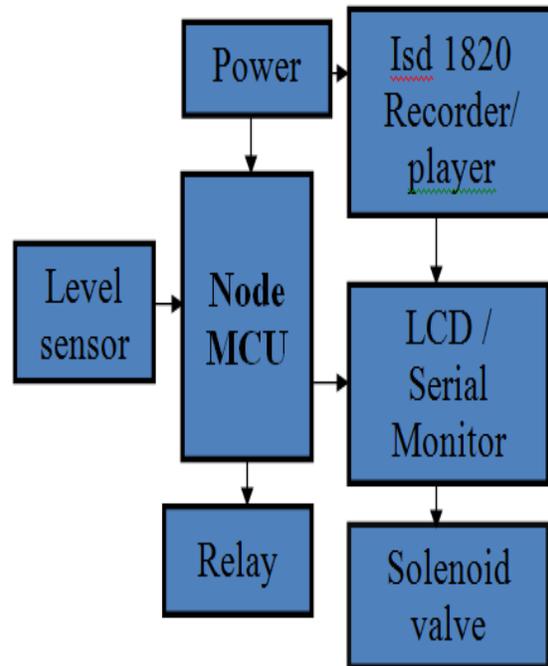


Fig 5.1 Transmitter

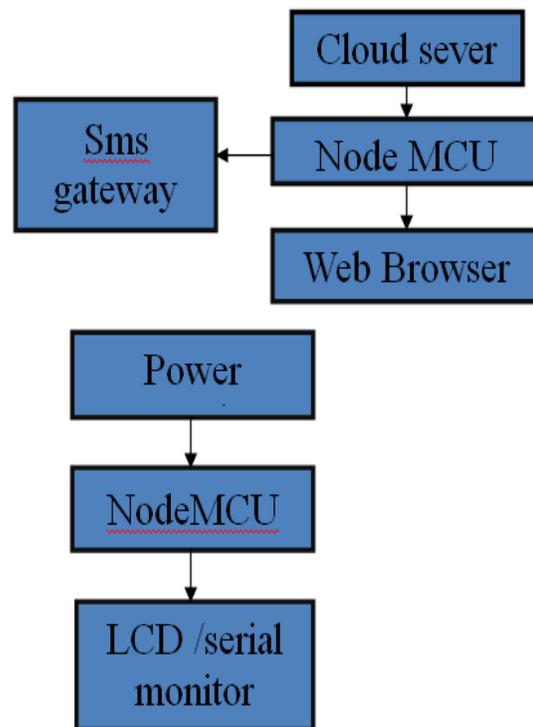


Fig 5.1 Receiver

5.2. Node MCU

The node MCU is the open source and low-cost IOT platform. The name “node MCU” combines “node” and “MCU”(micro-controller unit).

It initially included firmware which runs on the ESP8266 Wi-Fi SOC from expressive system, and hardware which was based on the ESP-12 module.

Later, support for the ESP32 32-bit MCU was added. In there the prototyping board designs are available.

Fig 5.2 : Node MCU

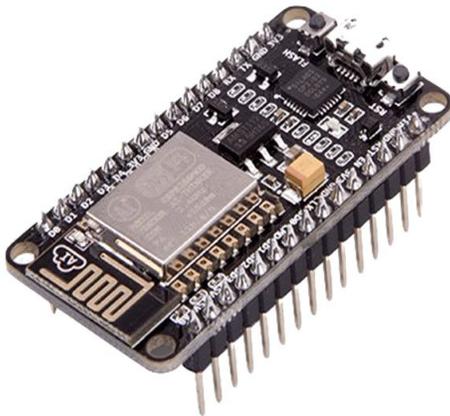


Fig 5.2 : Node MCU pin specification

5.3. Level Sensor

- The level sensor is used in the proposed system, which is monitor the level of the fluid and give the indication and information about the fluid bottle. In the level sensor is otherwise called leak detection sensor. It is placed on the fluid bottle with the certain threshold condition.
- The fluid is above 30ml no indication to the host. But, the fluid drop rates variations are immediately show on the LCD and the host node also.

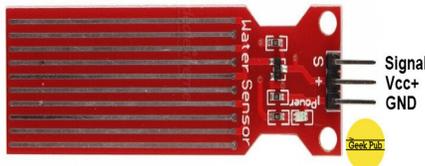


Fig 5.3 : Level sensor

pins	Definition
GND	GND
VCC	5V

Fig 4 : Pin description of level sensor

5.3. Solenoid Valve:

- A solenoid valve is an electro mechanical device used for controlling liquid flow.
- The solenoid valve controlled by electrical current which is run through a coil. When the coil is energized a magnetic field is created causing a plunger inside the coil to move.
- Solenoid valve function involves either opening or closing an orifice in a value body which either allows or prevents flow through the value.
- The plunger opens or closes the orifice by raising or lowering within a sleeve tube by energizing the coil plunger and sleeve assembly.

5.4. ISD Recording player:

- Voice recording module is based on ISD1820 which a multiple-message record/playback device. If can offers true single-chip voice recording, non-volatile storage and play back capability around 10 second.
- This module is easy to use which could direct control by push button on board or microcontroller such as arduino.

