ABSTRACT

Liquid is one of the Precious and most important resources on the earth. Nowadays people prefer working smarter rather than the old day's techniques that have been used till date. Internet of Things (IOT) Based on this concept we conserve the energy in the tank and monitor the tank at the same time (sense and monitor). The Main objective is to have a sensor which detects the level of liquid and it should notify the user about the liquid level which is currently available in the tank. The Ultrasonic Sensor is placed at the top of the tank in which we will measure the level of liquid and the if the distance of the liquid from the sensor gets increased, it means that the liquid in the tank gets low and finally after reaching to an extent the system should notify by buzzer. The Major requirement would be Ultrasonic sensor that senses level of liquid (in distance) from the top of the tank to the bottom of the tank. The sensor is connected to the system using the Wi-Fi of NODE MCU (D1 MINI ESP8266). The Blynk library is installed in the device and connected in the Nodemcu. The Blynk application is used to get the values and the notification will be sent to the mobile of the user. Thus, the user can get notified that the tank is empty and can take further steps to fill the liquid in the tank.

Keywords: Ultrasonic Sensor, echo, trig, relay, level.

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CHAPTER 1

INTRODUCTION

1.1 Background

Internet of Things (IOT) is a concept that encompasses various objects and methods of communication to exchange information. Today IOT is more a descriptive term of a vision that everything should be connected to the internet. IOT will be fundamental in the future because the concept opens up opportunities for new services and new innovations. All objects will be connected and able to communicate with each other, while they operate in unprotected environments. This later aspect leads to major security challenges. Today, IOT is in great need of standardization and clear architectures that describe how this technology should be implemented and how IOT devices interact with each other in a secure manner. The security challenges are rooted in the technology and how information is acquired and manipulated by this technology. The Internet of Things (IOT), sometimes referred to as the Internet of Objects, will change everything including ourselves. This may seem like a bold statement, but consider the impact the Internet already has had on education, communication, business, science, government, and humanity. Clearly, the Internet is one of the most important and powerful creations in all of human history. Now consider that IOT represents the next evolution of the Internet, taking a huge leap in its ability to gather, analyze, and distribute data that we can turn into information, knowledge, and, ultimately, wisdom. In this context, IOT becomes immensely important. Already, IOT projects are under way that promise to close the gap between poor and rich, improve distribution of the world's resources to those who need them most, and help us understand our planet so we can be more proactive and less reactive. Having a common set of standards, and developing energy sources for millions even billions of minute sensors. However, as businesses, governments, standards bodies, and academia work together to solve these challenges IOT will continue to progress

1.2 Motivation

Automatic Liquid level controller is highly recommended for Small Scale Industries, Home or areas drinking liquid is supplied through pipelines which are further distributed in homes, company, hotels. societies etc. At large these systems not only help us but our neighborhoods and society also, as it reduces the wastage of liquid by cutting down any further overflows than what you need.

CHAPTER 2

2.1 Problem Statement

The main problem we intend to focus on is the efficient automation working on the tanks. With our project we can solve the issue of needing manual surveillance and working of the tank. In most place there is a need for upgrade in such tanks and thus we want to make a change in the society by building a smarter tomorrow.

2.2 Scope

This project focuses on saving the precious resources such as liquid resources and electricity at the same time works without needing human interaction. Our project is an automation system which does all the work on its own and indicates the same to us on our smart phones.

CHAPTER 3

3.1 Literature Survey Summary

1. PAPER 1

PAPER: ULTRASONIC BASED WATER LEVEL DETECTION AND CONTROL SYSTEM

AUTHOR: M. I. Bello1, S. M. Gana2, M. I. Faruk3 and M. J. Umar4
PUBLICATION: Nigerian Journal of Technology (NIJOTECH)
I2CTISSN: Apr 2018

There are many proposed methods for liquid level detection given in various literature; such as the capacitive, fiber optics, infrared techniques etc. A more recent and related work proposed the level detection using ultrasonic sensor , but the system dynamics and the input to the system were not taken into consideration which will render the system highly unstable. Ebere, et al used copper sensors positioned at a particular level in the tank as the water level sensor. He considers the electrical conductivity of water and immersed metal contacts (copper) to compare the voltage corresponding to the water level with a reference voltage. In another related research, a water level controller was designed using Microcontroller interfaced with a couple of sensors, buzzer, motors and LCD for the water level detection, alerting, flow control and display respectively proved to have some level of sturdiness in terms of cost, speed and flexibility, though some degree of complexity is involved in relation to the overall system integration. It can be observed that the system require high-level expertise in its development, ranging from the sensor selection to the development of the signal conditioning circuit unit, then data acquisition which is usually accompanied by computer programming and finally to the output display unit for observations. Sakharov et al. proposed a liquid level sensor by using ultrasonic lamb wave where the characteristics of the acoustic lamb wave propagating in a steel plate was observed experimentally, but the non-linearity of the system renders it impracticable. Guillet et al. proposed an innovative way of detecting water level, by using Chipless RFID principles. Several high quality factor resonators are used for this purpose where no additional sensitive material is needed. The water level detection is done using classical RFID tag with Chipless RFID sensor design based on multiple resonators etched on flexible lamination. The maximum water level that can be detected is strongly dependent on the distance between the tag and the reader antenna. N. K. Kaphungkui utilizes the switching effect of a transistor which will be either in cut off mode or saturation mode depending upon the signal level applied to its base and a 555 timer control the state of output. He also proposed checking the level of impurity in the water (dirt) where low Signal is receive from the output. A relay is used to switch the pump ON only when the High output is produce from both dirt detection and when water level is low otherwise pump is off. On the other hand an invasive optical fiber technique is used for the detection of liquids below freezing point; the system was made up of a multiplexed array of point probes

though limited to the elimination of large temperature gradient from liquid vapor. In another related literature, a water level controller was developed using a metal contact and the concept of water conductivity to detect its maximum and the minimum levels. The sensing unit must be fully immersed into the water tank before any measurement can be obtained with make the system highly intrusive. Other disadvantages of the designed system are its unreliability due to water-metal contact that will lead to corrosion and the fact that the system only considers the level extremes (maximum and the minimum) and ignore all other levels.

2. PAPER 2

PAPER: AUTOMATIC WATER LEVEL INDICATOR USING ULTRASONIC SENSOR AND GSM MODULE

AUTHOR: Mr.Muthamil Selvan.S , 2Aratrika Roy, 3Kurnal Pratap Singh, 4Ashutosh Kumar

PUBLICATION: IJARIIE
ISSN: Published on MAY 2017

[1] Tank Water Level Indicator and Controller Using Arduino by Amrit Kumar Panigrahi, Chandan Kumar Singh, Diwesh Kumar, Nemisha Hota. This paper gave the idea of using echo method. It also helped us in making the system's mechanism simpler. [2] Electrical Appliances Control Prototype by Using GSM Module and Arduino by Tigor Hamonangan Nasution, Muhammad Anggia Muchtar, Ikhsan Siregar, Ulfi Andayani, Esra Christian,Emerson Pascawira Sinulingga. This paper helped us to understand the connections between the components. [3] Water Level Indicator using Micro-controller by Mudit Bajpai, Money Saxena. This paper helped us to understand the uses of probe method and how it is cost efficient. [4] Water Level Monitoring System using IOT by Priya J, Sailusha Chekuri. This method helped us to understand the use of Bluetooth modules and how it can be made as portable device. [5] Smart Wireless Water Level Monitoring and Pump Controlling System by Madhurima Santra, Sanjoy Biswas, Sibasis Bandhapadhyay, Kaushik Palit. This paper helped us to understand the use of echo method better and how it can be made cost efficient.

