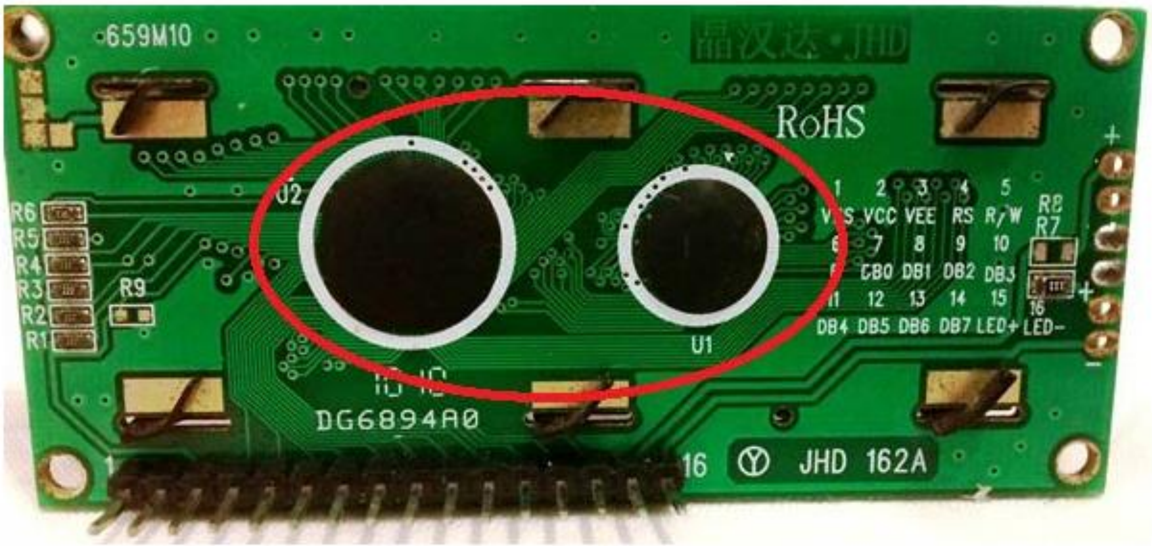
AUTOMATIC WATER LEVEL INDICATOR CUM CONTROLLER

Function: The prototype can detect the space left in the water tank and automatically switch off the motor once the tank is full and also warn the user with an alarm. It can also automatically start the motor when the water level is low.

Components:

1. **Arduino Uno :** It's the brain of the project. It coordinates and controls other components.

2. **16 x 2 LCD:** It displays the space left in the water tank. It has 16 pins.

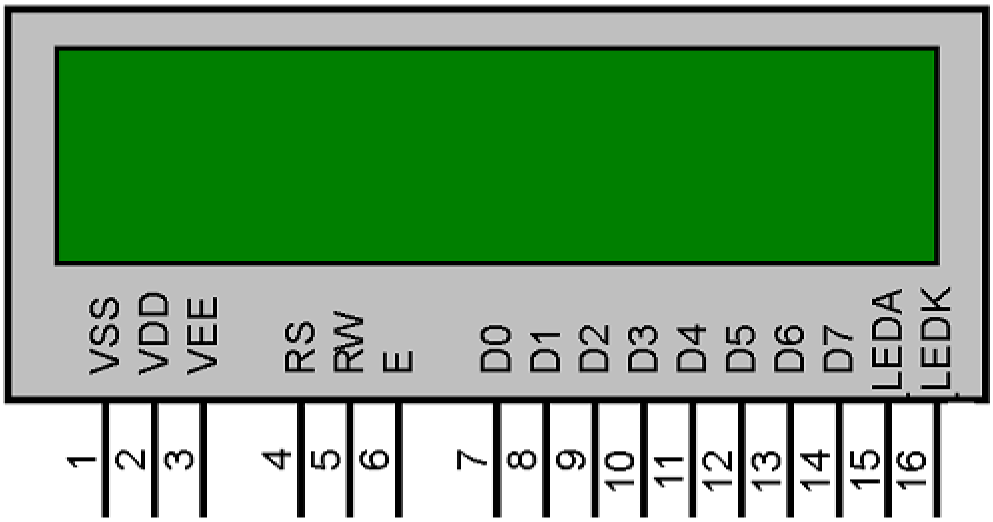


These black circles consist of an interface IC and its associated components to help us use this LCD with the MCU. Because our LCD is a 16*2 Dot matrix LCD and so it will have

(16*2=32) 32 characters in total and each character will be made of 5*8 Pixel Dots. A Single character with all its Pixels enabled is shown in the below picture.

