Journal of Engineering Sciences
Vol 12, Issue 7, July/202J
ISSN NO:0377-9254

IOT TECHNOLOGY BASED SMART VIAL

Babu Rayhan Shaik[1], Sumalatha Boina[2], Rama Tulasieswar Reddy Gunti[3], B.Prem Kumar[4], Dr.G.Lakshminarayana[5]
Assistant Professor[4], Professor[5],UG Student[123]
DEPT OF ECE
SVR ENGINEERING COLLEGE, NANDYAL

ABSTRACT
During recent years, due to the technological advancements many sophisticated techniques has been evolved for assuring fast recovery of the patients in hospitals .Need for good patient care in hospitals, assessment and management of fluid and electrolyte is the most fundamental thing required. All most in all hospital, and 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 correct time due to their busy schedule .To overcome this critical situation, a IoT based automatic alerting and indicating device is proposed where sensor is used as a weight sensor. It is based on the principle that the sensor output changes when fluid weight is below certain limit. When Fluid weight is low, will alerts the observer through the display or/and mobile phone at the control room indicates the room number of the patient for quick recovery Hospital uses simple electrolytes bottles with no indication, it may create a problem to patient because the reverse flow will start, blood start to flow from body towards bottle. In, Hospital ICU, CCU, NICU most of all department of hospital required such kind of automatic monitoring and indication system. Also Health care industries will one of the users. Such monitoring system can be useful in small, medium and large size of hospitals and also it useful during home care. If such a monitoring system builds, it will decrease the chances of patients hazards and increases the accuracy of health care in hospital. Such data can also send to nurses and/or doctor`s mobile and they can start or stop the fluid and also monitoring fluid condition, such things required security password also. Hospital staff, the constant need to manually monitor the level of bottles is avoided.

I. INTRODUCTION

Saline solution is used in the hospital whenever some energy needs to be supplied to the patient in form of liquid. But there are some issues with this saline injection process. As there is more quantity to be injected it takes time to complete this process. In this injection process, continuous monitoring is required, where it is difficult in many hospitals. The monitoring staff may forget about the patient. This forgetting may result in serious danger to the patient. when the saline bottle is about to empty the blood from the body of the patient flows back into the bottle. This flowing back of blood causes serious damage to the patient. The patient might be in a situation of unable to check his own saline bottle level. During recent years, due to the technological advancements many sophisticated techniques has been evolved for assuring fast recovery of the patients in hospitals .Need for good patient care in hospitals, assessment and management of fluid and electrolyte is the most fundamental thing required. All most in all hospital, and 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 correct time due to their busy schedule .To overcome this critical situation, a IoT based automatic alerting and indicating device is proposed where sensor is used as a weight sensor. It is based on the principle that the sensor output changes when fluid weight is below certain limit. When Fluid weight is low, will alerts the observer through the display or/and mobile phone at the control room indicates the room number of the patient for quick recovery Hospital uses simple electrolytes bottles with no indication, it may create a problem to patient because the reverse flow will start, blood start to flow from body towards bottle. In, Hospital ICU, CCU, NICU most of all department of hospital required such kind of automatic monitoring and indication system. Also Health care industries will one of the users. Such monitoring system can be useful in small, medium and large size of hospitals and also it useful during home care. If such a monitoring system builds, it will decrease the chances of patients hazards and increases the accuracy of health care in hospital. Such data

can also send to nurses and/or doctor`s mobile and they can start or stop the fluid and also monitoring fluid condition, such things required security password also. Hospital staff, the constant need to manually monitor the level of bottles is avoided.

II. POWER SUPPLY

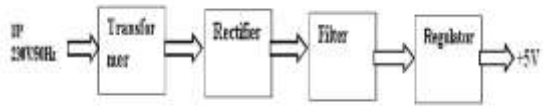


Figure 3.1 Power Supply

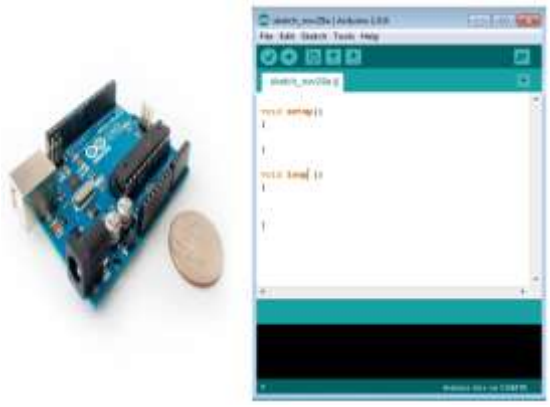
III. HARDWARE

3.1 Arduino

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

The key features are −

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.