3. PAPER 3

PAPER: Water Level Monitoring using Blynk Application in IoT
AUTHOR: C.Navaneethan, S.Meenatchi

PUBLICATION: International Journal of Research and Innovations in Science and Technology (IJRTE)
E-ISSN: NOV 2019

In this paper water level detection is done by the ultrasonic sensor, when the water level reaches below a threshold value which is specified by the user, the senser notifies the Arduino Uno. Data uploaded to the Cloud storage and android app get the notification [1]. In this paper based on water wastage prevention and making it as automatic one to control over wastage. Main aim of this paper is making automatic control to prevent water wastage with help of embedded components using wi-fi module to send data[2] In this paper based on water level monitoring based on GSM technology and pump control system. the Ultrasonic sensor fixed and measure the distance send message to the user about status of water level This Paper aimed sense level of water with the help of sensor and GSM Technology[3]. In this paper based on two major components: Microcontroller and Zigbee module for wireless sensor networks. Here system observe the water quality using Microcontroller as well as Zigbee module. Implemented in Raspberry pi which creates gateway and cloud technology.it makes system can monitor the data anywhere in the world. Since it is a Internet based system which supports web application also [4] In this paper implemented based on real time scenario. This paper give solution is that low cost integrates sensory which permit to observe the water quality. with the help of internet data collected, transferred to cloud and this data received by consumer owned terminal[5] In this paper based on design and develop real time water level monitoring and its quality. with the help of more than one sensor values sensed and send it to Raspberry pi which send data to the cloud. this data can see anywhere in the world as well as Since it is a Internet based system which supports web application also [6]

CHAPTER 4

Proposed System

4.1 Overview

What are we building?

We are trying to make Liquid Level Control System and it will have very simple interface.

Monitoring Systems are necessary to understand the changes that take place in environments. Remote monitoring and data collection systems are useful and effective tools to collect information from bulk storage tanks and to monitor the same. The measurement of liquid inside the tank is most important and such systems are useful in industries which are categorized as safety critical systems. the architecture and initial testing results of a low power wireless system for tank level monitoring using ultrasonic sensors. This liquid level system is based on new Android application and preserves more energy. It's very easy to maintain, low cost and flexible monitoring. This system uses Blynk application to point out the liquid level. Liquid level is monitored by using Blynk Android application in online mode. The Blynk application is also used to do scheduled process of motor on/off & monitor the liquid level. It can detect error-free level of liquid in tank.

Flow diagram of the proposed system

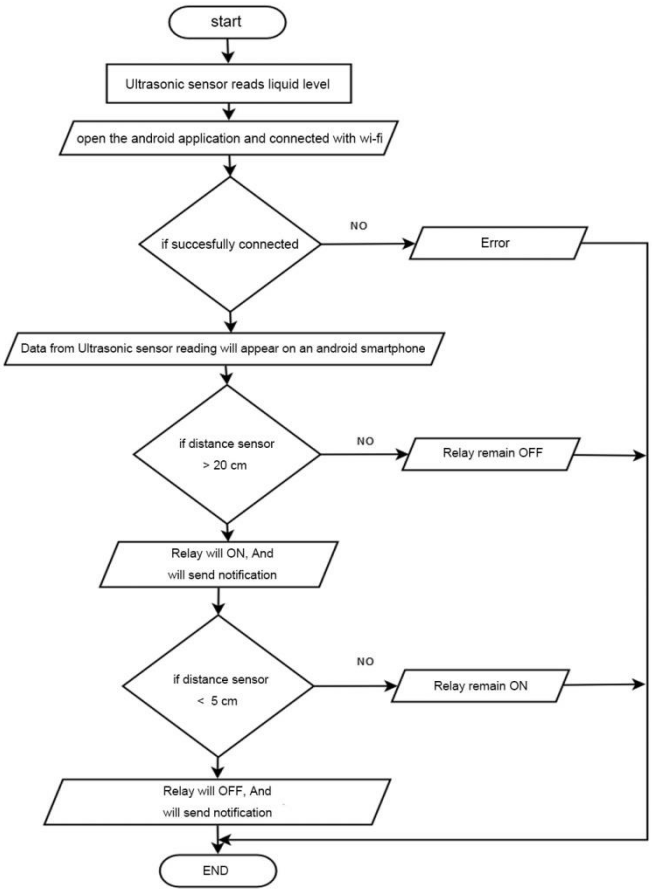


Figure 4.1.1 Flow diagram

- When the system starts, ultrasonic sensor reads liquid level
- Open the android application and connect with cloud server connected successfully
- If the liquid level is lesser than 25% relay gives signal to start pump and fill the liquid tank
- When the liquid level reaches 90% ,relay gives signal to stop the pump
- All of this is displayed on the blynk interface and LCD.

4.2 Functional modules

1. D1 MINI ESP8266

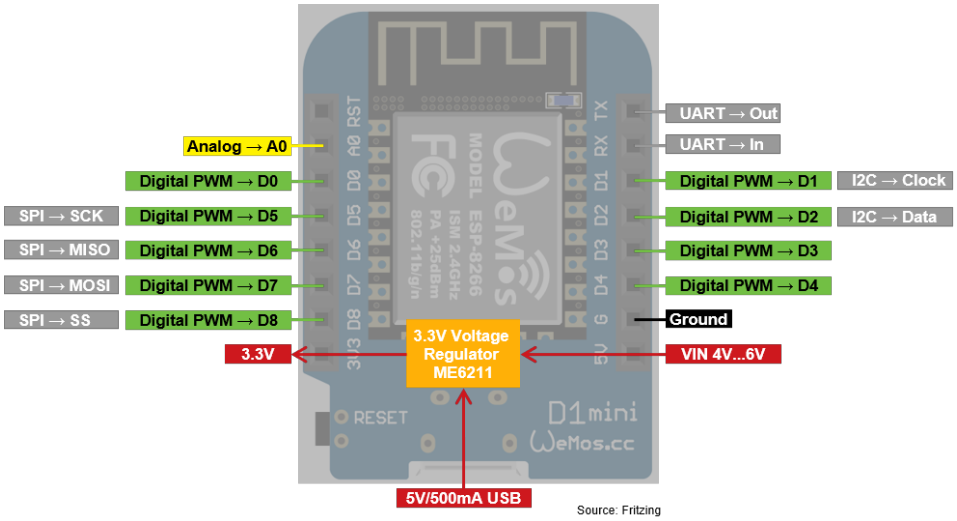


Figure 4.2.1 D1 MINI ESP8266

ESP8266 is a very popular Wi-Fi enabled microcontroller. Thanks to very attractive price and huge possibilities quickly became a very popular choice - especially in domain of home automation. However bare ESP8266 is a bit tricky for beginners. It requires stable power supply, and sophisticated programming method. WeMo's D1 mini solves all those inconveniences. Basically, it's very similar to NodeMCU module. The main difference is size. Wemos D1 is smaller, and have newer version of Wi-Fi module - 12F. More stable and with a better range. Wemos D1 module it's a small board with ESP8266-12F. On board there is also USB-UART converter (popular CH340). Because of that, all you need to start programming is simple USB cable. Wemos D1 provides 9 GPIO ports with PWM, I2C, SPI and 1-Wire support. Thanks to 3.3V LDO module can be powered directly from USB port via microUSB power supply. They are 3 basic methods to use Wemos. AT commands, LUA programming language with NodeMCU firmware and simplest and our favourite Arduino IDE.