So Now, we know that each character has (5*8=40) 40 Pixels and for 32 Characters we will have (32*40) 1280 Pixels. Further, the LCD should also be instructed about the Position of the Pixels.

It will be a hectic task to handle everything with the help of MCU, hence an **Interface IC like HD44780** is used, which is mounted on LCD Module itself. The function of this IC is to get the **Commands and Data** from the MCU and process them to display meaningful information onto our LCD Screen.

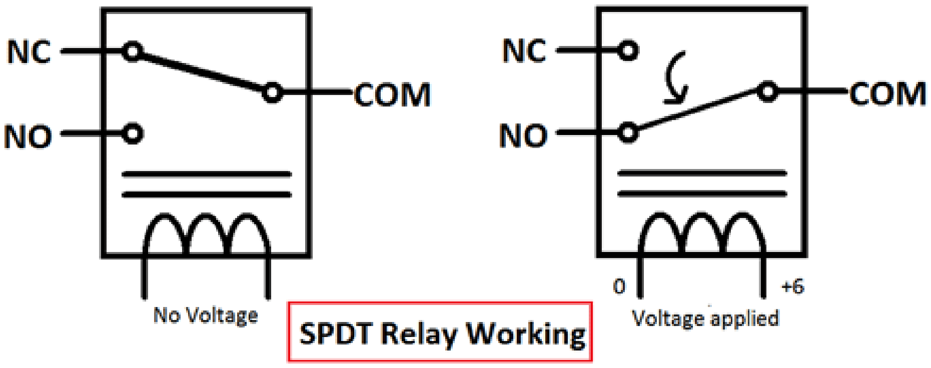


Sr. No	**Pin No.**	**Pin Name**	**Pin Type**	**Pin Description**	**Pin Connection**
1	Pin 1	Ground	Source Pin	This is a ground pin of LCD	Connected to the ground of the MCU/ Power source
2	Pin 2	VCC	Source Pin	This is the supply voltage pin of LCD	Connected to the supply pin of Power source

3	Pin 3	V0/VEE	Control Pin	Adjusts the contrast of the LCD.	Connected to a variable POT that can source 0-5V
4	Pin 4	Register Select	Control Pin	Toggles between Command/Data Register	Connected to a MCU pin and gets either 0 or 1. 0 -> Command Mode 1-> Data Mode
5	Pin 5	Read/Write	Control Pin	Toggles the LCD between Read/Write Operation	Connected to a MCU pin and gets either 0 or 1. 0 -> Write Operation 1-> Read Operation
6	Pin 6	Enable	Control Pin	Must be held high to perform Read/Write Operation	Connected to MCU and always held high.
7	Pin 7-14	Data Bits (0-7)	Data/Command Pin	Pins used to send Command or data to the LCD.	In 4-Wire Mode Only 4 pins (0-3) is connected to MCU In 8-Wire Mode All 8 pins(0-7) are connected to MCU
8	Pin 15	LED Positive	LED Pin	Normal LED like operation to illuminate the LCD	Connected to +5V