VI. LITRATURE OF SURVEY

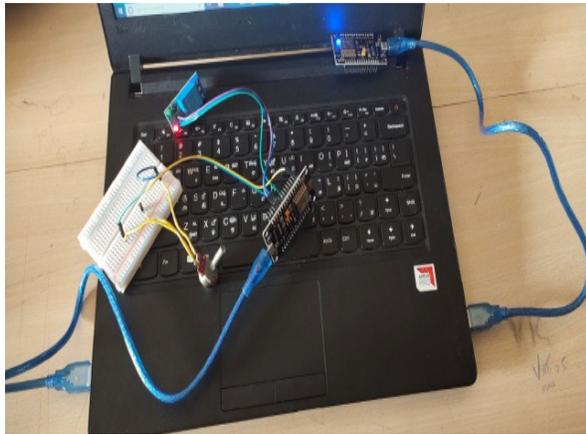
6.1 Literature Of Survey 1

Description: built up an infrared innovation based gadget to measure heart rate likewise utilized simple Temperature sensor to decide temperature of body. It was employment a re-remote correspondence to send information to the PC through serial port. At that point by utilizing the web the information is sent to the web server. And further more it can be seen starting at any-place in the web program. The drawback of this created approach is that it requires a PC for sending the information to the web server through the web [1].

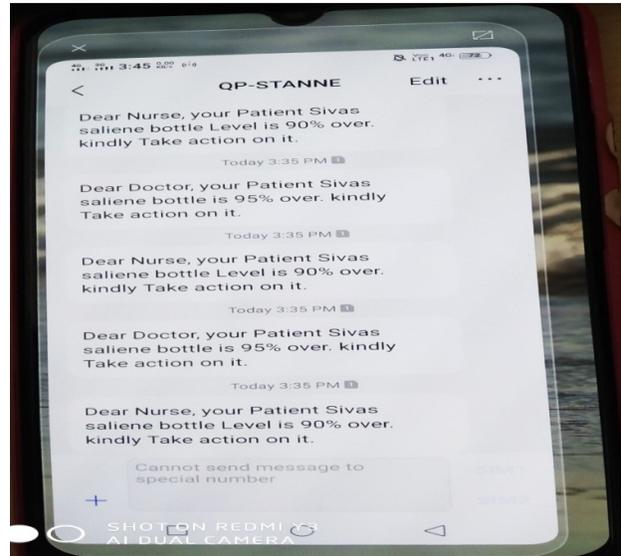
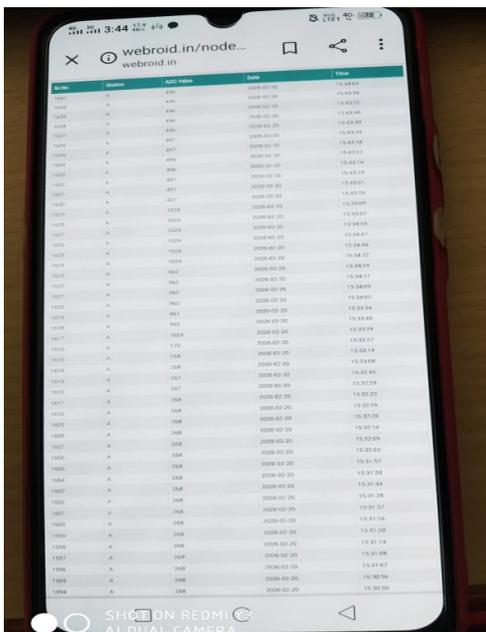
6.2. LITRATURE SURVEY 2

- Description: Developed system which patient’s body temperature, heart rate and ECG are transferred wirelessly through Bluetooth technology. In this approached system, the alert of SMS is sent from data acquisition system to the hospital for monitoring center through Zigbee wireless communication method [2].

VII. PROJECT SETUP



7.1 Output:



VIII. CONCLUSION

In this paper all system are automated. It requires very less human intervention. It will be advantages at night. It can wirelessly send the information in the form of saline droplet rate. This will reduce the stress in continual monitoring by the doctor or nurse. The anaesthesiologist can monitor several patients in parallel. In case of any anomaly in measured data, the doctor is alerted by a notification sent by the mobile phone/laptop, it can send data wirelessly to nurses or doctors, economical and convenient for patient health and saline level monitoring.

REFERENCES

- [1] M. M. A. Hashem, R. Shams, Md. A. Kader and A. Sayed, "Design and development of a heart rate measuring device using fingertip," 3rd IEEE International Conference on Computer and Communication Engineering (ICCCCE'10), Kuala Lumpur, Malaysia, May 11-12, 2010
- [2] Ahmed, Salman, et al. "Wireless health monitoring system for patients." 2015 IEEE International WIE Conference on Electrical and Computer Engineering (WIECON-ECE). IEEE, 2015
- [3] IEEE Draft for Health Informatics - Personal Health Device Communication - Part 10425: Device Specialization - Continuous Glucose Monitor (CGM) - Corrigendum 1: year 2016. Pp.1-33.
- [4] Elisa Spanò; Stefano Di Pascoli; Giuseppe Iannaccone, "Low-Power Wearable ECG Monitoring System for Multiple-Patient Remote Monitoring," IEEE Sensors Journal Year: 2016, Volume:16, Issue: 13 Pages: 5452 – 5462.
- [5] Manoj Kumar Swain, Santosh Kumar Mallick, RatiRanjan Sa-bat " Smart Saline Level Indicator cum Controller", International Journal of Application or Innovation in Engineering & Management (IJAEM), Volume 4, Issue 3, March 2015, Page No.1 and 3.