2. ULTRASONIC SENSOR

The HC-SR04 Ultrasonic sensor comes with four pins namely Vcc pin, Trigger pin, Echo pin, & Ground pin. This sensor is used to measure the accurate distance between the target and the sensor. This sensor mostly works on the sound waves. When the power supply is given to this module, it generates the sound waves to travel throughout the air to hit the necessary object. These waves strike and come back from the object, then collects by the receiver module. Here both the distance as well as time has taken is directly proportional because the time taken for more distance is high. If the trigger pin is kept high for 10 μs, then the ultrasonic waves will be generated which will travel at the sound speed. So it creates eight cycles of sonic burst that will be gathered within the Echo pin. This ultrasonic sensor is interfaced with Arduino to gauge the necessary distance between sensor & object. The distance can be calculated using the following formula.

S = (V x t)/2

Where the 'S' is the required distance

'V' is the sound's speed

t' is the time taken for sound waves to return back after striking the object.

The actual distance can be calculated by dividing its value with 2 as the time will be twice once the waves travel and get back from the sensor.

3. POWER SUPPLY:

A DC Adapter or charger, powerbank has been used as means of power supply. A battery converts chemical energy into electrical energy by a chemical reaction. Usually, the chemicals are kept inside the battery. It is used in a circuit to power other components. A battery produces direct current (DC) electricity (electricity that flows in one direction, and does not switch back and forth). Using the electricity from an outlet in a building is cheaper and more efficient, but a battery can provide electricity in areas that do not have electric power distribution. It is also useful for things that move, such as electric vehicles and mobile phones. Batteries may be primary or secondary. The primary is thrown away when it can no longer provide electricity. The secondary can be recharged and reused.

4. RELAY MODULE :

A relay is an electromagnetic switch operated by a relatively small current that can control much larger current. Here's a simple animation illustrating how the relay uses one circuit to switch on another circuit. Initially the first circuit is switched off and no current flows through it until something (either a sensor or switch closing) turns it on. The second circuit is also switched off. When a small current flows through the first circuit, it activates the electromagnet, which generates a magnetic field all around it. The energized electromagnet attracts a contact in the second circuit toward it, closing the switch and allowing a much bigger current to flow through the second circuit. When the current stops flowing, the contact goes back up to its original position, switching the second circuit off again.

5. 16X2 LCD MODULE:

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is a very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in a 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

6. I2C MODULE:

I2C Module has an inbuilt PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display. These modules are currently supplied with a default I2C address of either 0x27 or 0x3F. To determine which version, check the black I2C adaptor board on the underside of the module. If there are 3 sets of pads labelled A0, A1, & A2 then the default address will be 0x3F. If there are no pads the default address will be 0x27. The module has a contrast adjustment pot on the underside of the display. This may require adjusting for the screen to display text correctly.

CHAPTER 5

Methodology

5.1 System Design

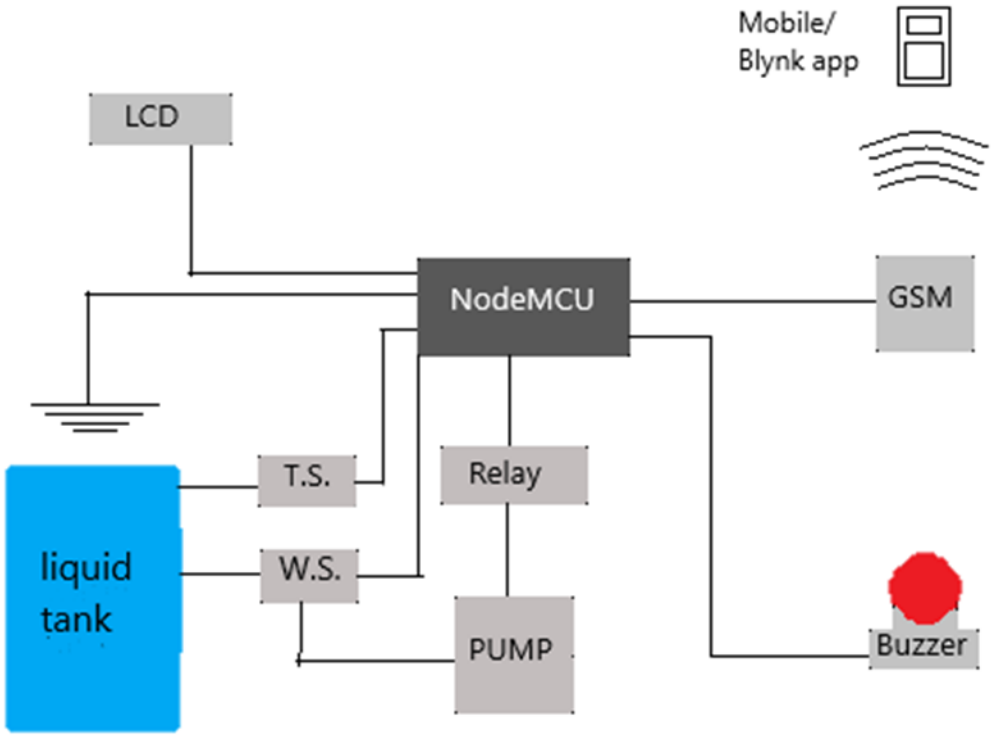


Figure 5.1.1 Hardware block diagram

As the figure suggests, everything is mainly connected to the nodemcu as it is the most important component and brain of our system. The system needs a constant power supply for the continuous working of every component, and it also needs Wi-Fi connectivity to monitor and indicate the liquid level regularly. The relay gives the signal for the pump to turn on/ off, the Lcd display is another display unit the, the buzzer is for extreme conclusions

5.2 System Component Selection

1. D1 MINI ESP8266 :

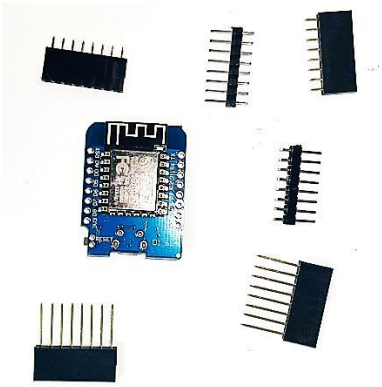


Figure 5.3.1 D1 MINI ESP8266

This is D1 Mini V2 NodeMcu 4M Bytes Lua WIFI Internet Of Things Development Board Based ESP8266, it is a mini WIFI board based on ESP-8266EX. 11 digital input/output pins, all pins have interrupt/PWM/I2C/one-wire supported(except D0) 1 analog input(3.3V max input) and a Micro USB connection. The development board features Wi-Fi-SoC ESP8266 and is made for fast Internet-of-Things (IoT) prototyping. It is flashed with the latest firmware version and can be set up and programmed right away with the onboard micro USB connection. With only a few lines of code, the NodeMCU Dev Kit connects to your local network and ready for control by other network members like computers and smartphones. The d1 mini is an ESP8266 development board that is compact, versatile and very easy to use with the Arduino IDE. It supports natively by the Expressive SDK.

