Automatic Irrigation System

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Link to the project
Link to GitHub

Content

Project Description

Our project is set to automate the tedious chore of checking on your plants. With our Automatic Irrigation System the user will be able to check up on their plants with just a glance at the Liquid Crystal Display and see the status of the plants. Here we'll describe how to work with it and what each of its signals means.

For any of the systems to work at least one of the moisture sensor switches must be switched on.

The most simple of the signals are the LED lights. They are shared amongst all the plants and are meant to communicate the lightness and temperature levels of the atmosphere. The first set of LEDs are that of white, yellow and orange. When the light levels are too low, the orange LED will turn on to indicate that. When the light levels are too high, the white LED will turn on to indicate that. When the light levels are perfect the orange LED will turn on to indicate that.

The second set of LEDs are those that serve to show the temperature levels. The LEDs are blue, green and red; blue for too cold, red for too hot and green for perfect temperature. The perfect temperature of the plant is in the set range of above 20 degrees celsius and under 30 degrees celsius.

The second system is the switch one. It is connecting the moisture sensors to the power supply and is in charge of turning the whole Automatic Irrigation System on and off. One of the switches must be on for the AIS to turn on. Each of the switches is connected to the moisture sensors; first switch to the first sensor, second switch to the second sensor.

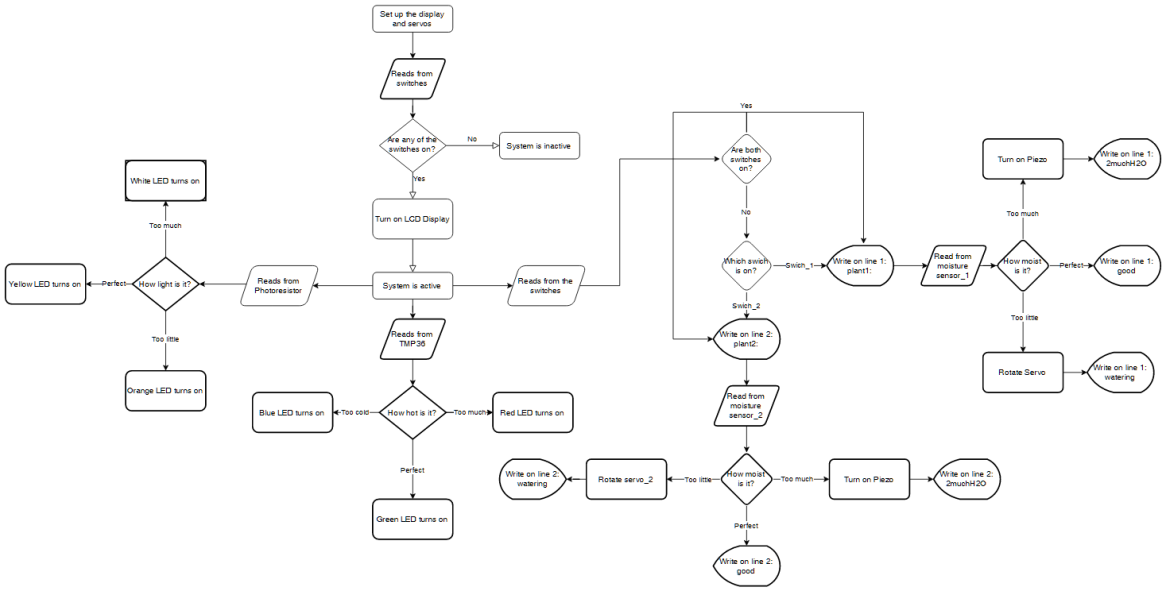
The third one is the main one – that being the moisture system one. It is interconnected to the servos, LCD display and switch system. The moisture denser reads the water level from the plant and sends the data back to the arduino.

If the moisture is too low the servos turn 90 degrees and imitate the action of water pumping through them. Moreover, the LCD display writes "watering" to the corresponding plant. After 2 seconds the servo goes back to its original position and the LCD display updates.

