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OBJECTIVE

These are the reasons we chose the following project –

- We chose it because of the problems faced by individuals also in current situation there is no proper way to distribute the water.

- Respective to the conventional water system there could be a more chance for wastage of water.

- To conserve the energy and water Smart Water Grid is essential.

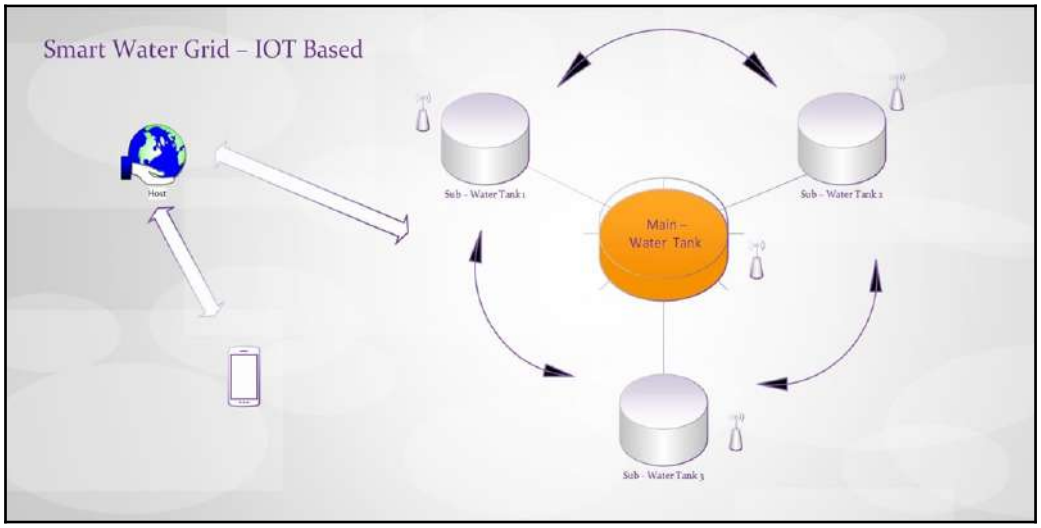
- The availability of water is under insecure condition. Due to the continuous increase of population, water scarcity becomes a menacing problem.

- This makes the system easy going and allows the officer to operate this system from any part of the world using IOT.

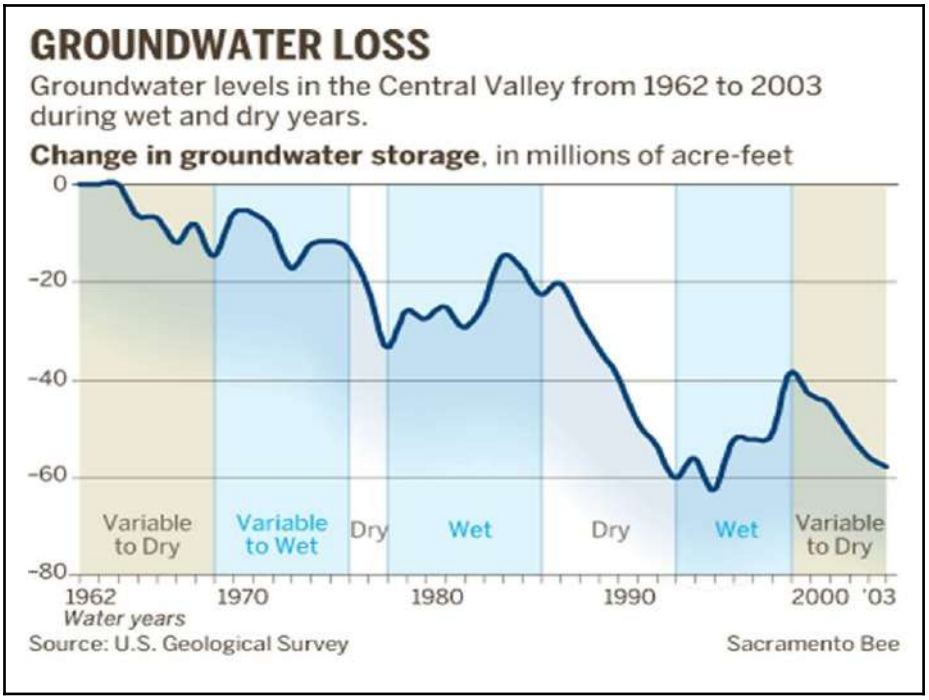
INTRODUCTION

The usage of a Smart Water Grid framework underpins the Public Utilities Board (PUB's) central goal to supply great water day in and day out to its clients. With sensors and logical apparatuses sent broad to give a constant checking and decision supportive system, the Smart Water Grid framework empowers PUB to deal with the water supply network efficiently. For our situation, we are utilizing IOT to take care of our water issue utilizing smart grid control. Though there are others approaches to comprehend this which could conceivably be as powerful or valuable as this strategy. The only setback the following model has is that the installation cost may be higher but the running cost is very less, which makes it free with the passage of time.