3.2 Board Types

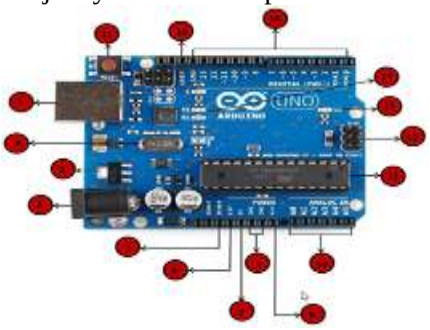
Various kinds of Arduino boards are available depending on different microcontrollers used. However, all Arduino boards have one thing in common: they are programed through the Arduino IDE.

The differences are based on the number of inputs and outputs (the number of sensors, LEDs, and buttons you can use on a single board), speed, operating voltage, form factor etc. Some boards are designed to be embedded and have no programming interface (hardware), which you would need to buy separately. Some can run directly from a 3.7V battery, others need at least 5V.

Here is a list of different Arduino boards available.

3.3 Board Description:

In this chapter, we will learn about the different components on the Arduino board. We will study the Arduino UNO board because it is the most popular board in the Arduino board family. In addition, it is the best board to get started with electronics and coding. Some boards look a bit different from the one given below, but most Arduinos have majority of these components in common.



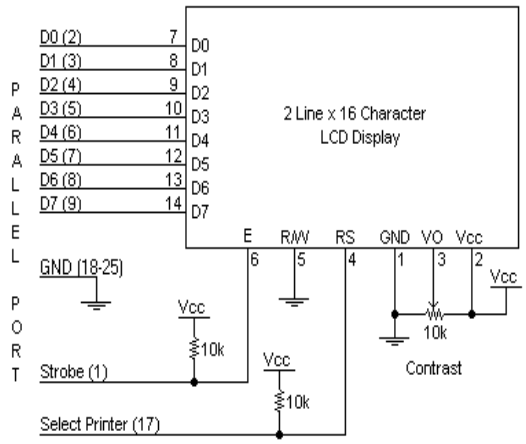
3.4 Liquid Cristal Display

A liquid crystal display (LCD) is a thin, flat display device made up of any

number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

A program must interact with the outside world using input and output devices that communicate directly with a human being. One of the most common devices attached to an controller is an LCD display. Some of the most common LCDs connected to the contollers are 16X1, 16x2 and 20x2 displays. This means 16 characters per line by 1 line 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

3.5 Schematic Diagram



- Above is the quite simple schematic. The LCD panel's *Enable* and *Register Select* is connected to the Control Port. The Control Port is an open collector / open drain output. While most Parallel Ports have internal pull-up resistors, there are a few which don't. Therefore by incorporating the two 10K external pull up resistors, the circuit is more portable for a wider range of computers, some of which may have no internal pull up resistors.
- We make no effort to place the Data bus into reverse direction. Therefore we hard wire the *R/W* line of the LCD panel, into write mode. This will cause no bus conflicts on the data lines. As a result we cannot read back the LCD's internal Busy Flag which tells us if the LCD has accepted and finished processing the last instruction. This problem is overcome by inserting known delays into our program.
- The 10k Potentiometer controls the contrast of the LCD panel. Nothing fancy here. As with all the examples, I've left the power supply out. You can use a bench power supply set to 5v or use a onboard +5 regulator. Remember a few de-coupling capacitors, especially if you have trouble with the circuit working properly.

3.6 CONTROL LINES:

EN: Line is called "Enable." This control line is used to tell the LCD that you are sending it data. To send data to the LCD, your program should make sure this line is low (0) and then set the other two control lines and/or put data on the data bus. When the other lines are completely ready, bring EN high (1) and wait for the minimum amount of time required by the LCD datasheet (this varies from LCD to LCD), and end by bringing it low (0) again.

RS: Line is the "Register Select" line. When RS is low (0), the data is to be treated as a command or special instruction (such as clear screen, position cursor, etc.). When RS is high (1), the data being sent is text data which should be displayed on the screen. For example, to display the letter "T" on the screen you would set RS high.

RW: Line is the "Read/Write" control line. When RW is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively querying (or reading) the LCD. Only one instruction ("Get LCD status") is a read command. All others are write commands, so RW will almost always be low. Finally, the data bus consists of 4 or 8 lines (depending on the mode of operation selected by the user). In the case of an 8-bit data bus, the lines are referred to as DB0, DB1, DB2, DB3, DB4, DB5, DB6, and DB7.