1.	Processor	:	Tensilica Xtensa Diamond 32-bit – 2.4Mhz
2.	Clock Speed	:	80/160MHz
3.	Operating Voltage	:	3.3V
4.	Input Current	:	400mA-500mA
5.	Maximum input Voltage	:	4-5V
6.	Digital I/O Pins (with PWM)	:	11
7.	Analog Input Pins	:	1
8.	Flash Memory	:	4MB
9.	SRAM	:	64KB
10.	WIFI	:	IEEE 802.11 b/g/n
11.	Programmable	:	Arduino IDE
12.	Maximum Output Current	:	400mA

2. ULTRASONIC SENSOR :

Figure 5.3.2 ULTRASONIC SENSOR-HC-SR04

Ultrasonic sensors provide a measurement of the time it takes for sound to bounce off an object and return to the sensor. The "ping" sound pulse is generated when the Ping Pin level goes HIGH for two micro-seconds. The sensor will then generate a pulse that terminates when the sound returns. The width of the pulse is proportional to the distance the sound traveled and the sketch then uses the pulse in () function to measure that duration. The speed of sound is 340 meters per second, which is 29 microseconds per centimeter. The formula for the distance of the round trip is: Roundtrip = microseconds / 29. So, the formula for the one-way distance in centimeters is: Microseconds / 29 / 2

Specification:

1. Operating voltage : 5V
2. Operating current : 15mA
3. Operating frequency : 40KHz
4. Measuring angle : 15degree
5. Ranging accuracy : 3mm
6. Range : 2cm-400cm
7. Trigger input signal : 10microS

3. 16X2LCD DISPLAY :

Figure 5.3.3 16X2 LCD DISPLAY

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data. Command register stores various commands given to the display. Data register stores data to be displayed. The process of controlling the display involves putting the data that form the image of what you want to display into the data registers, then putting instructions in the instruction register. In your Arduino project Liquid Crystal Library simplifies this for you so you don't need to know the low-level instructions. Contrast of the display can be adjusted by adjusting the potentiometer to be connected across VEE pin.

Specification:

1. Display Type: Negative white on Blue backlight.
2. I2C Address:0x38-0x3F (0x3F default)
3. Supply voltage: 4.8-5V
4. Interface: I2C to 4bits LCD data and control lines.
5. Input Current : 170mA

4. I2C MODULE:

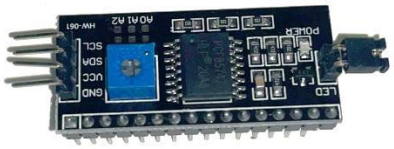


Figure 5.3.4 I2C MODULE

I2C Module has a inbuilt PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display. These modules are currently supplied with a default I2C address of either 0x27 or 0x3F. To determine which version you have check the black I2C adaptor board on the underside of the module. If there 3 sets of pads labelled A0, A1, & A2 then the default address will be 0x3F. If there are no pads the default address will be 0x27. The module has a contrast adjustment pot on the underside of the display. This may require adjusting for the screen to display text correctly.

Specifications:

1. Operating Voltage: 5V
2. Backlight and Contrast is adjusted by potentiometer
3. Serial I2C control of LCD display using PCF8574
4. Operating current : 30mA
5. Compatible for 16x2 LCD
6. With this I2C interface module, you will be able to realize data display via only 2 wires.

5. RELAY :

Figure 5.3.5 RELAY

2-Channel 5V Relay Module is a relay interface board, it can be controlled directly by a wide range of microcontrollers such as Arduino, AVR, PIC, ARM and so on. It uses a low level triggered control signal (3.3-5VDC) to control the relay. Triggering the relay operates the normally open or normally closed contacts. It is frequently used in an automatic control circuit. To put it simply, it is an automatic switch to control a high-current circuit with a low-current signal.5V relay signal input voltage range, 0-5V. VCC power to the system. JD-VCC relay in the power supply. JD-VCC and VCC can be a shorted.

Specifications:

1. High current relay, AC250V 10A, DC5V 10A
2. 2 LEDs to indicate when relays are on
3. Works with logic level signals from 3.3V or 5V devices
4. Opti isolation circuitry
5. Operating current : 70mA Per Relay

6. TEMPRATURE SENSOR:

Figure 5.3.6 TEMPRATURE SENSOR DS18B20

This is a 1 Meter Long Waterproof, sealed and pre-wired digital temperature sensor probe based on DS18B20 sensor. It is very handy for when you need to measure something far away, or in wet conditions. These 1-wire digital temperature sensors are fairly precise (±0.5°C over much of the range) and can give up to 12 bits of precision from the on board digital-to-analog converter. They work great with any microcontroller using a single digital pin, and you can even connect multiple ones to the same pin, each one has a unique 64-bit ID burned in at the factory to differentiate them. Usable with 3.0-5.0V systems. The only downside is they use the Dallas 1-Wire protocol, which is somewhat complex, and requires a bunch of code to parse out the communication. When using with microcontroller put a 4.7k resistor to sensing pin, which is required as a pull-up from the DATA to VCC line.

Specifications:

1. Usable temperature range: -55 to 125°C (-67°F to +257°F)
2. 9 to 12 bit selectable resolution
3. Uses 1-Wire interface- requires only one digital pin for communication
4. Operating Current : 1mA
5. Multiple sensors can share one pin
6. ±0.5°C Accuracy from -10°C to +85°C
7. Operating Voltage: 4.5-5V
8. Query time is less than 750ms
9. Usable with 3.0V to 5.5V power/data

7. BUZZER:

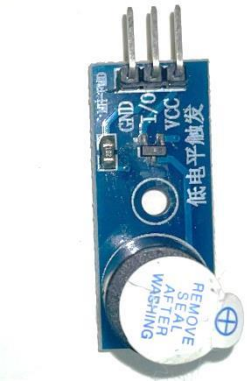


Figure 5.3.7 BUZZER

A 5V Active Alarm Buzzer Module for Arduino is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Just like what you are viewing now, it is a 5V DC Electronic Part Active Buzzer Module. Using top-quality material, it is durable in use.

Specifications:

1. Operating Voltage : 3.3-5V
2. Operating Current : 1mA
3. Buzzer On when input signal is logic low

9. PUMP:

Figure 5.3.8 LIQUID PUMP

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low-cost, small-size Submersible Pump Motor that can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with a very low current consumption of 220mA. Just connect the tube pipe to the motor outlet, submerge it in water, and power it. Make sure that the water level is always higher than the motor. A dry run may damage the motor due to heating and it will also produce noise.

Specifications:

1. Operating Voltage : 3 ~ 6V
2. Operating Current : 130 ~ 220mA
3. Flow Rate: 80 ~ 120 L/H
4. Maximum Lift: 40 ~ 110 mm
5. Continuous Working Life: 500 hours
6. Driving Mode: DC, Magnetic Driving
7. Material: Engineering Plastic
8. Outlet Outside Diameter: 7.5 mm
9. Outlet Inside Diameter: 5 mm

