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# Smart Wireless water level Monitoring & Pump controlling System

**Madhurima Santra[1], Sanjoy Biswas[2], Sibasis Bandhapadhyay[3], Kaushik Palit[4]**

Lecturer[1], Technical Assistant[2], Lecturer[3], Project fellow[4]

Department of

Electronics & Tele communication Engineering

Panchrokhi, Sugandhya,

Hooghly, India

**ABSTRACT**

*In this Smart Wireless water level Monitoring & Pump controlling System,We are going to measure the water level by using ultrasonic sensors. Basic principal of ultrasonic distance measurement is based on ECHO. When sound waves are transmitted in environment then they return back to the origin as ECHO after striking on any obstacle. So we have to only calculate its traveling time of both sounds means outgoing time and returning time to origin after striking on any obstacle. And after some calculation we can get a result that is the distance. This concept is used in our water controller project where the water motor pump is automatically turned on when water level in the tank becomes low. You can also check this simple water level indicator circuit for a simpler version of this project.*

***Keywords*****:** *Ultrasonic water level indicator, wireless water pump control, smart water level monitoring & control system*

## 1. INTRODUCTION:

In everyday life, there must be some physical elements that need to be controlled in order for them to perform their expected behaviours. A control system therefore can be defined as a device, or set of devices, that manages, commands, directs or regulates the behaviour of other device(s) or system(s). Consequently, automatic controlling involves designing a control system to function with minimal or no human interference.Today there search, designs, building of new smart technology used in different domestic, commercial, industrial sectors are developing the applications of smart monitoring day by day. A smart monitoring and control, in general an electro- mechanical & computer programming using power and control machinery device that can perform takes automatically depending on sensors. This project is designed to build to maser a water level in a

tank, and controlling the water pump by without human interfacing. An Arduino UnoR3 is used to achieve the desired operation. Ultrasonic sensor is used to detect the level of water and sends a command to the Arduino. ASK RF transmitter is used to send a command to the RX for starting or stop the water pump.

## 2.BASIC CONCEPT:

The technique of water level monitoring and controlling system concentrated with some basic parts which are softly aggregated together in our proposed method. Basic descriptions of some parts are described below.

### A.Water Level Indicator

For water level indication unit we can use LCD or relay which will work for water level indication. By sensing water levels through water level sensor, LCD should be display as on/off (i.e. on: yes sensor senses water).

### B. Water Level Sensor

To make special water level sensor we would like to introduce some convenient materials such as Iron rod, nozzles, resistance, rubber etc Or we use sensor here we use ultrasonic sensor to detect the level of water.

### C. Water Pump Controlling System

We can control the water pump by connecting it with an output pin of microcontroller via a motor driver circuit. When microcontroller sends a positive signal (+5v) or a ground signal (0v) to the motor driver circuit, then the water pump become on or off respectively. We also would like to use a manual switch on the motor driver circuit which is supposed to use for controlling it manually. It makes this system more users friendly.

### D. Microcontroller

Microcontroller is a computer on a chip that is programmed to perform almost any control, sequencing, monitoring and display the function. Because of its relatively low cost, it becomes the natural choice to the designer. Microcontroller is designed to be all of that in one. Its great advantage is no other external components are needed for its application because all necessary peripherals are already built into it. Thus, we can save the time, space and cost which is needed to construct low cost devices

