INTERNET OF THINGS - GROUP 5

PROJECT: SMART WATER SYSTEM

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PHASE 5: Project Documentation

SMART WATER SYSTEM

Introduction:

Smart Water Management is the activity of planning, developing, distributing and managing the use of water resources using an array of IOT technologies which are designed to increase transparency, and make more reasonable and sustainable usage of these water resources. The main goal of smart water is to ensure that the resource is being managed effectively by using data to help inform decisions.

Problem Statement:

Water issues in developing countries include scarcity of drinking water, floods, the siltation of river systems, as well as the contamination of rivers and large dams Millions of people in low- and middle-income countries receive water through intermittent water supply for drinking and domestic purposes.

Project Objective:

In this smart water management aim are whether its real-time monitoring, leak detection, water conservation, efficient irrigation, or a combination of these objectives.

Components of Smart Water Management:

- Sensors and IOT technology for real-time monitoring and control can help monitor and prevent pollution and even improve the water quality.
- Monitoring water quality to fight pollution and diseases.

Water Level Monitoring:

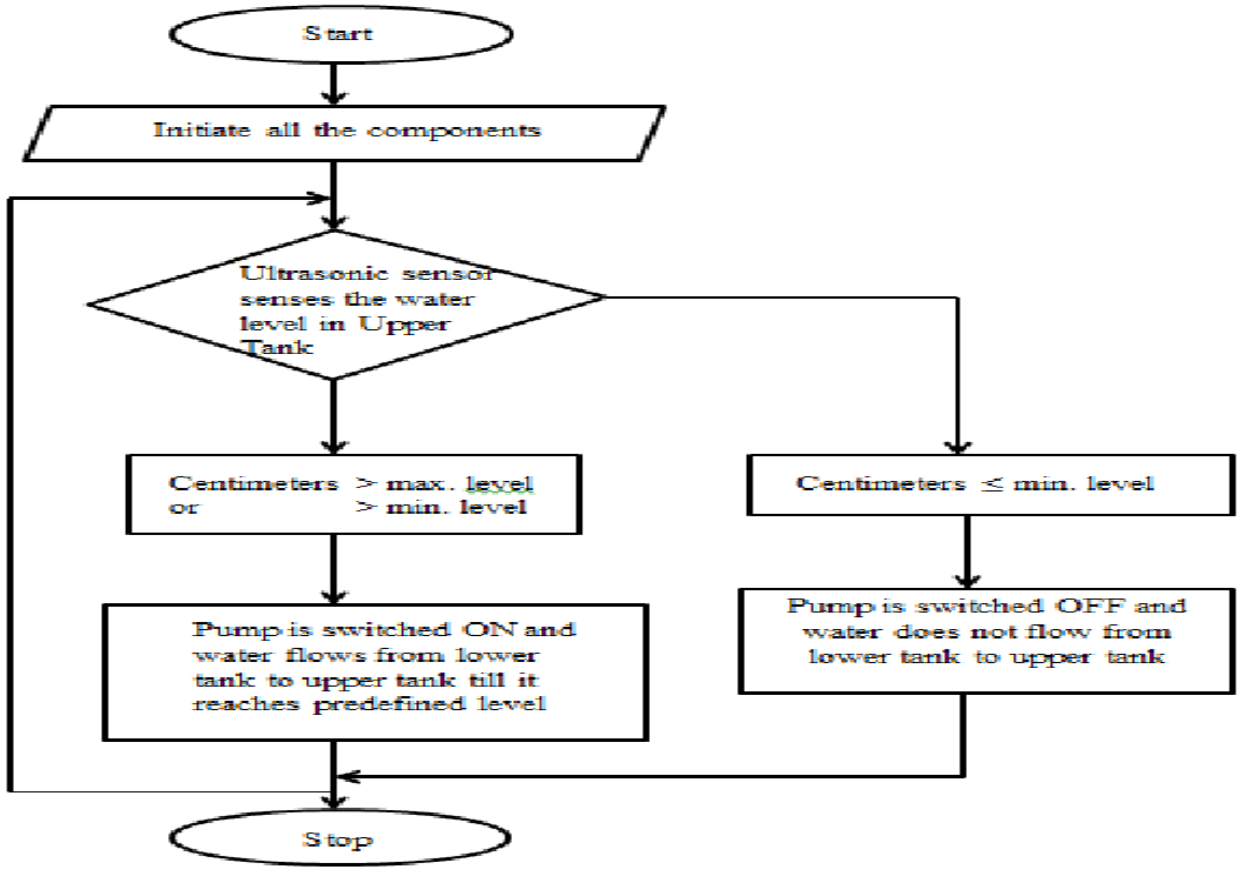
It consists of sensor devices, which automatically detect the level of water inside any tank. The solution provides actionable insights for the managers to make wise& necessary decisions in situation of leakages or over spilling of tangs.