Here, is the block diagram of proposed IoT Solution –



LITERATURE SURVEY



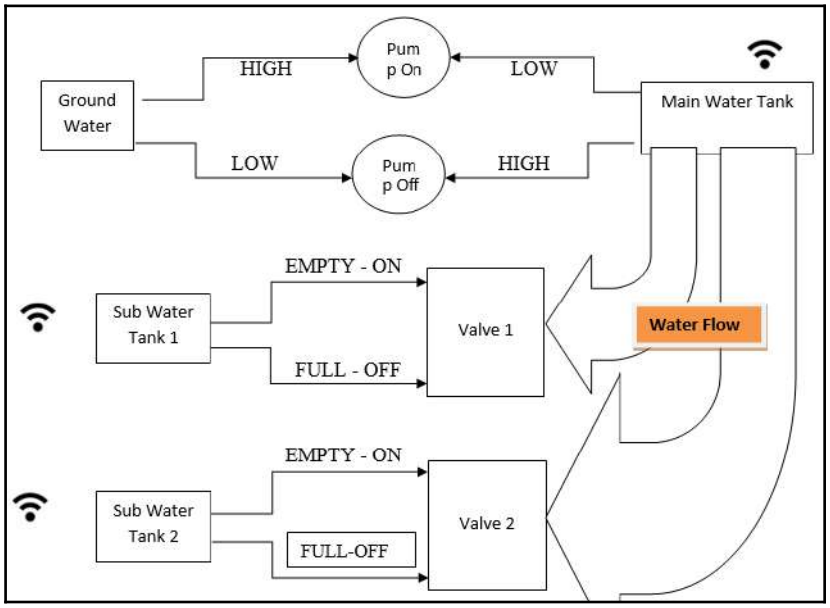
Country	Population 2010 (in thousands)	Groundwater extraction			
		Estimated groundwater extraction 2010 (km^3/yr)	Breakdown by sector		
			Groundwater extraction for irrigation (%)	Groundwater extraction for domestic use (%)	Groundwater extraction for industry (%)
India	1224614	251.00	89	9	2
China	1341335	111.95	54	20	26
United States	310384	111.70	71	23	6
Pakistan	173593	64.82	94	6	0
Iran	73974	63.40	87	11	2
Bangladesh	148692	30.21	86	13	1
Mexico	113423	29.45	72	22	6
Saudi Arabia	27448	24.24	92	5	3
Indonesia	239871	14.93	2	93	5
Turkey	72752	13.22	60	32	8
Russia	142985	11.62	3	79	18
Syria	20411	11.29	90	5	5
Japan	126536	10.94	23	29	48
Thailand	69122	10.74	14	60	26
Italy	60551	10.40	67	23	10

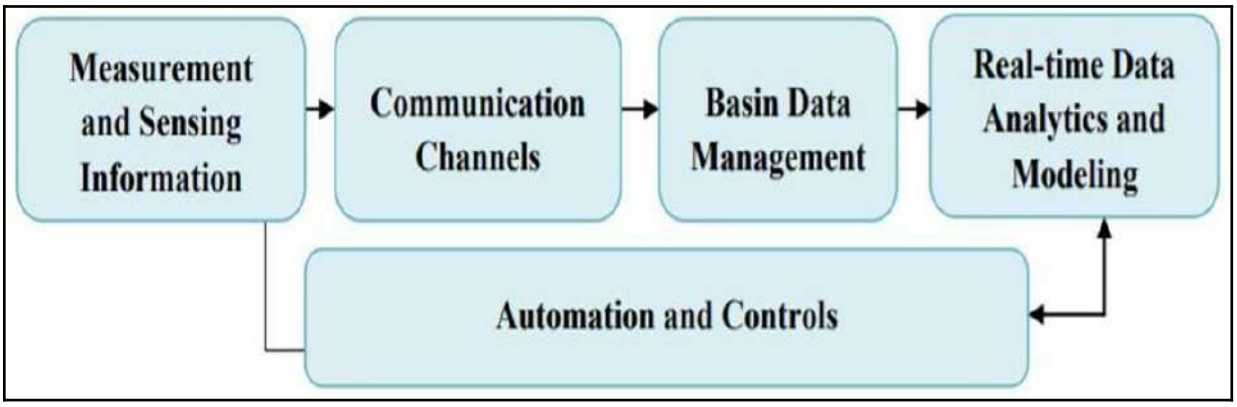
All these figures point to a very serious issue. All these figures suggest that the groundwater levels are depleting everyday. And with decreasing levels of groundwater the demand for the same is still increasing everyday. Thus, water management system becomes very crucial for sustainable development. Hence, innovative ways to conserve water should be employed.