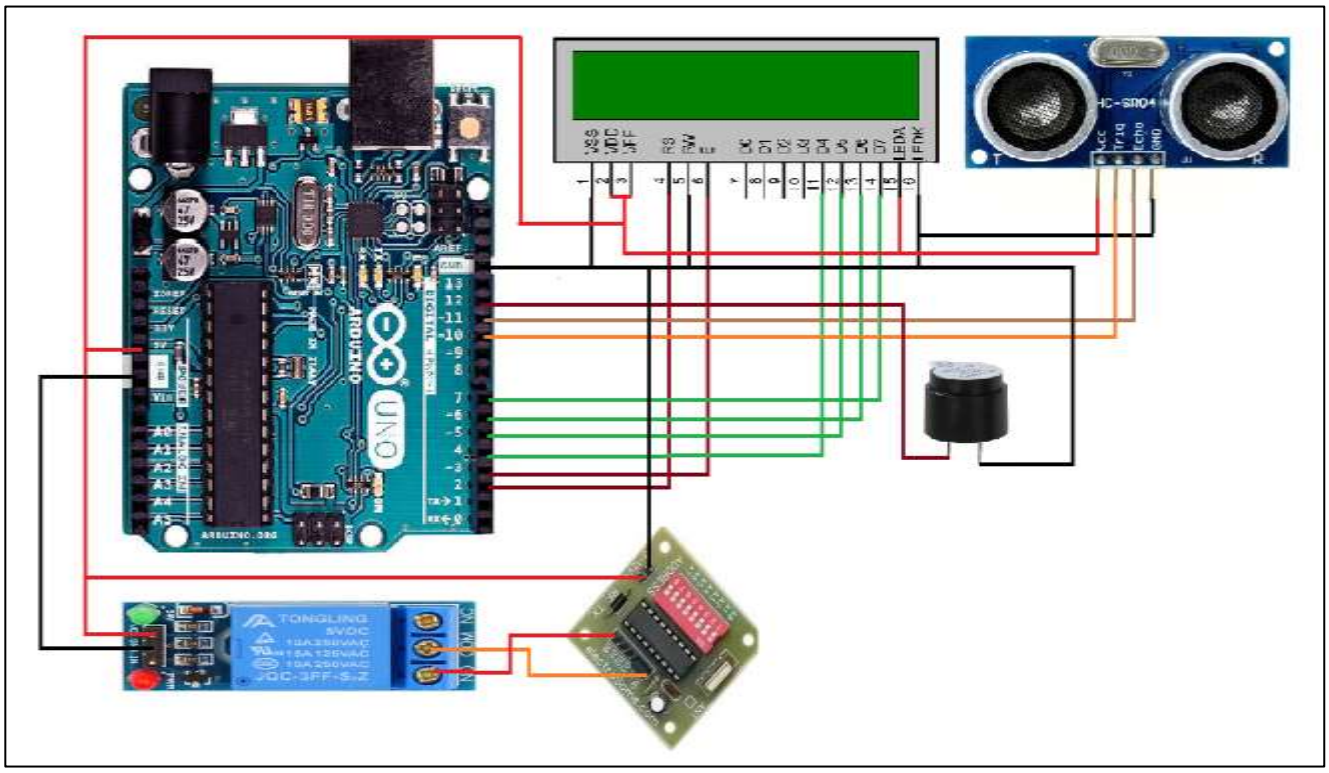
### *E. Others*

To control some high power devices such as lights, heaters, solenoids and motor with a microcontroller we need interface devices between the microcontroller pins and the high power devices. Mechanical relays sometimes called contactors are available to switch currents from milli ampere to several thousands of amperes. In this system we should use a relay circuit with the water pump to adapt with high voltage ac current. The output of relay circuit should be connected with motor's negative side of the cable. The positive side of the cable should be connected with 220v ac current. So, we can use electromagnetic relay as an electrical amplifier

