# SPRINT – 1

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|---|---|
| **DATE** | **27th October 2022** |
| **TEAM ID** | **PNT2022TMID27433** |
| **PROJECT NAME** | **Smart Farmer - IoT Enabled Smart Farming Application** |

# SMART FARMER PROGRAM IN TINKERCAD

## Description:

This Smart Irrigation System is used to help farmers in the irrigation process. The System provides data on the parameters which can be used to monitor the condition of the field to maintain and protect the crops. The parameters like temperature, soil moisture, the water level in the field, etc., can be accessed through the system. The sensors in the system monitor the parameters and provide them to the farmer to take the necessary measures.

## Program:

```
#include <Adafruit_LiquidCrystal.h> //Includes the library for LCD Display
#include <Wire.h>                   //Includes the library for connections
#include <Servo.h>                  //Includes the library for Servo Motor


Servo s;
int e = 4;
int t = 5;
int r = 12;
int b = 11;
int g = 10;
int sec = 0;
int Sensor = 0;
```

```
int soil = 0;
int motorPin = 9;
Adafruit_LiquidCrystal lcd(0);

void setup()
{
   Wire.begin();
   pinMode(A0, INPUT);              // Temperature Sensor
   pinMode(A1, INPUT);              // Soil Moisture Sensor
   pinMode(t, OUTPUT);              // Ultra sonic Trigger
   pinMode(e, INPUT);               // Ultra sonic Echo
   pinMode(b, OUTPUT);              // GREEN light for LED
   pinMode(g, OUTPUT);              // BLUE light for LED
   pinMode(r, OUTPUT);              // RED light for LED
   pinMode(motorPin, OUTPUT);       // DC motor
   s.attach(3);                     // Servo Motor
   lcd.begin(16, 2);                // LCD 16x2 Display
   lcd.setBacklight(0);
   Serial.begin(9600);
}

float readDistanceCM()
{
   digitalWrite(t, LOW);
   delayMicroseconds(2);
   digitalWrite(t, HIGH);
   delayMicroseconds(10);
```

```
    digitalWrite(t, LOW);
    int duration = pulseIn(e, HIGH);
    return duration * 0.034 / 2;
}

void loop()
{
    // Soil Moisture:
    Sensor = analogRead(A1);
// Reads data from Soil Moisture    sensor
    soil = map(Sensor, 0, 1023, 0, 117);
// Low analog value indicates HIGH moisture level and High analog value indicates LOW moisture level
    // data = map(analogValue,fromLOW,fromHIGH,toLOW,toHIGH)
    Serial.print("Soil Moisture value:");
    Serial.println(soil);
    //'data = 0' indicates total wetness and 'data = 100' indicates total dryness

    // Temperature:
    double a = analogRead(A0);          // Reads data from Temperature sensor
    double t = (((a / 1024) * 5) - 0.5) * 100;
    Serial.print("Temperature value:"); //Temperature value in Celsius
    Serial.println(t);

    // Ultrasonic sensor:
    float distance = readDistanceCM();  //Reads data from Ultrasonic sensor
    Serial.print("Measured distance: ");
    Serial.println(readDistanceCM());
```

```
// LCD Display:
lcd.setBacklight(1);          //ON the background light in LCD
lcd.clear();

// Conditions:
```

/*If the temperature is Greater than 20 and less than 35 and also the moisture of soil is less than 60 then the GREEN light will be turned ON indicating the Normal condition */

```
if (t >= 20 && t < 35 && soil >= 40 && soil < 50)
{
  digitalWrite(b, 0);
  digitalWrite(g, 1);
  digitalWrite(r, 0);
  s.write(90);
  digitalWrite(motorPin, HIGH);
  lcd.setCursor(3, 0);
  lcd.print("ON MOTOR");
  delay(1000);
  lcd.clear();
  Serial.println("Water Partially Flows");
}
```

/*If the temperature is Greater than 35 and less than 45, then the BLUE light will be turned ON indicating the Intermediate risk condition due to slightly warm weather */

```
else if (t >= 35 && t < 45)
```

```
{
  digitalWrite(b, 1);
  digitalWrite(g, 0);
  digitalWrite(r, 0);
  s.write(90);
  digitalWrite(motorPin, HIGH);
  lcd.setCursor(3, 0);
  lcd.print("ON MOTOR");
  delay(1000);
  lcd.clear();
  Serial.println("Water Partially Flows");
}
```

/*If the temperature is Greater than 45 or the moisture of soil is less than 30, then the RED light will be turned ON indicating the Critical condition due to highly warm weather or the low moisture content in soil */

```
else if (t >= 45 || soil < 30)
{
  digitalWrite(b, 0);
  digitalWrite(g, 0);
  digitalWrite(r, 1);
  s.write(180);
  digitalWrite(motorPin, HIGH);
  Serial.println("Water Fully Flows");
  lcd.setCursor(2, 0);
  lcd.print("ON MOTOR!!!");
  lcd.setCursor(3, 1);
  lcd.print("Low Water");
```