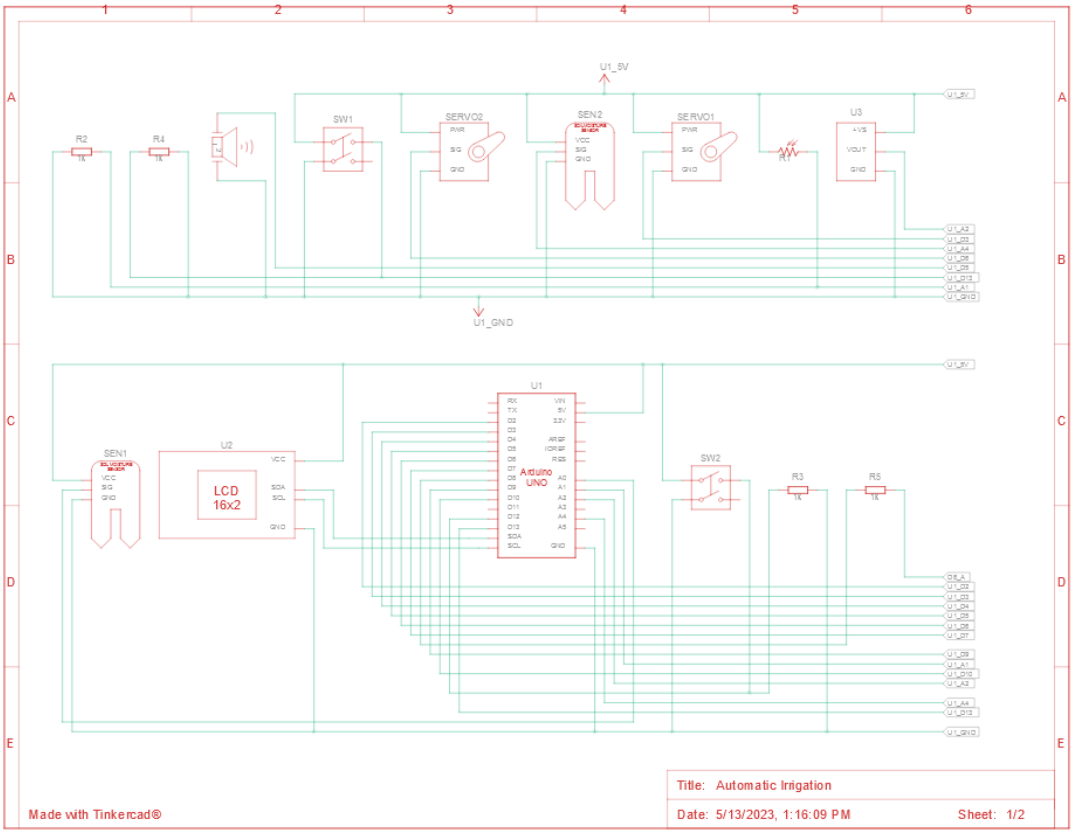
If the moisture levels are too high, the Piezo starts beeping, alerting the user to empty the water from the plant. In addition to that, the LCD display writes "2muchH2O" which is short for too much water, but since the room was not enough, we had to make do with what we had.