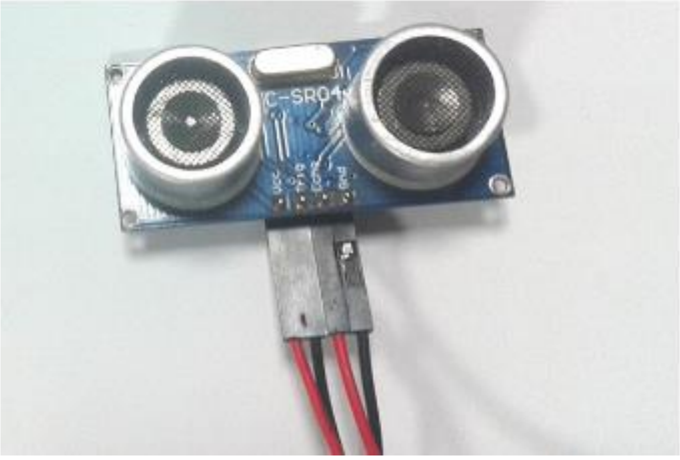
9	Pin 16	LED Negative	LED Pin	Normal LED like operation to illuminate the LCD connected with GND.	Connected to ground

3. **Relay:** It is an electromechanical switch. Relay consists of one electromagnetic coil and three terminals for switching. One among these three terminals is a common terminal that floats between other two terminals. These two terminals are Normally Close(NC) and Normally Open(NO).



SPDT Relay Working

4. **Ultrasonic Sensor HC SR 04-**



5. VCC is the power supply for HC-SR04 Ultrasonic distance sensor which we connect the 5V pin on the Arduino.
6. Trig (Trigger) pin is used to trigger the ultrasonic sound pulses.

7. Echo pin produces a pulse when the reflected signal is received. The length of the pulse is proportional to the time it took for the transmitted signal to be detected.
8. GND should be connected to the ground of Arduino.

It all starts, when a pulse of at least 10 µS (10 microseconds) in duration is applied to the Trigger pin. In response to that the sensor transmits a sonic burst of eight pulses at 40 KHz. This 8-pulse pattern makes the “ultrasonic signature” from the device unique, allowing the receiver to differentiate the transmitted pattern from the ambient ultrasonic noise.

The eight ultrasonic pulses travel through the air away from the transmitter. Meanwhile the Echo pin goes HIGH to start forming the beginning of the echo-back signal.

In case, if those pulses are not reflected back then the Echo signal will timeout after 38 mS (38 milliseconds) and return low. Thus a 38 mS pulse indicates no obstruction within the range of the sensor.

If those pulses are reflected back the Echo pin goes low as soon as the signal is received. This produces a pulse whose width varies between 150 µS to 25 mS, depending upon the time it took for the signal to be received.