COMPONENTS USED

- NODE MCU – ESP8266
- ULTRASONIC SENSOR
- SOIL MOISTURE SENSOR
- RELAY
- ARDUINO
- WATER PUMP
- SOLENOID VALVE

METHODOLOGY





PROGRAM

```
#include <LiquidCrystal.h>

const int TMP36=A0;
const int motor=13;
const int LedRed2=12;
const int LedGreen2=11;
int sensorValue=0;
int outputValue=0;
LiquidCrystal lcd(2,3,4,5,6,7);

void setup(){
  pinMode(A1,INPUT);
  pinMode(9,OUTPUT);
  pinMode(10,OUTPUT);
  Serial.begin(9600);
  lcd.begin(16,2);
  lcd.print("SMART");
  lcd.setCursor(0,1);
  lcd.print("WATER GRID");
  pinMode(motor,OUTPUT);
  pinMode(LedRed2,OUTPUT);
  pinMode(LedGreen2,OUTPUT);
  delay(4000);
  lcd.clear();
  lcd.print("Tem= ");

  lcd.setCursor(10,0);
  lcd.print("S= ");

  lcd.setCursor(0,1);
  lcd.print("Pump= ");
}
void loop(){
  sensorValue =analogRead(A1);
  outputValue = map(sensorValue, 0, 1023, 0, 255);
  analogWrite(9,outputValue);
  analogWrite(10,outputValue);


  float value = analogRead(TMP36);
  value=value/1024;
  value=value*5;
  value=value-0.5;
  value=value*100;
  float Temperature=value;
  lcd.setCursor(4,0);
  lcd.print(Temperature);

  //Serial.print("Sensor = ");
  //Serial.print(sensorValue);
  Serial.print(" output= ");
  Serial.println(outputValue);
  Serial.print("\t Temperature = ");
```