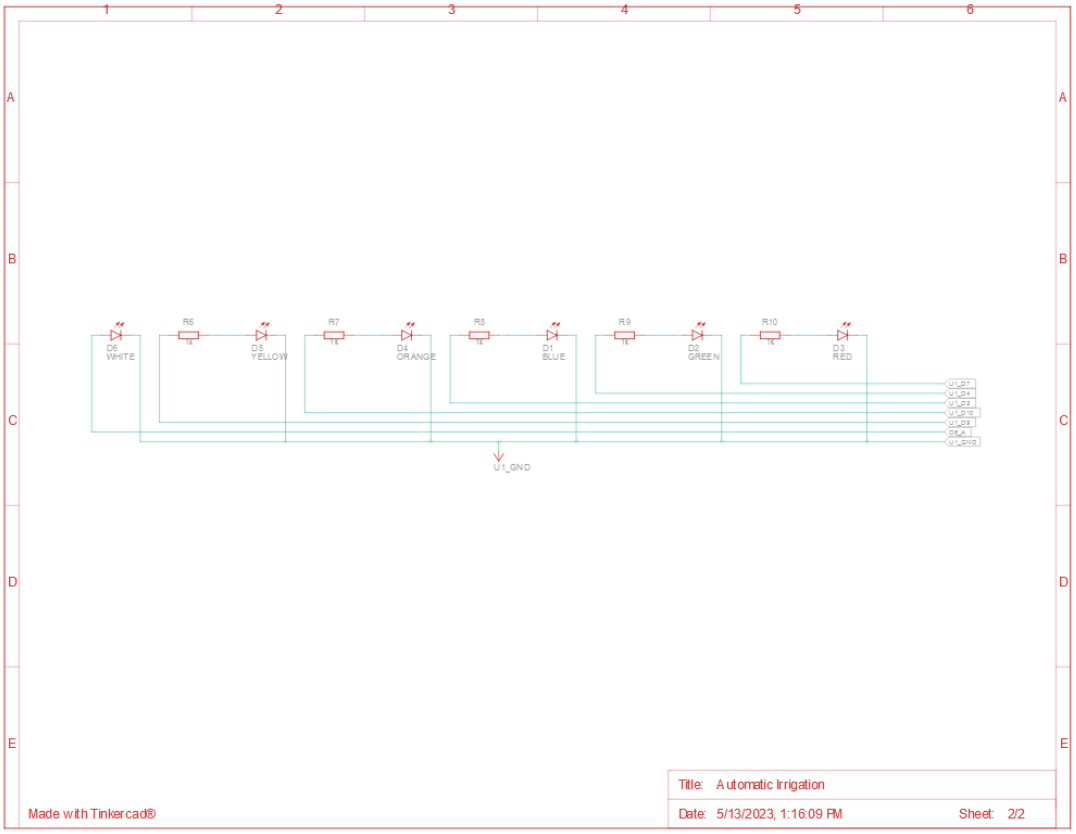
If the moisture levels are good, nothing of note happens. The only thing that changes is the fact that the LCD displays write "good" to the corresponding plant.

Flow Chart


Set up the display and servos
Reads from switches
Are any of the switches on?
No
System is inactive
Yes
Turn on LCD Display
System is active
Reads from Photoresistor
How light is it?
Too much
White LED turns on
Perfect
Yellow LED turns on
Too little
Orange LED turns on
Reads from the switches
Reads from TMP36
How hot is it?
Too cold
Blue LED turns on
Too much
Red LED turns on
Perfect
Green LED turns on
Are both switches on?
Yes
No
Which swich is on?
Swich_1
Write on line 1: plant1:
Swich_2
Write on line 2: plant2:
Read from moisture sensor_1
How moist is it?
Too much
Turn on Piezo
Write on line 1: 2muchH2O
Perfect
Write on line 1: good
Too little
Rotate Servo
Write on line 1: watering
Read from moisture sensor_2
How moist is it?
Too much
Turn on Piezo
Write on line 2: 2muchH2O
Too little
Rotate servo_2
Write on line 2: watering
Perfect
Write on line 2: good

Electrical Scheme





Components Table

Name	Quantity	Component
U1	1	Arduino Uno R3
SEN1 SEN2	2	Soil Moisture Sensor
U3	1	Temperature Sensor [TMP36]
R1	1	Photoresistor
PIEZO1	1	Piezo
D1	1	Blue LED
D2	1	Green LED
D3	1	Red LED
SERVO1 SERVO2	2	Micro Servo
U2	1	MCP23008-based, 32 LCD 16 x 2 (I2C)
SW1 SW2	2	DIP Switch DPST
R3 R4 R2 R5 R6 R7 R8 R9 R10	9	1 kΩ Resistor
D4	1	Orange LED
D5	1	Yellow LED
D6	1	White LED