5.3 Implementation :

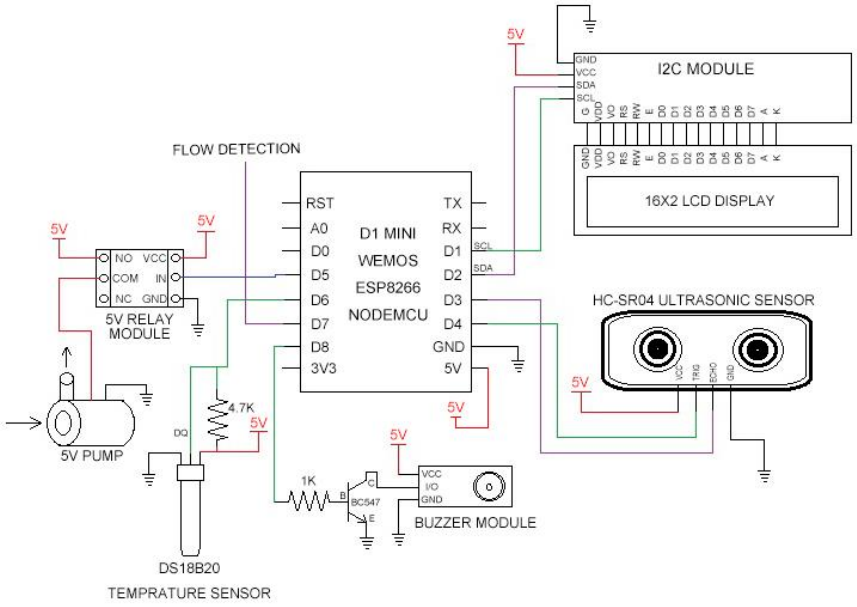


Figure 5.4.1 Circuit diagram

- D1 is connected to the SCL pin of the I2C Module and D2 is connected to the SDA pin
- D3 is connected to the Echo pin of the Ultrasonic sensor and D4 is connected to the Trigger pin
- D5 is connected to the relay module of the input pin and D6 is connected to the temperature sensor
- D8 pin is connected to the buzzer module through a 1K Resistor and transistor BC547
- D7 is a pin for liquid flow detection
- 5v Pump is connected to the relay module normally open and common pin
- All VCC pins use for the 5V power supply and the GND pin is connected to the ground

5.4 Software specifications:

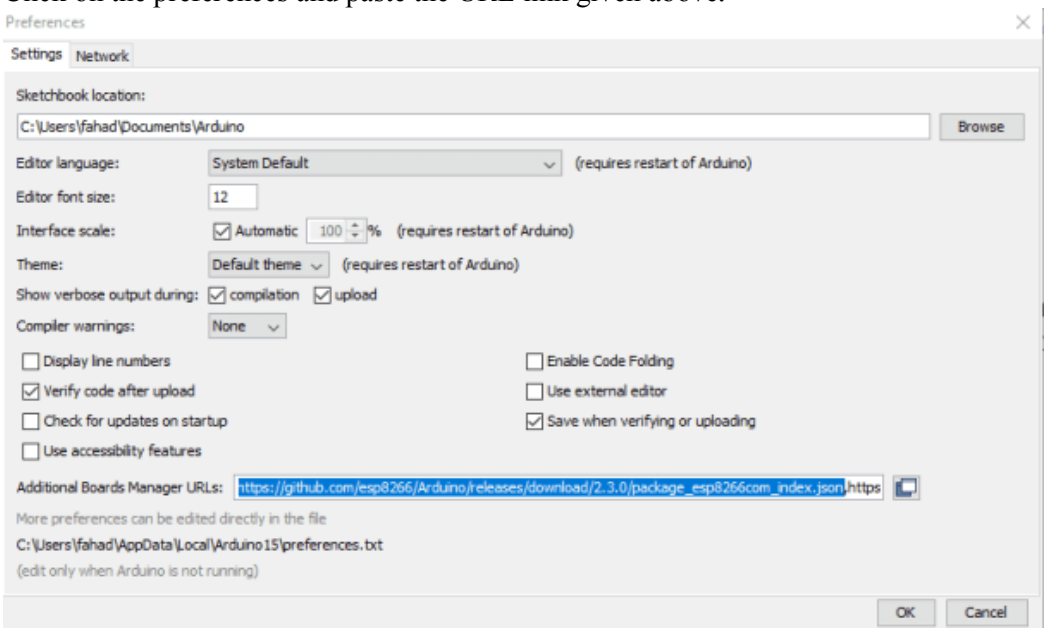
Arduino IDE

Step1:

Open your Arduino IDE

Step2:

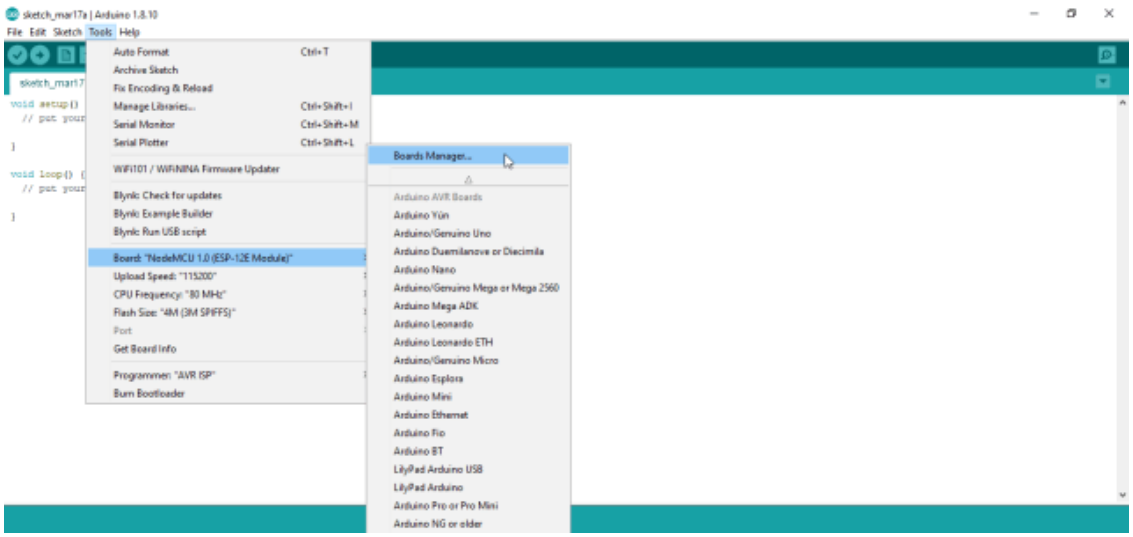
Click on the preferences and paste the URL link given above.



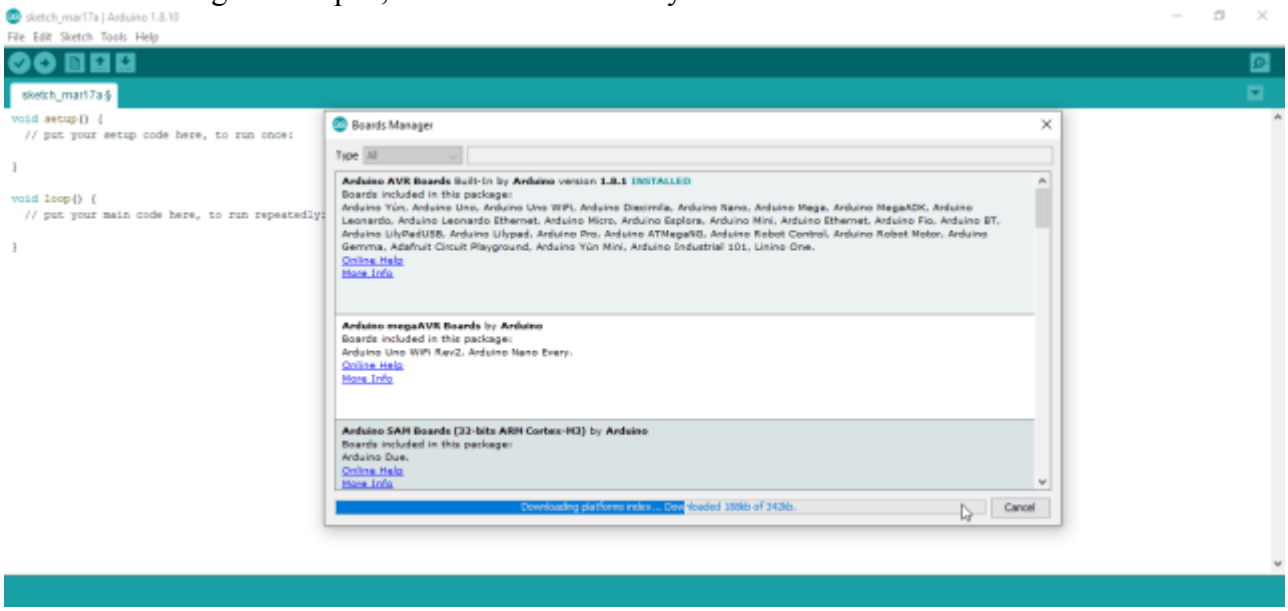
You can see I pasted this link in the Additional Boards Manager URLs box. You are all set and now you can click on the OK button.