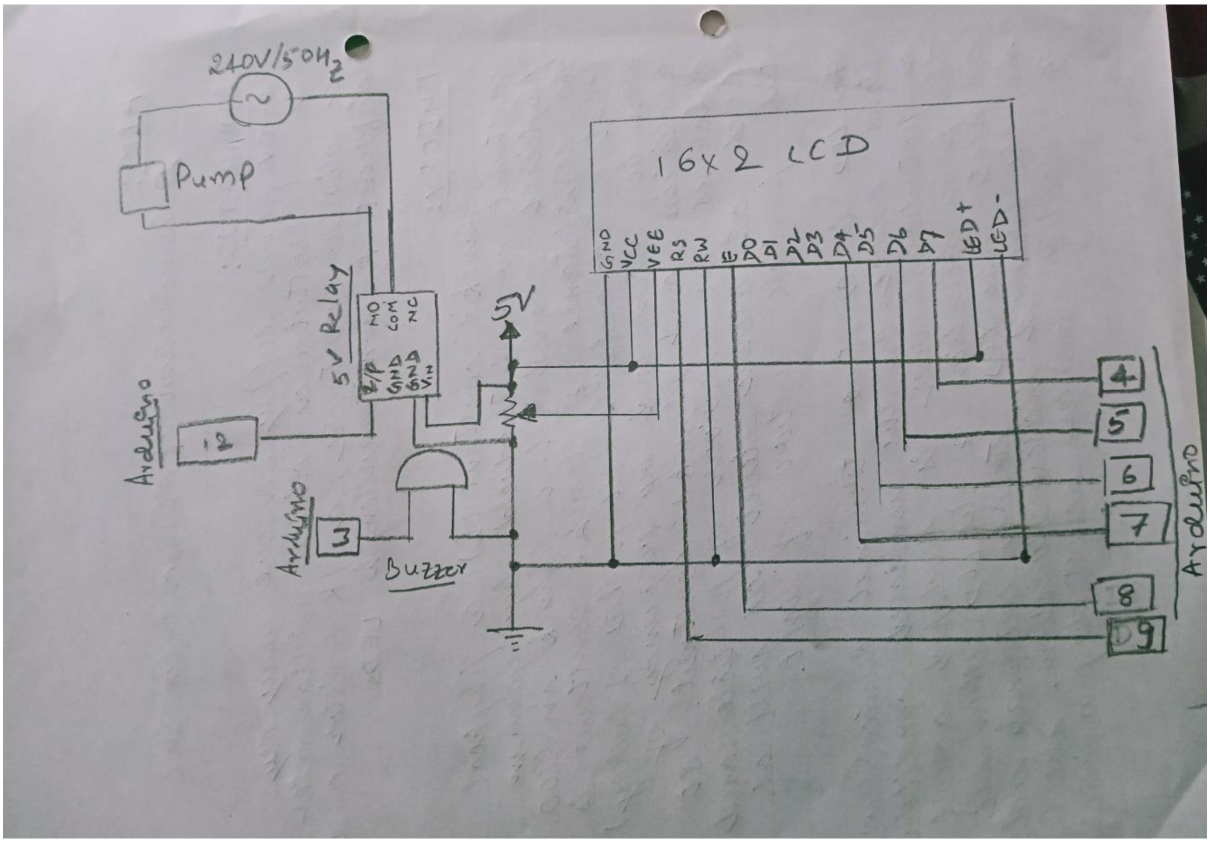
The width of the received pulse is then used to calculate the distance to the reflected object.