Components of Water Level Monitoring:

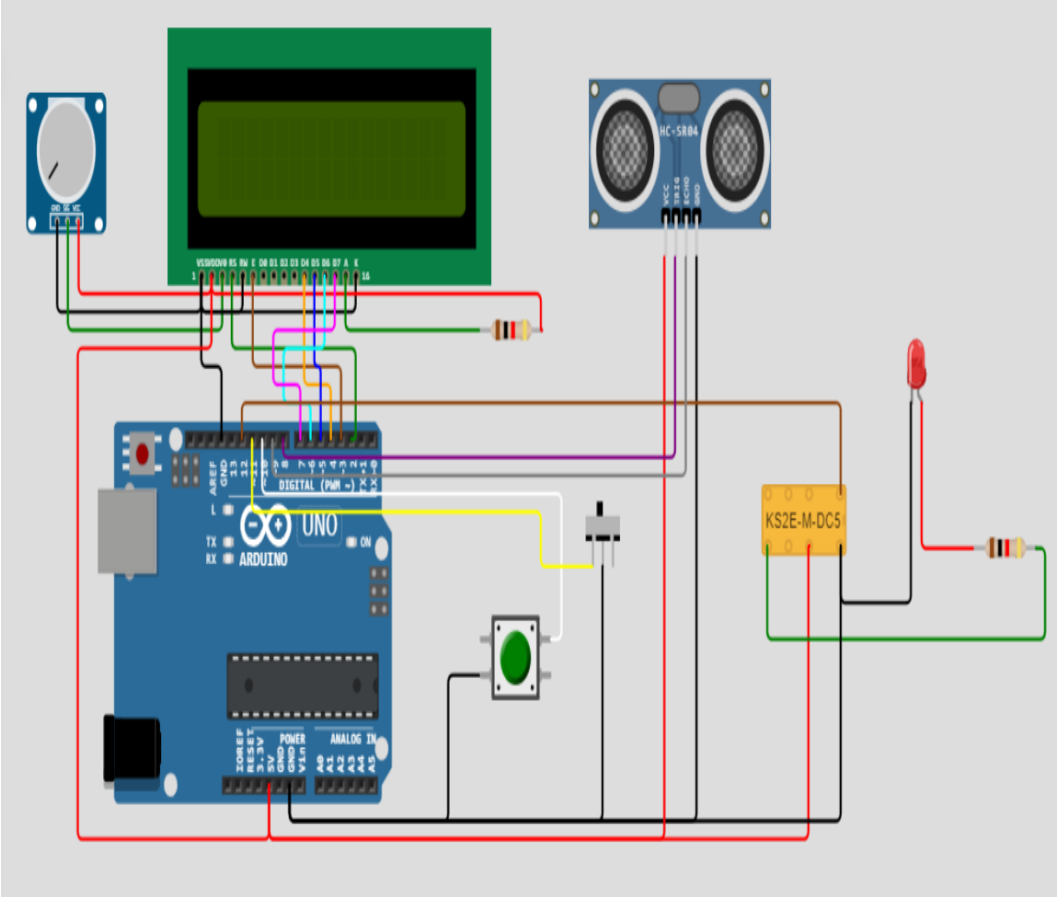
Some components are used to make the sensor work, to read the sensor data and displaying the process what doing now. The components are,

1. Arduino UNO
2. Potentiometer
3. lcd 1602
4. hc-sr04 Ultrasonic Distance sensor
5. pushbutton
6. slide-switch
7. ks2e-m-dc5 Relay

Flowchart:



Connection of Arduino Board using Wokwi:



Source code for the above Arduino board:

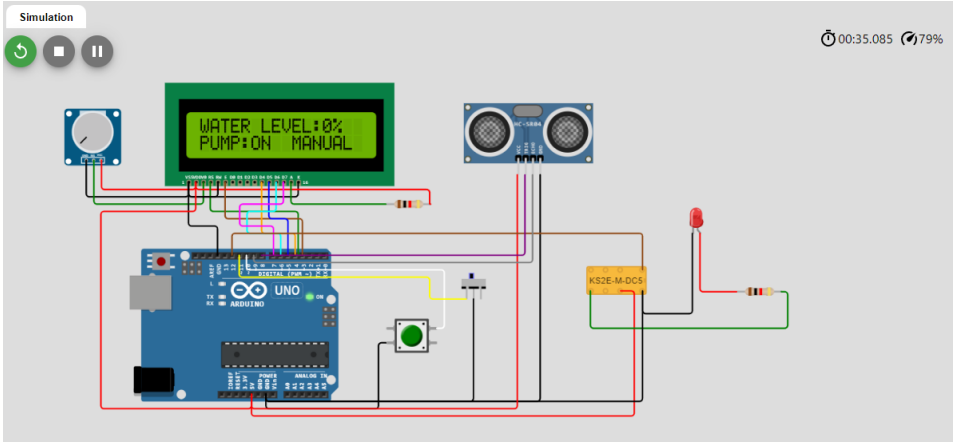
```
#include <EEPROM.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(2,3,4,5,6,7);
long duration, inches;
int set_val,percentage;
bool state,pump;
void setup()
{
  lcd.begin(16, 2);
  lcd.print("WATER LEVEL:");
  lcd.setCursor(0, 1);
  lcd.print("PUMP:OFF MANUAL");
  pinMode(8, OUTPUT);
  pinMode(9, INPUT);
  pinMode(10, INPUT_PULLUP);
  pinMode(11, INPUT_PULLUP);
  pinMode(12, OUTPUT);
  set_val=EEPROM.read(0);
  if(set_val>150)set_val=150;
```