Code

```
// C++ code
//
#include <LiquidCrystal_I2C.h>

#include <Adafruit_LiquidCrystal.h>

#include <Servo.h>

int switch_1 = 0;

int switch_2 = 0;

int temp_input = 0;

int unnamed = 0;

int i = 0;

int j = 0;

int moisture_1 = 0;

int moisture_2 = 0;

int k = 0;

int light_input = 0;

int m = 0;

int n = 0;

LiquidCrystal_I2C lcd_2(32, 16, 2);

Adafruit_LiquidCrystal lcd_1(0);

Servo servo_3;

Servo servo_6;

void setup()
{
  pinMode(12, INPUT);
```

```
  pinMode(13, INPUT);
  lcd_2.init();
  lcd_1.begin(16, 2);
  Serial.begin(9600);
  servo_3.attach(3, 500, 2500);
  servo_6.attach(6, 500, 2500);
  pinMode(A1, INPUT);
  pinMode(A2, INPUT);
  pinMode(2, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(10, OUTPUT);
  pinMode(8, OUTPUT);
  pinMode(9, OUTPUT);
  pinMode(A0, INPUT);
  pinMode(A3, INPUT);
  pinMode(5, OUTPUT);
}

void loop()
{
  switch_1 = digitalRead(12);
  switch_2 = digitalRead(13);
  lcd_1.setCursor(0, 0);
  // Reading all the data
  Serial.println(switch_1);
  Serial.println(switch_2);
  servo_3.write(0);
  servo_6.write(0);
  if (switch_1 + switch_2 == 0) {
      lcd_1.noDisplay();
      // both dont work, the whole system should not work
  } else {
      while (switch_1 + switch_2 > 0) {
      lcd_1.display();
      // at least one works, system is up
      light_input = analogRead(A1);
      Serial.print("light: ");
      Serial.print(light_input);
      Serial.println("");
      temp_input = analogRead(A2);
      Serial.print("temp: ");
      Serial.print(temp_input);
      Serial.println(" ");
      if (temp_input <= 130) {
      digitalWrite(2, HIGH);
```

```
digitalWrite(4, LOW);
digitalWrite(7, LOW);
} else {
if (temp_input <= 170) {
      digitalWrite(4, HIGH);
      digitalWrite(2, LOW);
      digitalWrite(7, LOW);
} else {
      digitalWrite(7, HIGH);
      digitalWrite(2, LOW);
      digitalWrite(4, LOW);
}
}
if (light_input <= 230) {
digitalWrite(10, HIGH);
digitalWrite(8, LOW);
digitalWrite(9, LOW);
} else {
if (light_input <= 550) {
      digitalWrite(9, HIGH);
      digitalWrite(8, LOW);
      digitalWrite(10, LOW);
} else {
      digitalWrite(8, HIGH);
      digitalWrite(10, LOW);
      digitalWrite(9, LOW);
}
}
if (switch_1 + switch_2 == 2) {
// both work
lcd_1.setCursor(0, 0);
lcd_1.print("plant1: ");
lcd_1.setCursor(0, 1);
lcd_1.print("plant2: ");
moisture_1 = analogRead(A0);
moisture_2 = analogRead(A3);
// 1 works
moisture_1 = analogRead(A0);
Serial.print("moist1: ");
Serial.print(moisture_1);
Serial.println("");
delay(2000); // Wait for 2000 millisecond(s)
if (moisture_1 <= 240) {
      servo_3.write(90);
      delay(2000); // Wait for 2000 millisecond(s)
      servo_3.write(0);
```

```
      delay(5000); // Wait for 5000 millisecond(s)
      lcd_1.setCursor(8, 0);
      lcd_1.print("     ");
      lcd_1.setCursor(8, 0);
      lcd_1.print("watered");
} else {
      servo_3.write(0);
      if (moisture_1 >= 580) {
      digitalWrite(5, HIGH);
      lcd_1.setCursor(8, 0);
      lcd_1.print("     ");
      lcd_1.setCursor(8, 0);
      lcd_1.print("2muchH2O");
      delay(2000); // Wait for 2000 millisecond(s)
      digitalWrite(5, LOW);
      delay(2000); // Wait for 2000 millisecond(s)
      } else {
      lcd_1.setCursor(8, 0);
      lcd_1.print("     ");
      lcd_1.setCursor(8, 0);
      lcd_1.print("good");
      delay(2000); // Wait for 2000 millisecond(s)
      }
}
moisture_2 = analogRead(A3);
Serial.print("moist2: ");
Serial.print(moisture_2);
Serial.println("");
delay(2000); // Wait for 2000 millisecond(s)
if (moisture_2 <= 240) {
      servo_6.write(90);
      delay(2000); // Wait for 2000 millisecond(s)
      servo_6.write(0);
      delay(5000); // Wait for 5000 millisecond(s)