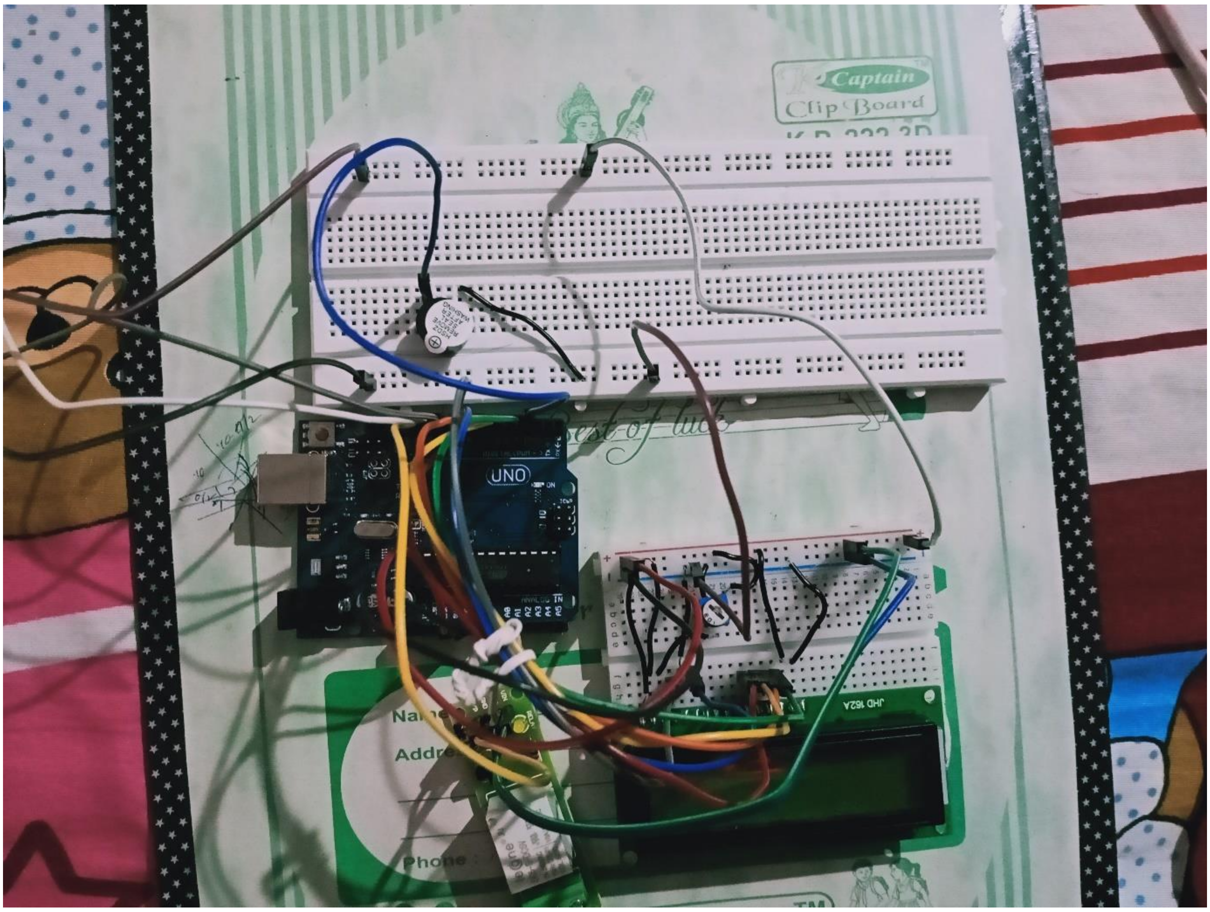
5. Buzzer

6.Jumper wires

7.Submersible water pump

CIRCUIT DIAGRAM





Code

```
#include <LiquidCrystal.h

#define trigger 10
#define echo 11
#define motor 12
#define buzzer 3

LiquidCrystal lcd(9,8,7,6,5,4);

float time=0.0,distance=0.0;
int temp = 0;

void setup()
{
 lcd.begin(16,2);
 pinMode(trigger,OUTPUT);
 pinMode(echo,INPUT);
 pinMode(motor, OUTPUT);
 pinMode(buzzer, OUTPUT);
 lcd.print("  Water Level ");
 lcd.setCursor(0,1);
 lcd.print("   Indicator  ");
 delay(2000);
}

void loop()
{
  lcd.clear();
 digitalWrite(trigger,LOW);
 delayMicroseconds(2);
 digitalWrite(trigger,HIGH);
 delayMicroseconds(10);
 digitalWrite(trigger,LOW);
 delayMicroseconds(2);
 time=pulseIn(echo,HIGH);
 distance=time*340.0/20000.0;

 lcd.clear();
 lcd.print("Water Space In  ");
 lcd.setCursor(0,1);
 lcd.print("Tank is: ");
 lcd.print(distance);
 lcd.print("Cm");
 delay(500);

 if(distance<5 && temp == 0)
 {
    digitalWrite(motor, LOW);
    digitalWrite(buzzer, HIGH);
    lcd.clear();
    lcd.print("distance:");
    lcd.print(distance);
    lcd.setCursor(0,1);
    lcd.print("Motor Turned OFF");
    delay(2000);
    digitalWrite(buzzer, LOW);
    delay(3000);
    temp = 1;
}
else if(distance<5 && temp == 1)
{
    digitalWrite(motor, LOW);
    digitalWrite(buzzer,LOW );
    lcd.clear();
    lcd.print("distance:");
    lcd.print(distance);
    lcd.setCursor(0,1);
    lcd.print("Motor Turned OFF");
    delay(2000);
    digitalWrite(buzzer, LOW);
    delay(3000);
    }

else if(distance>16)
{
  digitalWrite(motor, HIGH);
  lcd.clear();
  lcd.print("distance");
  lcd.print(distance);
  lcd.setCursor(0,1);
  lcd.print("Motor Turned ON");
  delay(5000);
  temp = 0;
}
}
```

Pic

UI20EC13_Amish