Logic status on control lines:

• E - 0 Access to LCD disabled
- 1 Access to LCD enabled
• R/W - 0 Writing data to LCD
- 1 Reading data from LCD
• RS - 0 Instructions

- 1 Character

Writing data to the LCD:

1) Set R/W bit to low
2) Set RS bit to logic 0 or 1 (instruction or character)
3) Set data to data lines (if it is writing)
4) Set E line to high
5) Set E line to low

Read data from data lines (if it is reading) on LCD:

1) Set R/W bit to high
2) Set RS bit to logic 0 or 1 (instruction or character)
3) Set data to data lines (if it is writing)
4) Set E line to high
5) Set E line to low

Entering Text:

First, a little tip: it is manually a lot easier to enter characters and commands in hexadecimal rather than binary (although, of course, you will need to translate commands from binary couple of sub-miniature hexadecimal rotary switches is a simple matter, although a little bit into hex so that you know which bits you are setting). Replacing the d.i.l. switch pack with a of re-wiring is necessary.

3.7 L293D

L293D is basically a high current dual motor driver/controller Integrated Circuit (IC). It is able to drive load having current up to 1A at the voltage ranging from 4.5V to 36V. Motor driver usually act as current amplifier because they receive a low current signal as an input and provides high current signal at the output.

Motors usually operates on this higher current. L-293D has to builtin H-Bridge driver circuits and is able to control two DC motors at a time in both clockwise and counter clockwise direction. It has two enable pins and they should be kept high in order to control the motor. By changing the polarity of applied signal motor can be rotated in either clockwise or counter clockwise direction. If L 293D enable pin is high, its corresponding driver will provide the desired out. If the enable pin is low, there will be no output. L-293D has different features including internal ESD protection, large voltage supply range, large output current per channel, high noise immunity input etc. L 293D plays a vital role in electronics era and has several different applications e.g relay drivers, DC motor drivers, stepping motor drivers etc. The further detail about L 293D motor driver/controller will be given later in this tutorial.

3.8 Introduction to L293D

L293D is basically a motor driver or controller. It has two builtin H-bridge circuits which are able to control two DC motors simultaneously in both clockwise and counter clockwise direction. It acts as an current high amplifier because it take low current signal at its input and provides higher current signal at the output in order to drives different load e.g stepper motor & DC motors. Its features include large inpu voltage supply range, large output current high noise immunity input signals etc. Its common real life applications include stepping motor drivers, relay drivers, DC motor drivers etc. L-293D motor driver/controller is shown in the figure given below.

L293D Motor Driver

1. L293D Pins

- L-293D has sixteen (16) pins, having different individual functions.
- All of these sixteen pins along with their serial no, are given in the table shown below.

2. L293D Pin Functions

- L 293D each pin has different tasks to perform when they are in working condition.
- The tasks assigned to each pin are given in the table shown below.

3.9 L293D Pinout

- Pinout diagram of any device presents the pins configuration through a completely labelled diagram.
- L293D pinout diagram is shown in the figure given below.

Figure: L293D

3.10 Buzzer:

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Electromechanical

The electric buzzer was invented in 1831 by Joseph Henry. They were mainly used in early doorbells until they were phased out in the early 1930s in favor of musical chimes, which had a softer tone.[2]

Piezoelectric

Piezoelectric buzzers, or piezo buzzers, as they are sometimes called, were invented by Japanese manufacturers and fitted into a wide array of products during the 1970s to 1980s. This advancement mainly came about because of cooperative efforts by Japanese manufacturing companies. In 1951, they established the Barium Titanate Application Research Committee, which allowed the companies to be "competitively cooperative" and bring about several piezoelectric innovations and inventions.

Electromechanical

Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz (the contacts buzz at line frequency if powered by alternating current) Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made.

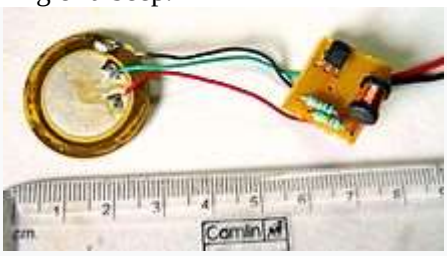
Mechanical

A joy buzzer is an example of a purely mechanical buzzer and they require drivers. Other examples of them are doorbells.

Piezoelectric

Piezoelectric disk beeper

A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.



Interior of a readymade loudspeaker, showing a piezoelectric-disk-beeper (With 3 electrodes ... including 1 feedback-electrode (the central, small electrode joined with red wire in this photo), and an oscillator to self-drive the buzzer.