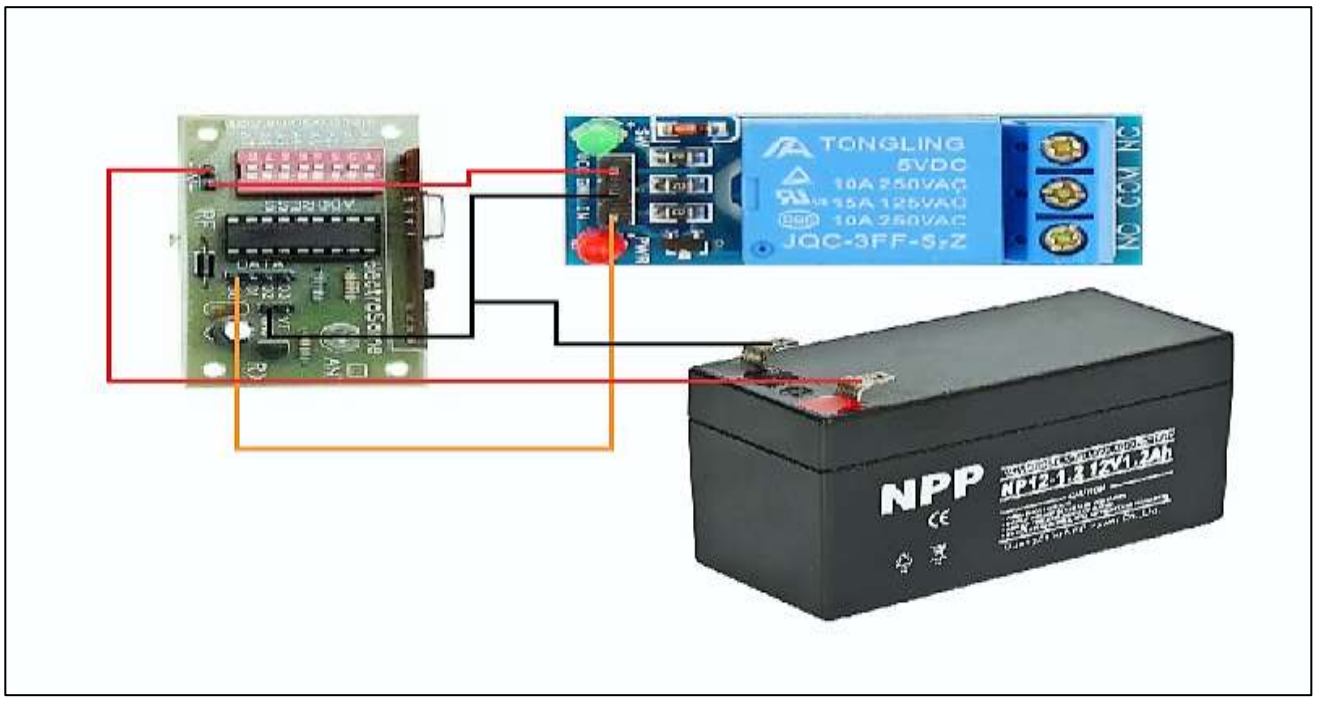
## 3. DESIGN OF THE SYSTEM

The entire circuit diagram has two major sections. One is Transmitter section and processing section module with the help of Ultrasonic sensor & another is receiver section with motor controlling unit.