Step3:

While your Arduino IDE is still open. Click on the Tools Menu > Board > Boards Manager. Click on the Boards Manager.

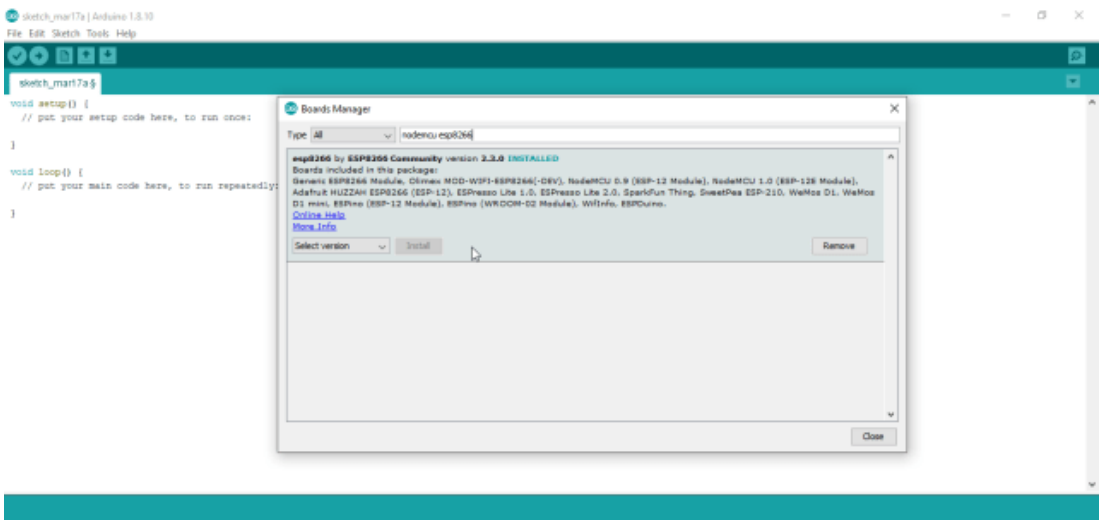


The board manager will open, and will automatically download the index.



This download process may take some time depending on the speed of your internet connection. So, set back and wait for the download process to complete. When the download process is completed then in the search box type “nodemcu esp8266”. Currently, you can see my esp8266 board is installed. So, you will see the install button, click on the install button and wait.

Step4: download other libraries for the device (One Wire, Blynk, Dallastemp etc.)

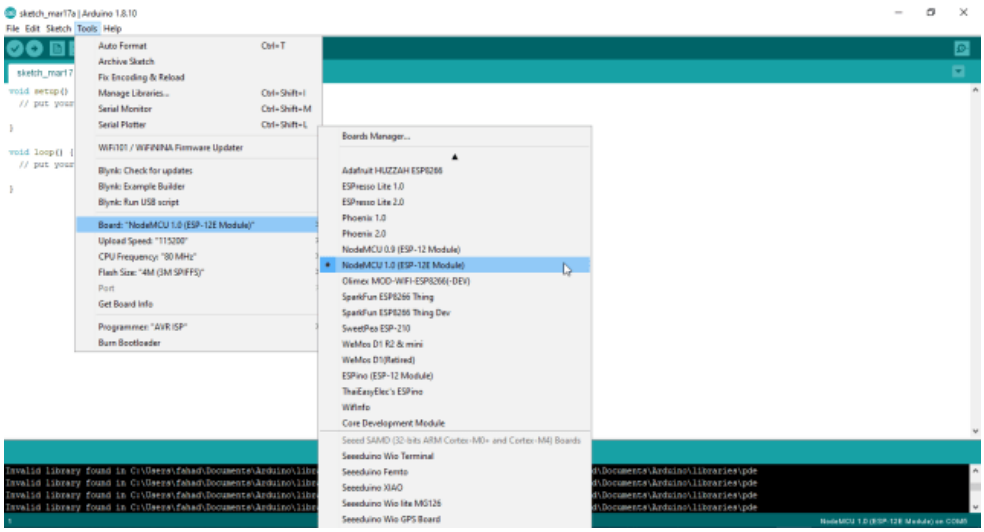


Step5:

After your Nodemcu, ESP8266 board has been installed. The final step is to close the board's Manager window. Now you will need to restart the Arduino IDE so that the Arduino IDE can properly load all the boards.

Step6:

This is the final step to confirm if the Nodemcu ESP8266 board is installed.



Click on the tools menu > boards, scroll down and find the Nodemcu as you can see in the image above.

Step7: Start the coding.