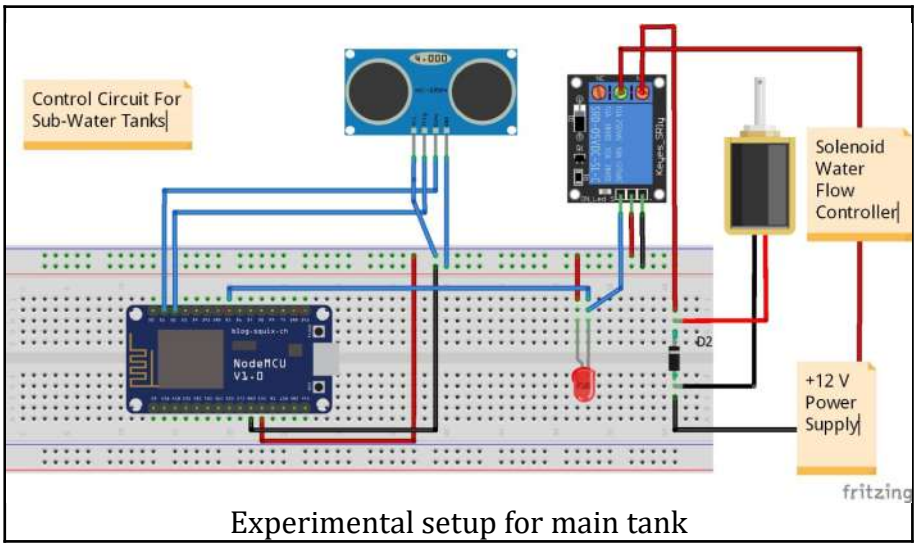
Code for main tank

```
  Serial.print(Temperature);
  delay(2);

  lcd.setCursor(13,0);
  if(outputValue > 150)
  {
    digitalWrite(motor, HIGH);
    digitalWrite(10, HIGH); //10 - red led potentiometer
    digitalWrite(9, LOW);    //9 - green led potentiometer
    lcd.print(outputValue);

    digitalWrite(12,LOW);   //12 - red led temp
    digitalWrite(11,HIGH);    //11 - green led temp
    lcd.setCursor(7,1);
    lcd.print("OFF");
  }
  else if(outputValue<150 && Temperature<25)
  {
    digitalWrite(motor, LOW);
    digitalWrite(10, LOW);
    digitalWrite(9, HIGH);
    lcd.print(outputValue);

    digitalWrite(12,HIGH);
    digitalWrite(11,LOW);
    lcd.setCursor(7,1);
    lcd.print("25 ");
  }
  else if(outputValue<150 && Temperature>25 && Temperature<45)
  {
    digitalWrite(motor, HIGH);
    digitalWrite(10, LOW);
    digitalWrite(9, HIGH);
    lcd.print(outputValue);

    digitalWrite(12,LOW);
    digitalWrite(11,HIGH);
    lcd.setCursor(7,1);
    lcd.print("50 ");
  }
  else if (outputValue<150 && Temperature>45)
  {
    digitalWrite(motor, HIGH);
    digitalWrite(10, LOW);
    digitalWrite(9, HIGH);
    lcd.print(outputValue);

    digitalWrite(12,LOW);
    digitalWrite(11,HIGH);
    lcd.setCursor(7,1);
    lcd.print("100");
  }
  delay(1000);
 }

```

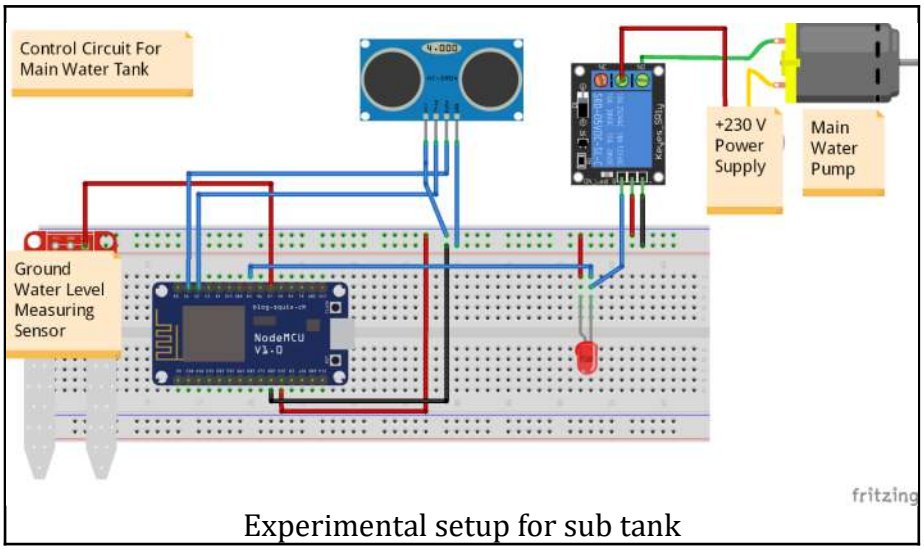
```
#include <Servo.h>
const int pingPin = 4;
const int servoPin = 2;
Servo servoMotor;
void setup()
{
  Serial.begin(9600);
  servoMotor.attach(servoPin);
}

void loop()
{
  long duration, cm;

  pinMode(pingPin, OUTPUT);
  digitalWrite(pingPin, LOW);
  delayMicroseconds(2);
  digitalWrite(pingPin, HIGH);
  delayMicroseconds(5);
  digitalWrite(pingPin, LOW);

  pinMode(pingPin, INPUT);
  duration = pulseIn(pingPin, HIGH);

  // convert the time into a distance
 if(cm <=25){
    servoMotor.write(0);
  }
  else if(cm <= 50){
    servoMotor.write(30);
  }
  else if(cm <= 100){
    servoMotor.write(50);
  }
  else if(cm <= 150){
    servoMotor.write(70);
  }
  else if(cm <= 170){
    servoMotor.write(100);
  }
  else if(cm <= 200){
    servoMotor.write(130);
  }
  else if(cm <= 250){
    servoMotor.write(150);
  }
  else if(cm > 250){
    servoMotor.write(180);
  }
  delay(100);
  Serial.println("Water level in sub tank");
  Serial.println(cm);
}
```