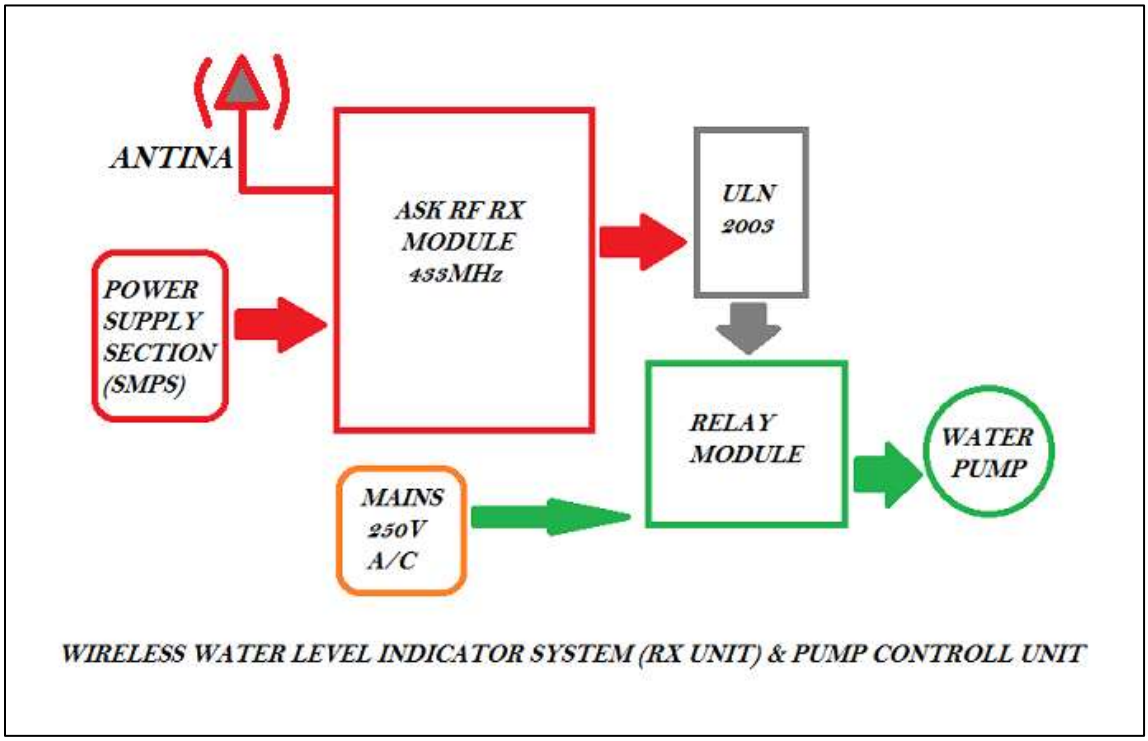
***Transmitter and main processing section*:-**