5.5 Program:

```
/*
 D1 5 SCL
 D2 4 SDA
 D3 0 ECHO
 D4 2 TRIDER
 D5 14 PUMP
 D6 12 ONE_WIRE_BUS
 D7 13 WFLOW
 D8 15 AUD
 TX
 TR

*/
// Include the libraries we need
#include <OneWire.h>
#include <DallasTemperature.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3F, 20, 4); // set the LCD address to 0x27 for a 16 chars and 2 line
display
#define BLYNK_PRINT Serial
#include <SPI.h>
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <SoftwareSerial.h>
#include <stdio.h>
#include <string.h>
int level;
char str[15];
char str1[20];

// Data wire is plugged into port 2 on the Arduino
char ssid[] = "OnePlus7t";
char pass[] = "12345679";
// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "hgS3NIovki8QCNMd5noWeuxh8xbDlo_D";
#define PMP 14
#define WFLOW 13
#define AUD 15
//#define PMP 13
#define TRIGGERPIN 2
#define ECHOPIN 0
long duration;
int distance;
```

```
int pinValue,pinValue1=0;
int
PMPS=0,WFLOWS=0,TEMP1=0,TEMP2=0,TEMP3=0,TEMP4=0,TEMP5=0,TEMP6=0,TEM
P7=0,TEMP8=0,MOD=0;
#define ONE_WIRE_BUS 12
WidgetBridge bridge1(V0);
BLYNK_CONNECTED() {
  bridge1.setAuthToken("hgS3NIovki8QCNMd5noWeuxh8xbDlo_D"); // Place the AuthToken of
the second hardware
}  //****

// Setup a oneWire instance to communicate with any OneWire devices (not just Maxim/Dallas
temperature ICs)
OneWire oneWire(ONE_WIRE_BUS);

// Pass our oneWire reference to Dallas Temperature.
DallasTemperature sensors(&oneWire);

/*
 * The setup function. We only start the sensors here
 */
 BLYNK_WRITE(V1)
{
  int pinValue = param.asInt(); // assigning incoming value from pin V1 to a variable
    if(pinValue==HIGH){SendMessage("AUTO MODE");MOD=1;}
    if(pinValue==LOW){SendMessage("MANUAL MODE");MOD=0;}

  // process received value
}
BLYNK_WRITE(V2)
{
  int pinValue1 = param.asInt(); // assigning incoming value from pin V1 to a variable
if(MOD==0&&pinValue1==HIGH){digitalWrite(PMP,LOW);SendMessage("Pump is
on");digitalRead(PMPS);delay(9000);lcd.setCursor(9,1);   lcd.print("P:ON   ");
MOD=0;delay(100);}
if(MOD==0&&pinValue1==LOW){digitalWrite(PMP,HIGH);SendMessage("Pump is
off");digitalRead(PMPS);(PMPS);lcd.setCursor(9,1);   lcd.print("P:OFF ");  MOD=0;}

   // process received value
}

void setup(void)
{
  // start serial port
  Serial.begin(9600);
  Serial.println("Dallas Temperature IC Control Library Demo");
 lcd.init();
  // Print a message to the LCD.
  lcd.backlight();
  // Start up the library
```

```
  lcd.clear();
  lcd.print("Circuit Digest");
  delay(1000);
  lcd.setCursor(0, 1);
  sensors.begin();
   Blynk.begin(auth, ssid, pass);;
  // Clear the terminal content
//  terminal.clear();
    pinMode(TRIGGERPIN, OUTPUT);
    pinMode(ECHOPIN, INPUT);
    pinMode(ONE_WIRE_BUS, INPUT_PULLUP);
     pinMode(PMP, OUTPUT);
     pinMode(WFLOW, INPUT_PULLUP);
pinMode(AUD, OUTPUT);
lcd.clear();
//PMPS=1;
//WFLOWS=1;
}
void loop(void)
{
   Blynk.run();
  // MOD=pinValue;
  // call sensors.requestTemperatures() to issue a global temperature
  // request to all devices on the bus
  //("Requesting temperatures...");
  sensors.requestTemperatures(); // Send the command to get temperatures
  //Serial.println("DONE");
  // After we got the temperatures, we can print them here.
  // We use the function ByIndex, and as an example get the temperature from the first sensor
only.
  float tempC = sensors.getTempCByIndex(0);

  // Check if reading was successful
  if(tempC != DEVICE_DISCONNECTED_C)
  {
   // Serial.print("Temperature for the device 1 (index 0) is: ");
   // Serial.println(tempC);
   sprintf(str1, "%f", tempC);TEMP3=0;
   bridge1.virtualWrite(V4,tempC);
  }
  else
  {if(TEMP3==0){
    SendMessage("Error: Could not read temperature data");TEMP3=1;}
  }
   digitalWrite(TRIGGERPIN, LOW);
   delayMicroseconds(3);
   digitalWrite(TRIGGERPIN, HIGH);
     delayMicroseconds(12);
   digitalWrite(TRIGGERPIN, LOW);
    duration = pulseIn(ECHOPIN, HIGH);
```

```
    distance = (duration/2) / 29.1;
     level=(25-distance)*5;
      delay(1000);
    sprintf(str1, "%f", level);
    bridge1.virtualWrite(V3,level);

    PMPS=digitalRead(PMP);
    WFLOWS=digitalRead(WFLOW);

if(PMPS==1&&WFLOWS==1&&TEMP8==0){SendMessage("Reseted");lcd.setCursor(9,1);lcd
.print("P:");TEMP8=1;PMPS=digitalRead(PMP);delay(100);}

if(PMPS==0&&WFLOWS==1&&TEMP8==1){digitalWrite(PMP,HIGH);SendMessage("Pump
is
tripped");lcd.setCursor(9,1);lcd.print("P:TRIP");TEMP8=0;PMPS=digitalRead(PMP);delay(100)
;}

   //lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("L:");
    lcd.setCursor(2,0);
    lcd.print("     ");
    lcd.setCursor(2,0);
    lcd.print(level);
    lcd.setCursor(6,0);
    lcd.print("%");
    delay(200);
    lcd.setCursor(8,0);
    lcd.print("T:");
    lcd.setCursor(10,0);
    lcd.print("     ");
    lcd.setCursor(10,0);
    lcd.print(tempC);
    lcd.setCursor(15,0);
    lcd.print("C");
    delay(200);
    //

if(MOD==1&&TEMP2==0&&PMPS==1&&level<25&&TEMP8==1){digitalWrite(PMP,LOW
);SendMessage("Pump is on");TEMP2=1;lcd.setCursor(9,1); lcd.print("P:ON   ");delay(9000);
MOD=1;delay(100);}

//if(MOD==1&&TEMP2==1&&PMPS==0&&level>99){digitalWrite(PMP,HIGH);SendMessa
ge("Pump is off");TEMP2=0;lcd.setCursor(9,1); lcd.print("P:OFF
");PMPS=digitalRead(PMP);MOD=1;delay(100);}
    if(TEMP5==1&&WFLOWS==0){SendMessage("Water is
flowing");TEMP5=0;lcd.setCursor(0,1);  lcd.print("W:FLOWING");}
   if(TEMP5==0&&WFLOWS==1){SendMessage("Water is not
flowing");TEMP5=1;lcd.setCursor(0,1); lcd.print("W:NO FLOW");}
  // if(TEMP1==1&&PMPS==0){SendMessage("Pump is on");TEMP1=1;lcd.setCursor(10,1);
```

```
lcd.print("P:ON ");delay(2000); PMPS=digitalRead(PMP);delay(100);}
  // if(TEMP1==0&&PMPS==1){SendMessage("Pump is off");TEMP1=1;lcd.setCursor(10,1);
lcd.print("P:OFF ");PMPS=digitalRead(PMP);delay(100);}
   if(level<25&&TEMP4==0){
digitalWrite(AUD,HIGH);delay(1000);digitalWrite(AUD,LOW);delay(1000);digitalWrite(AUD,
HIGH);delay(1000);digitalWrite(AUD,LOW);SendMessage("Watter level
is<25%");TEMP4=1;}
 // if(level>25&&level<98){TEMP4=0;}
  //if(level>98){TEMP4=1;}
  if(level>98&&TEMP4==1){ digitalWrite(PMP,HIGH);SendMessage("Pump is
off");TEMP2=0;
digitalWrite(AUD,HIGH);delay(1000);digitalWrite(AUD,LOW);delay(1000);digitalWrite(AUD,
HIGH);delay(1000);digitalWrite(AUD,LOW);SendMessage("Watter level
is>99%");TEMP4=0;}
}
void SendMessage(char str1[])
{
  Serial.println("AT+CMGF=1");    //Sets the GSM Module in Text Mode
  delay(1000);  // Delay of 1000 milli seconds or 1 second
  Serial.println("AT+CMGS=\"+917977946059\"\r"); // Mobile number
  delay(1000);
  Serial.println(str1);// The SMS text you want to send
  delay(100);
  Serial.write(26);// ASCII code of CTRL+Z
  delay(1000);
}


/*
 * Main function, get and show the temperature
 */
```

CHAPTER 6

6.1 Advantage: -

1. System runs automatically & manually if wanted.
2. Easy to install, low maintenance, compact design.
3. Shows indication of liquid level for any kind of tank.
4. Liquid levels indicated on the device.
5. Indicates the temperature of the liquid tank.