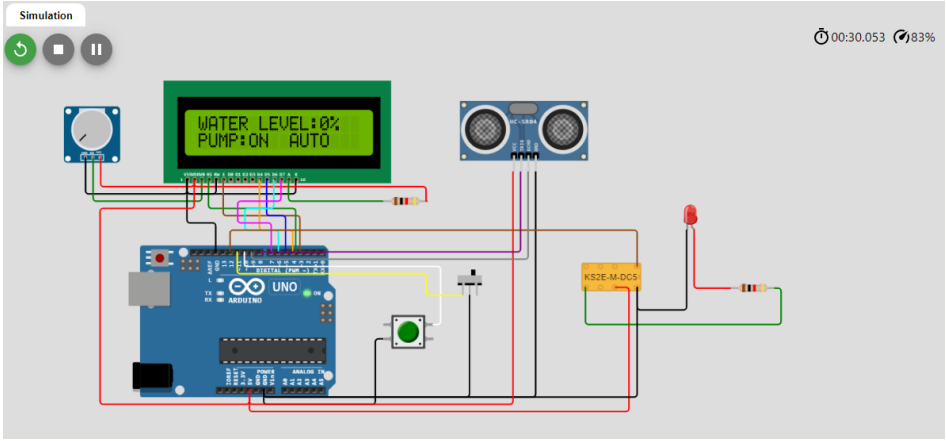
```
}
void loop()
{
   digitalWrite(3, LOW);
   delayMicroseconds(2);
   digitalWrite(8, HIGH);
   delayMicroseconds(10);
   digitalWrite(8, LOW);
   duration = pulseIn(9, HIGH);
   inches = microsecondsToInches(duration);
   percentage=(set_val-inches)*100/set_val;
   lcd.setCursor(12, 0);

   if(percentage<0)percentage=0;
   lcd.print(percentage);
   lcd.print("%   ");
   if(percentage<30&digitalRead(11))pump=1;
   if(percentage>99)pump=0;
   digitalWrite(12,!pump);
   lcd.setCursor(5, 1);
   if(pump==1)lcd.print("ON ");
   else if(pump==0) lcd.print("OFF");
   lcd.setCursor(9, 1);
   if(!digitalRead(11))lcd.print("MANUAL");
   else lcd.print("AUTO   ");

   if(!digitalRead(10)&!state&digitalRead(11))
    {
      state=1;
      set_val=inches;
      EEPROM.write(0, set_val);
    }
    if(!digitalRead(10)&!state&!digitalRead(11))
      {
        state=1;
        pump=!pump;
      }
      if(digitalRead(10))state=0;
      delay(500);
}
long microsecondsToInches(long microseconds)
{
   return microseconds / 74 / 2;
}
```

Output:

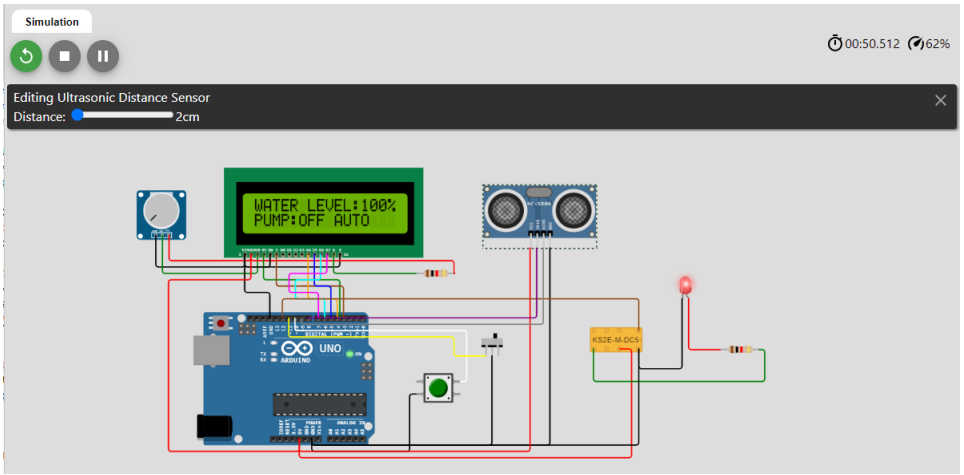
The pump is in manual mode, so we change the pump mode into auto-mode.