***Receiver section with motor control unit*:-**




### 3.1 BLOCKDIAGRAMOFTHE SYSTEM




*WIRELESS WATER LEVEL INDICATOR SYSTEM (RX UNIT) & PUMP CONTROLL UNIT*

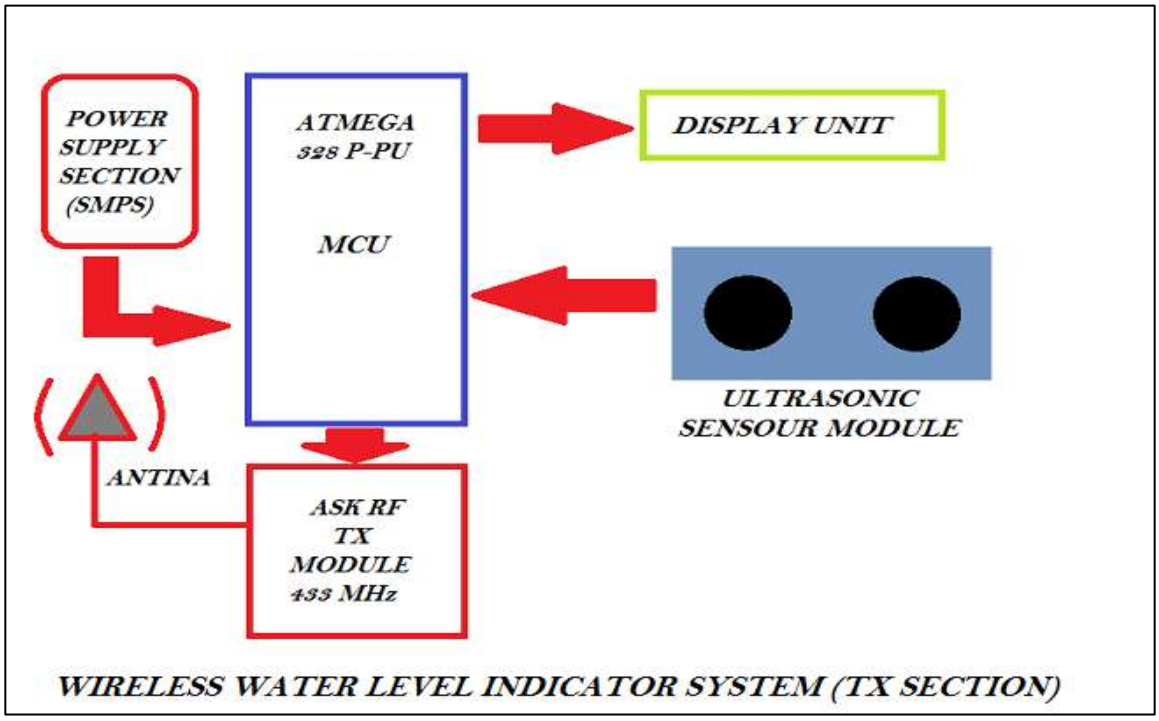



**Figure3.1:BlockdiagramofTransmitter section and receiver section**

At first system gets the power supply from SMPS. Then after calibrating the ultrasonic sensor then system start to work. Where the ultrasonic sensor get the location the level of water will start to calculate the distance if the water from trigger point. When an Ultrasonic sensor gets water so far from it, then it will send a signal to microcontroller and start to echo the pulses. The time of the triggering pin is measured the respected distance of the water level according to volume of the water tank. Then presser will decide according to the sensor pulse calculating value. If water is empty then microcontroller send a signal to the relay module and the relay send a signal to a ASK RF Transmitter module and transmitter module send a signal to the RX module to start water pump or Stop water pump

**4. CIRCUITDESIGN AND OPERATION:**

The heart of our module is Arduino Uno R3 is supplied by DC SMPS. The microcontroller ATMEGA 328p-pu is programmed to control HCSR-04 (Ultrasonic module).As per program HCSR-04module is connected to digital pin of Arduino for trigger(10)& ECHO(11) & LCD module is

connected to D2 to D7 Digital pins of the controller. The output is sensed by the Arduino and depending on the programming statues the specific digital data is sent to the relay module for Rx Encoder board control. Additionally the buzzer is add to digital pin(12) of is Arduino controlled by the HCSR-04 depending on the level of water. By condition of this sensor & program in Arduino controls transmitter signal and display as well as the buzzer. The ASK receiver received the signal and ULN2003 drive the relay to control the motor and the motor On/Off according to the set level of the water.