      lcd_1.setCursor(8, 1);
      lcd_1.print("     ");
      lcd_1.setCursor(8, 1);
      lcd_1.print("watered");
} else {
      servo_6.write(0);
      if (moisture_2 >= 580) {
      Serial.print("moist2: ");
      Serial.print(moisture_2);
      Serial.println("");
      digitalWrite(5, HIGH);
      lcd_1.setCursor(8, 1);
```

```
        lcd_1.print("     ");
        lcd_1.setCursor(8, 1);
        lcd_1.print("2muchH2O");
        delay(2000); // Wait for 2000 millisecond(s)
        digitalWrite(5, LOW);
        delay(2000); // Wait for 2000 millisecond(s)
        } else {
        lcd_1.setCursor(8, 1);
        lcd_1.print("     ");
        lcd_1.setCursor(8, 1);
        lcd_1.print("good");
        delay(2000); // Wait for 2000 millisecond(s)
        }
    }
    } else {
    if (switch_1 == 1) {
        // 1 works
        lcd_1.setCursor(0, 1);
        lcd_1.print("                ");
        lcd_1.setCursor(0, 0);
        lcd_1.print("plant1: ");
        moisture_1 = analogRead(A0);
        Serial.print("moist1: ");
        Serial.print(moisture_1);
        Serial.println("");
        delay(2000); // Wait for 2000 millisecond(s)
        if (moisture_1 <= 240) {
        servo_3.write(90);
        delay(2000); // Wait for 2000 millisecond(s)
        servo_3.write(0);
        delay(5000); // Wait for 5000 millisecond(s)
        lcd_1.setCursor(8, 0);
        lcd_1.print("     ");
        lcd_1.setCursor(8, 0);
        lcd_1.print("watered");
        } else {
        servo_3.write(0);
        if (moisture_1 >= 580) {
        digitalWrite(5, HIGH);
        lcd_1.setCursor(8, 0);
        lcd_1.print("     ");
        lcd_1.setCursor(8, 0);
        lcd_1.print("2muchH2O");
        delay(2000); // Wait for 2000 millisecond(s)
        digitalWrite(5, LOW);
        delay(2000); // Wait for 2000 millisecond(s)
```

```
        } else {
        lcd_1.setCursor(8, 0);
        lcd_1.print("     ");
        lcd_1.setCursor(8, 0);
        lcd_1.print("good");
        delay(2000); // Wait for 2000 millisecond(s)
        }
        }
    } else {
        // 2 works
        if (switch_2 == 1) {
        lcd_1.setCursor(0, 0);
        lcd_1.print("                ");
        lcd_1.setCursor(0, 1);
        lcd_1.print("plant2: ");
        moisture_2 = analogRead(A3);
        Serial.print("moist2: ");
        Serial.print(moisture_2);
        Serial.println("");
        delay(2000); // Wait for 2000 millisecond(s)
        if (moisture_2 <= 240) {
        servo_6.write(90);
        delay(2000); // Wait for 2000 millisecond(s)
        servo_6.write(0);
        delay(5000); // Wait for 5000 millisecond(s)
        lcd_1.setCursor(8, 1);
        lcd_1.print("     ");
        lcd_1.setCursor(8, 1);
        lcd_1.print("watered");
        } else {
        servo_6.write(0);
        if (moisture_2 >= 580) {
              Serial.print("moist2: ");
              Serial.print(moisture_2);
              Serial.println("");
              digitalWrite(5, HIGH);
              lcd_1.setCursor(8, 1);
              lcd_1.print("     ");
              lcd_1.setCursor(8, 1);
              lcd_1.print("2muchH2O");
              delay(2000); // Wait for 2000 millisecond(s)
              digitalWrite(5, LOW);
              delay(2000); // Wait for 2000 millisecond(s)
        } else {
              lcd_1.setCursor(8, 1);
              lcd_1.print("     ");
```

```
                  lcd_1.setCursor(8, 1);
                  lcd_1.print("good");
                  delay(2000); // Wait for 2000 millisecond(s)
            }
            }
            } else {
            // 2 works
            }
      }
      }
      switch_1 = digitalRead(12);
      switch_2 = digitalRead(13);
      }
  }
}
```