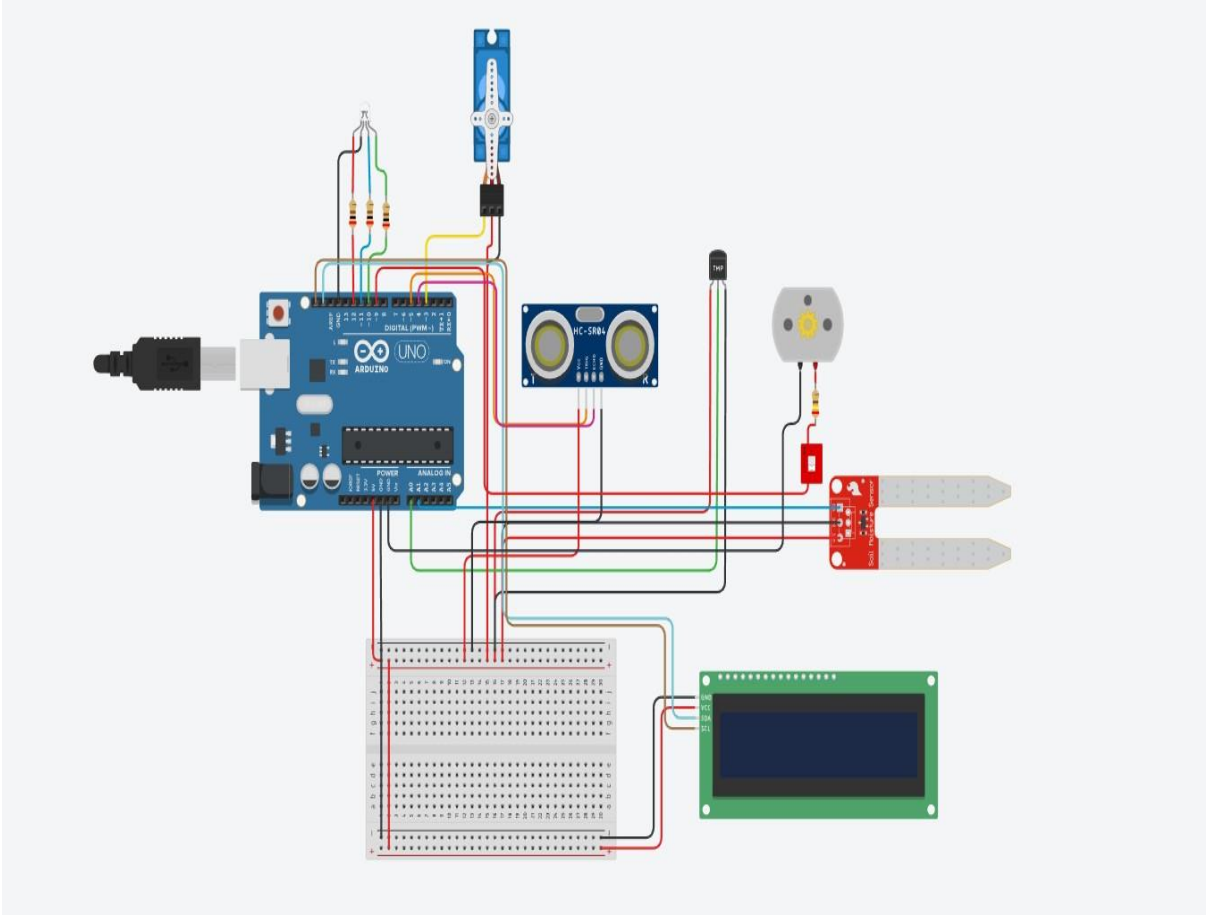
```
    delay(1000);
    lcd.clear();
  }
```

/*If the level of water is MORE in the field it will be indicated by distance sensor for less than 10cm and also the moisture of soil is greater than 80, then the YELLOW light will be turned ON indicating the high water level */

```
  else if (distance<10 && soil> 80)
  {
    digitalWrite(b, 0);
    digitalWrite(g, 1);
    digitalWrite(r, 1);
    s.write(0);
    digitalWrite(motorPin, LOW);
    Serial.println("Water Does Not Flow");
    lcd.clear();
    lcd.setCursor(3, 0);
    lcd.print("OFF MOTOR");
    delay(1000);
    lcd.clear();
    lcd.setCursor(1, 0);
    lcd.print("DRAIN WATER!!!");
    delay(1000);
    lcd.clear();
  }



  else
```

```
  {
    digitalWrite(b, 1);
    digitalWrite(g, 1);
    digitalWrite(r, 0);
    s.write(0);
    digitalWrite(motorPin, LOW);
    lcd.setCursor(3, 0);
    lcd.print("OFF MOTOR");
    delay(1000);
    lcd.clear();
    Serial.println("Water Does Not Flow");
  }

  lcd.setCursor(0, 0);
  lcd.print("Temp:");
  lcd.print(t);
  lcd.print("degree");
  lcd.setCursor(0, 1);
  lcd.print("SoilWetness:");
  lcd.print(soil);
  lcd.print("%");

  Serial.println("--------------------------------------------------");
  delay(1000);
}
```

# Circuit Diagram:



# Component Used:

| Name | Quantity | Component |
|---|---|---|
| UAU | 1 | Arduino Uno R3 |
| SERVOMS | 1 | Positional Micro Servo |
| DLED | 1 | LED RGB |
| RGreen LED Resistor<br>RRed LED Resistor<br>RBlue LED Resistor | 3 | 200 Ω Resistor |
| SENSMS | 1 | Soil Moisture Sensor |
| MSmall 6V DC Motor | 1 | DC Motor |
| RMotor Resistor | 1 | 240 Ω Resistor |
| UTS | 1 | Temperature Sensor [TMP36] |
| DISTUltrasonic Distance Sensor | 1 | Ultrasonic Distance Sensor |
| U3 | 1 | MCP23008-based, 32 LCD 16 x 2 (I2C) |
| SWDPST Switch | 1 | DIP Switch DPST |

## Link to Project in Tinkercad:

https://www.tinkercad.com/things/dcWbFQCFov5-smart-farmer-irrigation-system/editel?sharecode=XGk7187aEkY0Qz-xhQM-ey-K71uyCjmorp8hbDhM3WA

# Note:

The model done in Tinkercad in this Sprint-1 cannot send data to IBM cloud, because it does not have any Wi-fi module. So, we used Wokwi to design our project again in Sprint-2 as it has ESP32 module to send data to IBM cloud for visualisation.