**5. FLOWDIAGRAM:(As per coding)**

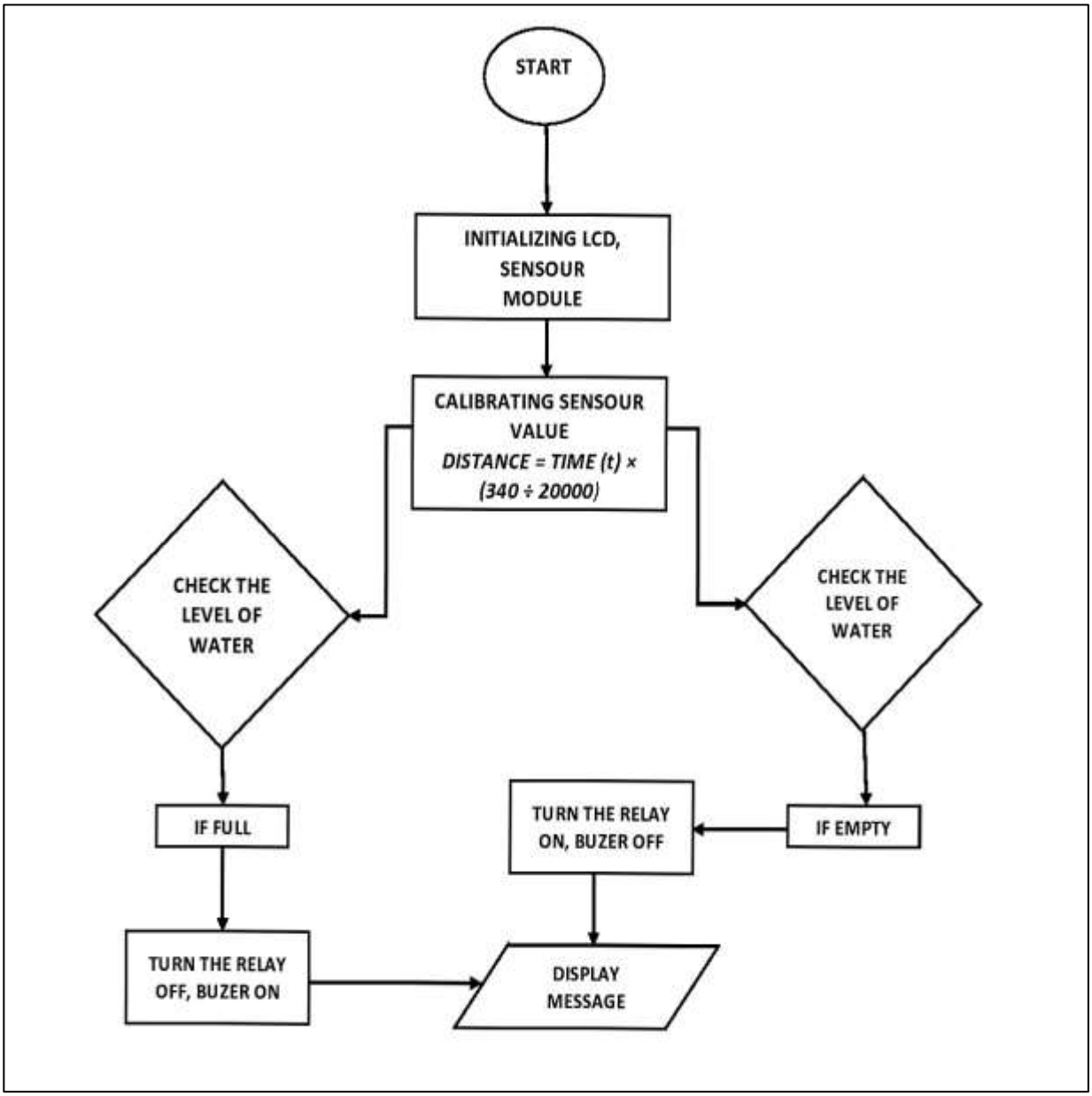



***Figure3:Flow chartdiagramof*Smart Wireless water level Monitoring & Pump controlling System**

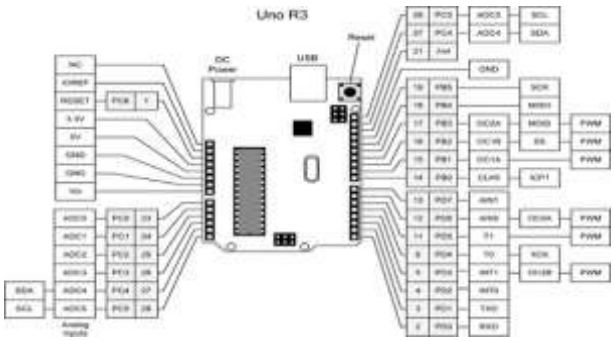
**6. ALGORITHM:**

```
#include <LiquidCrystal.h>

#define trigger 10
#define echo 11
#define motor 8
#define buzzer 12

LiquidCrystal lcd(7,6,5,4,3,2);

float time=0,distance=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*340/20000;
 lcd.clear();
 lcd.print("Water Space In  ");
 lcd.setCursor(0,1);
 lcd.print("Tank is: ");
 lcd.print(distance);
 lcd.print("Cm");
 delay(2000);
 if(distance<12 && temp==0)
 {
    digitalWrite(motor, LOW);
```