In the beginning, the LCD display automatically displays 0% which means the tank is empty.

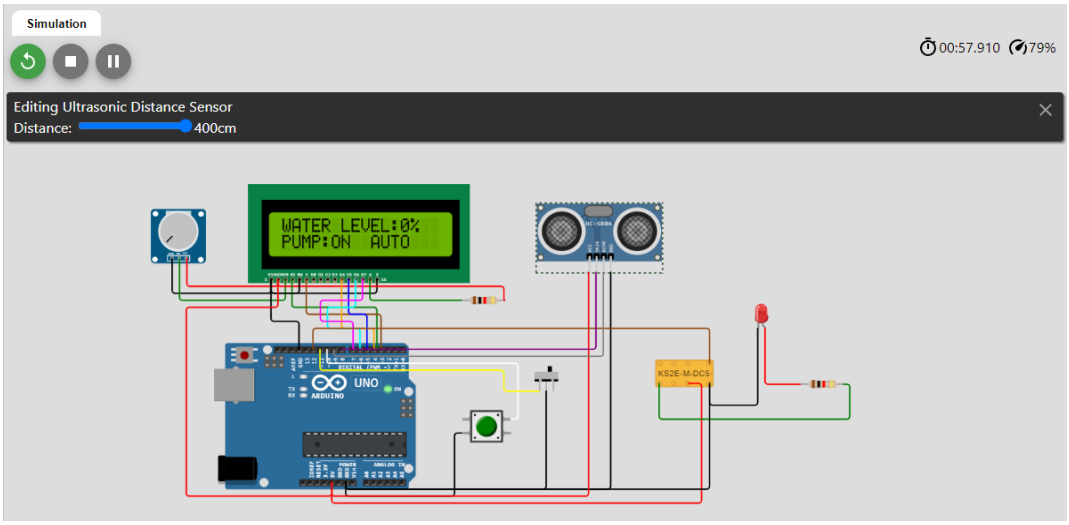




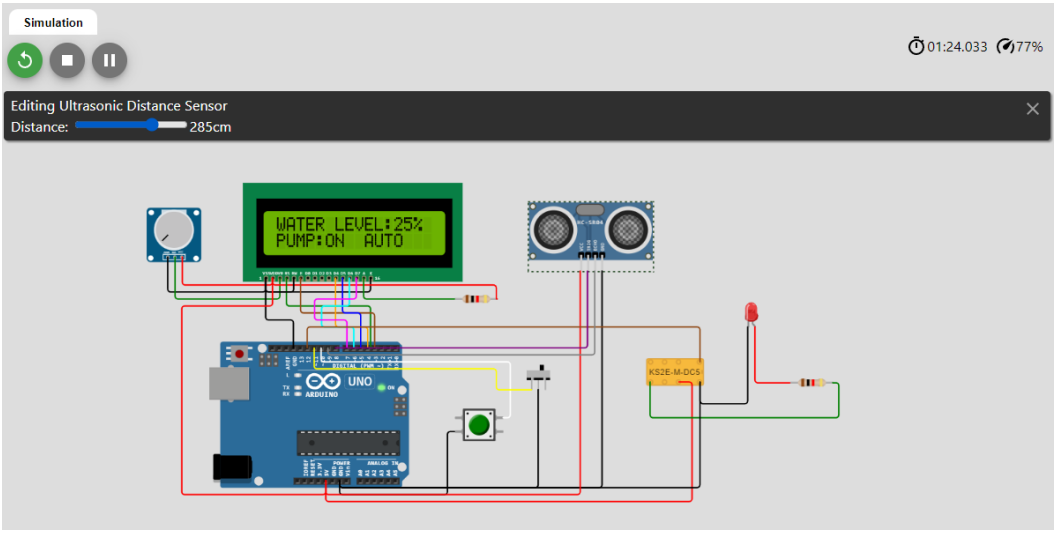
In the ultrasonic sensor we adjust the distance. If the distance is low then the water level is high. If the distance is high then the water level is low.



If the water level is 100% (the distance is less) then automatically the pump will be turned off. If the water level is 0% (the distance is high) then automatically the pump will be turned on.



Similarly when we adjust the distances, the pump will automatically turn on and off.



Conclusion:

In the smart water system and management there are many sectors like water level monitoring, monitoring the pH value, etc., in this phase, I have developed the water level monitoring by using Wokwi simulator by using the ultrasonic sensor. This sensor is used to calculate the distance between the water and the sensor.