Code for sub-tank

MODEL CIRCUIT

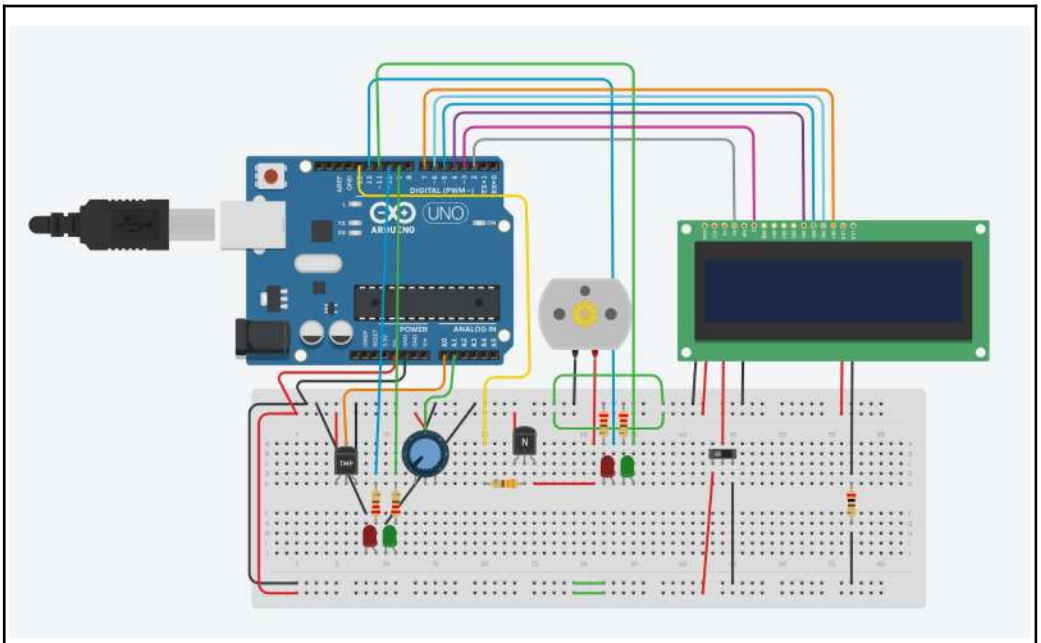


Experimental setup for main tank

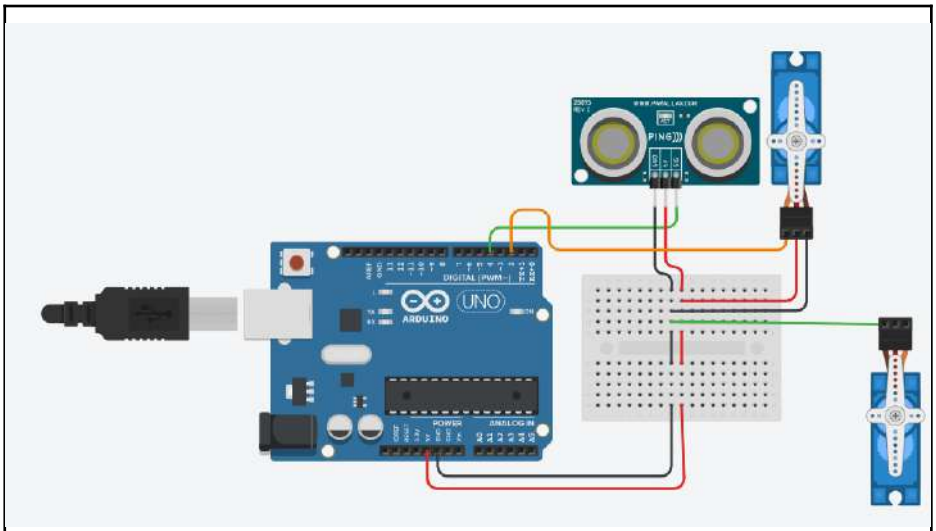


Experimental setup for sub tank

SIMULATED CIRCUIT

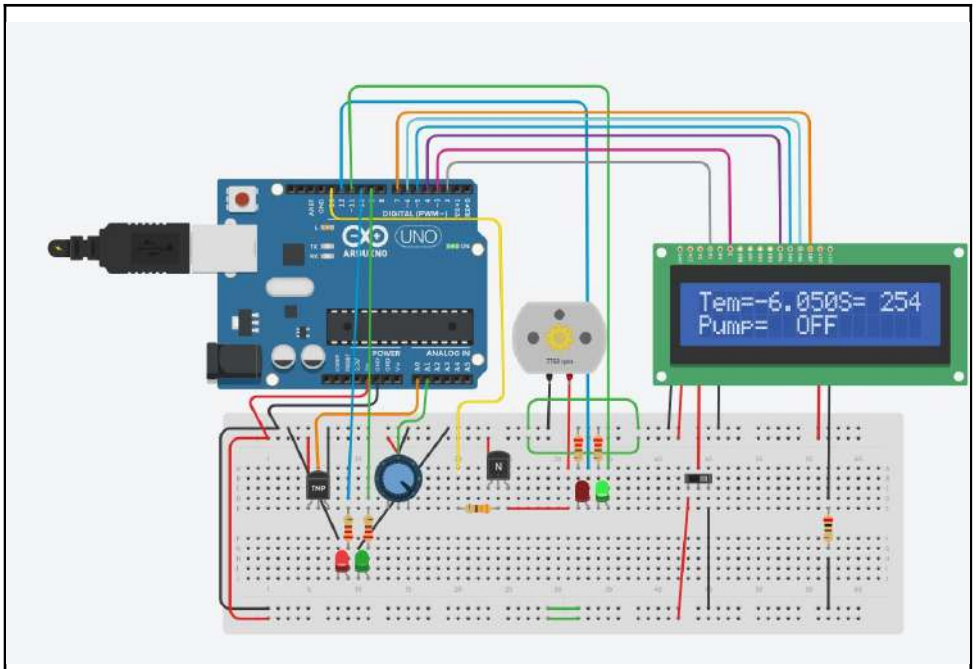


Simulated circuit of Main Tank

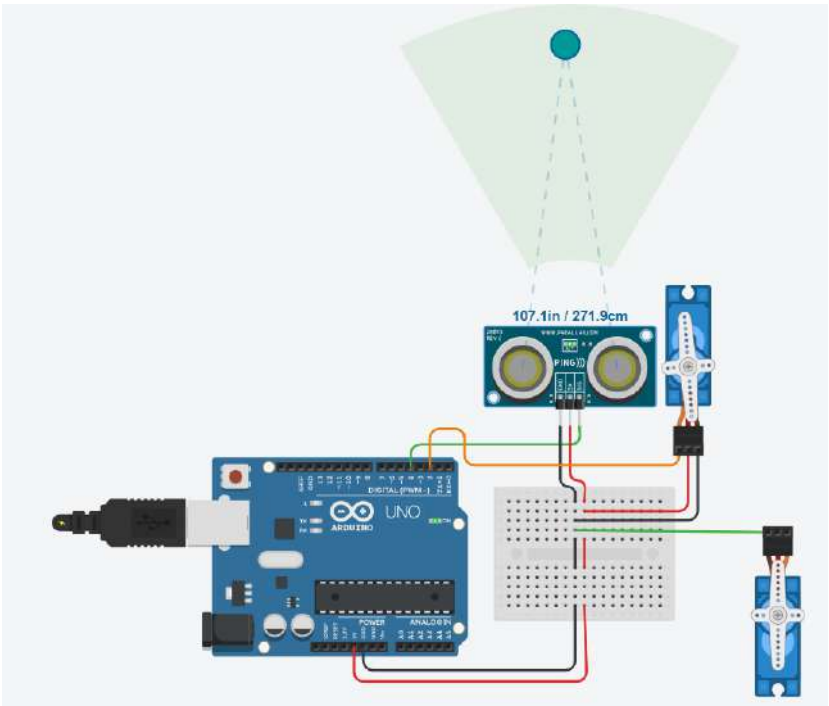


Simulated circuit of sub-tank

WORKING



Working of main tank



Working of sub-tank

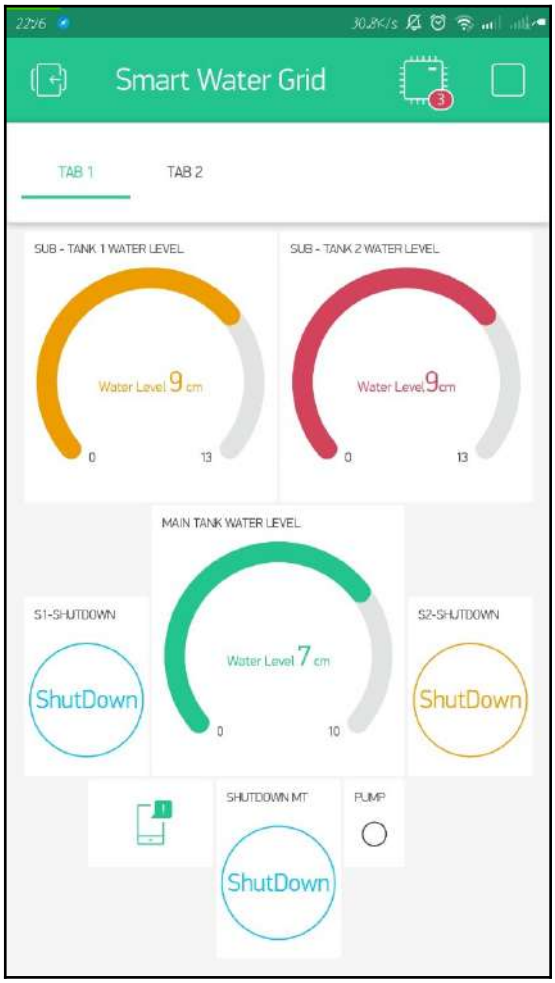
RESULT

The model was implemented using the online simulation. The model has following advantages over traditional methods –

- We can easily understand and control the water flow.
- Predominantly we can conserve the water.
- We can monitor the water quality.
- Energy conservation – the Unit can work under lower energy.
- Maintenance cost would be very low.
- Billing accuracy.
- More intelligence in control.
- Water smart grid is efficient and reliable.

DASHBOARD