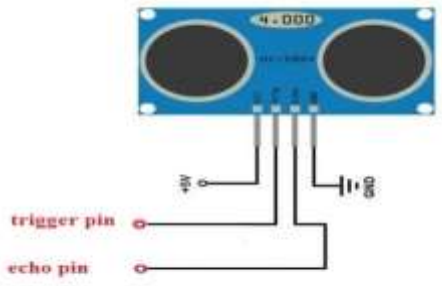
```
    digitalWrite(buzzer, HIGH);
    lcd.clear();
    lcd.print("Water Tank Full ");
    lcd.setCursor(0,1);
    lcd.print("Motor Turned OFF");
    delay(2000);
    digitalWrite(buzzer, LOW);
    delay(3000);
    temp=1;
 }

  else if(distance<12 && temp==1)
 {
    digitalWrite(motor, LOW);
    lcd.clear();
    lcd.print("Water Tank Full ");
    lcd.setCursor(0,1);
    lcd.print("Motor Turned OFF");
    delay(5000);
 }

 else if(distance>30)
 {
  digitalWrite(motor, HIGH);
  lcd.clear();
  lcd.print("LOW Water Level");
  lcd.setCursor(0,1);
  lcd.print("Motor Turned ON");
  delay(5000);
  temp=0;
 }
}
```

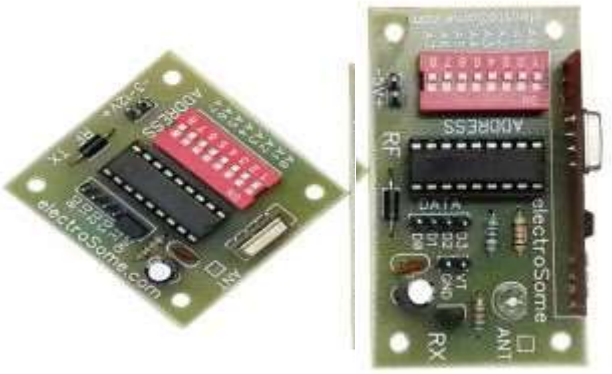
## 7. COMPONENTSUSED:

### 7.1 ARDUINO UNO R3(EmbeddedApplication Board)



**7.2 ULTRASONIC SENSOR HCSR-04**

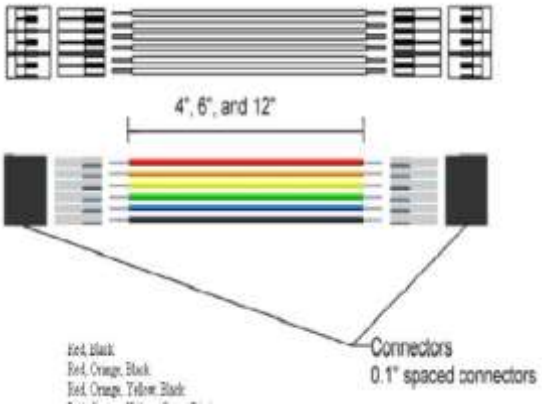



**7.3 ASK RF transmitter and receiver board6.3 channel relay module (2nos)**

**7.4 16/2 LCD module**


**7.5 CONNECTORS (Jumpers)**




**7.6 BATTERY12V**


**8. APPLICATION:**

- Automatic water pump control
- Alarm devices for reducing water wastage
- This technology can also be used to maintain industrial purpose smart monitoring system

## 9. CONCLUSION

We made the system name **Smart Wireless water level Monitoring & Pump controlling System** In the modern era of science and technology it is necessary to reduce the man power and increase the uses of instrument. Through this hardware cum software project we have learnt about many new developing projects and we have also developed our skill in programming. It was great scope for us to take the technology a little bit far.

## 10. ACKNOWLEDGEMENTS:

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