6.2 Disadvantage: -

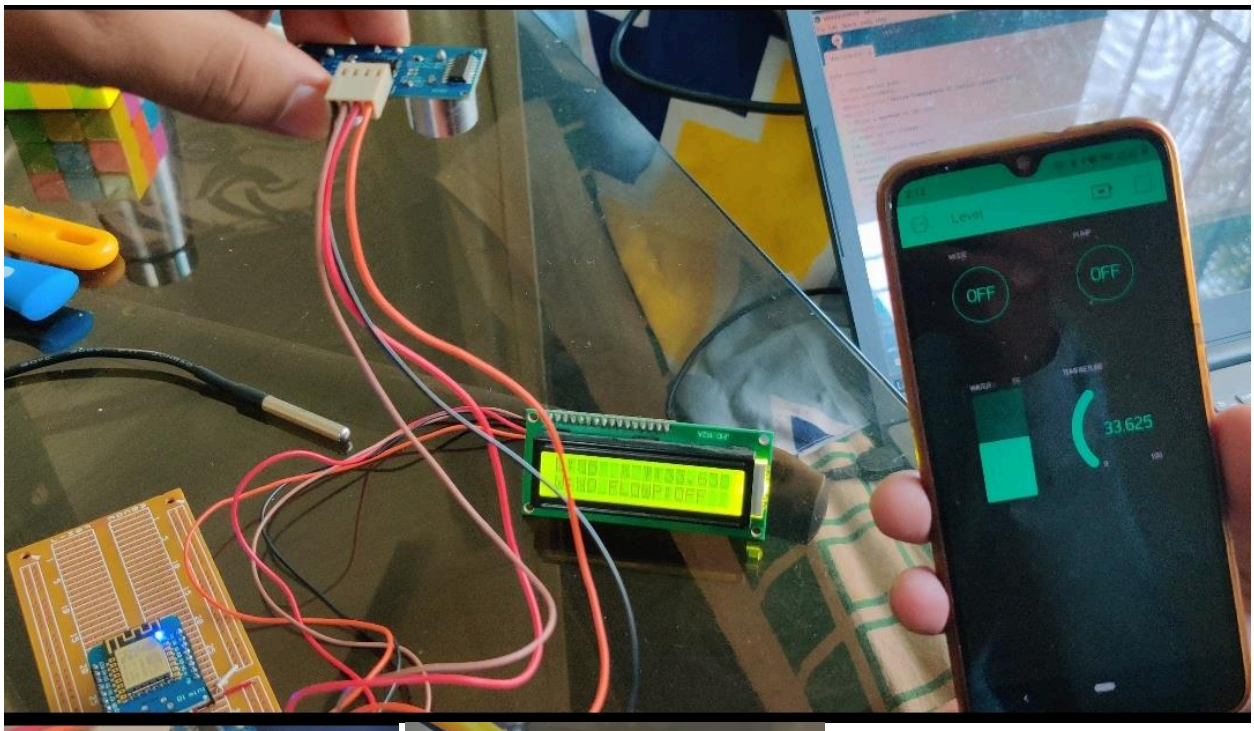
1. Limited range.
2. System needs a constant power supply.
3. Liquid level controls need to be replaced every 3 years

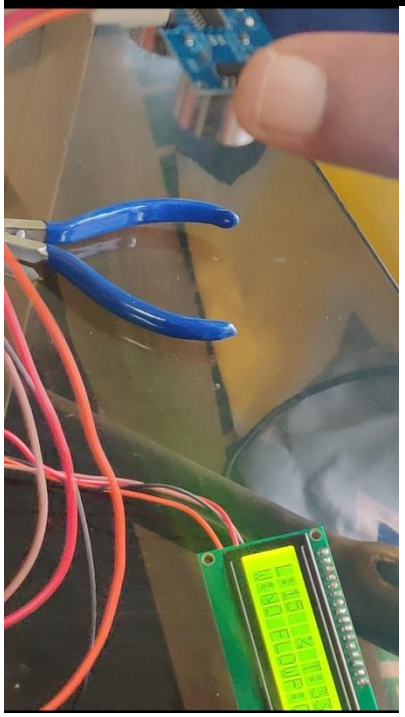
6.3 Application: -

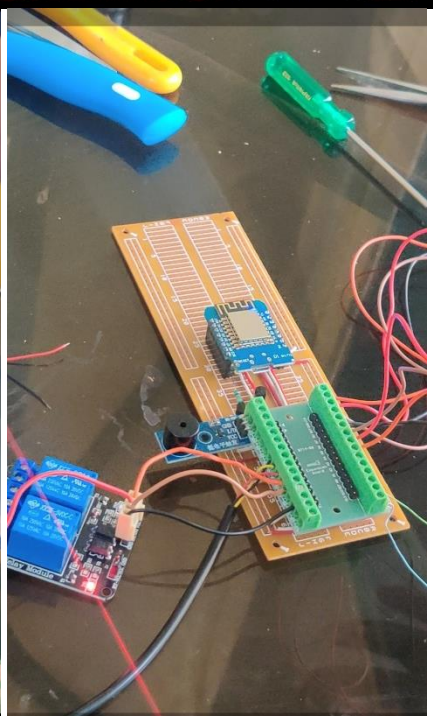
1. Automatic Liquid level Controller can be used in Hotels, Factories, Homes Apartments, Commercial Complexes, Drainages, etc.
2. Fuel level indicator in vehicles.
3. Liquid level indicator in the huge containers in the companies
4. Medical
5. Process control
6. Food and beverage applications

CHAPTER 7

7.1 Result:







As we can see in the above images, if the water level goes down below 25 then Relay will be on and the liquid will Start flowing

7.2 Conclusion:

Thus, the IoT-enabled liquid level monitoring system is done using the components and the notification is sent using the blynk application. With the help of sensors and hardware components, we can conserve the liquid in the sense control the unnecessary liquid wasting and saving the electricity also. By giving an alert message to the user (mobile) about the liquid level to conserve the energy. Moreover, this particular application is useful for home, small-scale industries. Finally, simple components are implemented which make the system efficient and cost-effective. Hence this paper gives a reliable solution to the user

Summary

Automatic liquid level controllers switch the motor on whenever the liquid level drops below a certain level and shuts the motor off when the liquid rises well above a fixed level. Automatic liquid level controllers are smart devices to help monitor the level of liquid in tanks. They are designed to help control the pump motor and are fitted with a smart sensor, which helps maintain a constant reserve of liquid in the storage tank. Sends ultrasonic signal at 40 kHz frequency through two of its digital output pins that are connected to two trigger pins of the ultrasonic sensors, one for the overhead and the other for the underground reservoir. To receive the reflected signal from the echo pins of the sensor, process the data and compute the corresponding level of the liquid in each of the reservoirs. To actuate the electric pumping machine to pump liquid from the underground to the overhead tank with the condition that there exists a sufficient quantity of liquid in the underground tank so as to avoid running the pumping machine without liquid. To automatically shut down the pumping machine whenever the level of the liquid in the overhead tank reaches the maximum capacity of the reservoir tank to avoid over flooding. To display the level of liquid in each tank reservoir and the state of the pumping machine on an alphanumeric liquid crystal display (LCD). And further displayed on the user's smartphone where the tank can be monitored.

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4. Sakthipriya, N.: An Effective Method for Crop Monitoring Using Wireless Sensor Network, Journal of Scientific Research, 20(9), 1127– 1132 (2014).Google Scholar