Here, is the sample dashboard output which helps user to control our system by the means of an Android application.



APPLICATIONS

- Water Scarcity is term that has been loosely used, not just by our generation, but also by Generation X, as evident from Kyoto Protocol and other water conservation runs during the 90's and 80's. But the real implications of these two words, have hit us now as the city of Cape Town, South Africa has declared that it would run out of water by the 22nd of April, 2018, marking it the Zero Day.

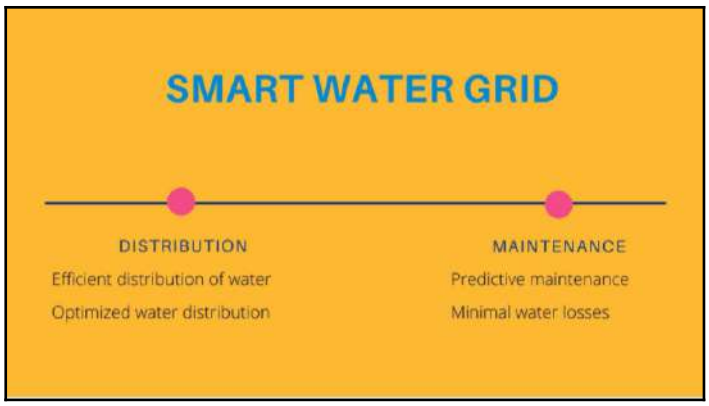
- The idea in essence helps people be aware of how much water is needed. Also, it does not require a human monitoring system, as it automatically operates the motors in the absence of human operations.

- This Water Smart Grid, is designed for efficiently tackling the issues of water conservation on the distribution end.

CONCLUSION

One of the strategies for water conservation is practising sustainable methods of utilizing groundwater resources. Groundwater flows due to gravity and eventually discharges into streams. Excess pumping of groundwater leads to a decrease in groundwater levels and if continued it can exhaust the resource. Ground and surface waters are connected and overuse of groundwater can reduce and, in extreme examples, diminish the water supply of lakes, rivers, and streams. In coastal regions, over pumping groundwater can increase saltwater intrusion which results in the contamination of groundwater water supply. Sustainable use of groundwater is essential in water conservation.

Here is the block diagram which summarises the working of our project –



However, the proposed model has some challenges. For instance, the installation cost may be higher but the running cost is very less, which makes it free with the passage of time.

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