WIFI:

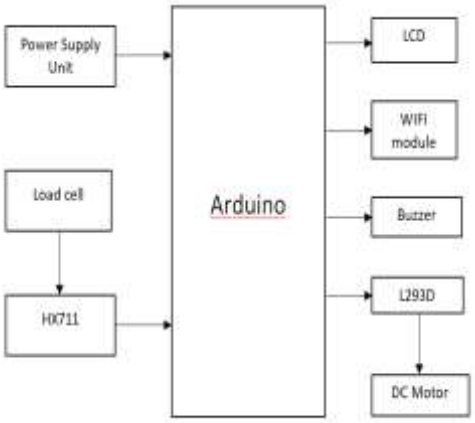
Figure 1. ESP8266 ESP-01 module / ©Sparkfun

HX711 ADC IC

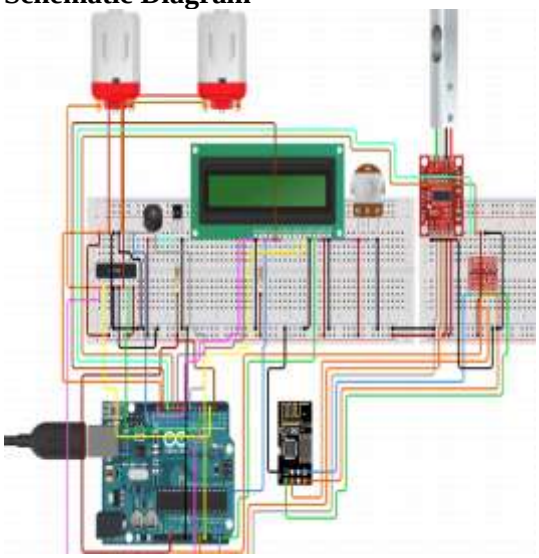
HX711 is an **ADC chip with preamplifier** included. The chip is specifically designed for weight scales applications. The load cells which usually measure weight provide voltage outputs in millivolts. These outputs are difficult to handle directly by controllers, so we can use **HX711 IC** which takes these voltage signals and provide standard digital values which can be used by a microcontroller. The chip has integrated preamplifier specifically to handle these low voltages.

IV. Result:

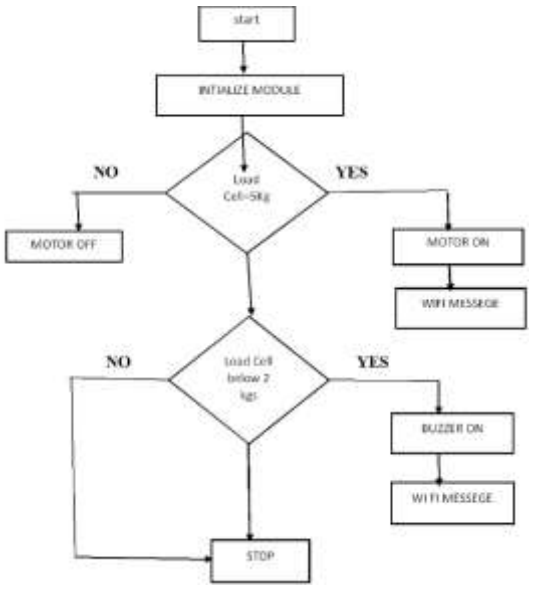
Block Diagram



Schematic Diagram



FLOWCHART



V. CONLCUSIONS

Through this project we are able to come up with a efficient solution in the medical field.To conclude, the entire project is about alerting the medical staff based upon the level of Saline in the bottle.If the Saline level reaches threshold the system automatically sends the message to the staff.Thus the staff can react and take care of the patient condition.

VI. REFERENCES

[1] Ashika A. Dharmale1, Revati R. Mehare, Ankita R. Bharti,ShwetaR.Meshram,Prof.SwapnilV.Deshmukh International Journal of Advanced Research in Computer and Communication Engineering Vol.8, Issue4, April 2019 IOT Based Saline LevelMonitoring&Automatic Alert System.

[2] Priyadharshini.R,Mithuna.S, Vasanth Kumar.U, Kalpana Devi.S, Dr. Suthanthira Vanitha., Automatic Intravenous Fluid Level Indication System for HospitalsN Volume 3 Issue VIII, August 2015 IC Value: 13.98 ISSN: 2321-9653 International Journal for Research in Applied Science & Engineering Technology (IJRASET) 2015.

[3] Khushboo Vaishnav, Neha Swamy, Nargees Bano Haidarali, Prof.Madhuri Patil , IoT Based Saline Level Monitoring System ,International Journal of Innovations & Advancement in Computer ScienceIJIACS ISSN 2347 – 8616 Volume 6, Issue 10

October 2017. ,International Journal of Engineering &Technology, 7 (2.7) (2018) 817-819 International Journal of Engineering &Technology.
[4] B. Naga Malleswari1, P. Vijay varma, Dr.N.Venkataram,, Smart saline level monitoring system using IOT
[5] Anusha Jagannathachari, Archana Rajan Nair, Saline Level Indicator, IOSR Journal of Computer Engineering (IOSRJCE) e-ISSN: 2278-0661,p-ISSN: 2278-8727 PP 13-16 www.iosrjournals.org