Automatic Irrigation System

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Table of Contents

1. Introduction
2. Components
3. How does it work?
4. Connections
5. Arduino Code
6. Conclusion
7. Bibliography

1. Introduction

The idea for this project is quite straight forward. I have always had a strong connection with nature and since I came to my university city, staying in a small room I felt the need to have greenery near me. I started growing plants, but the main problem is that I am always in another place and I cannot water my plants as frequently as I should. Then an automatic plant watering system would be very useful, so I decided to build it by myself than to buy one.

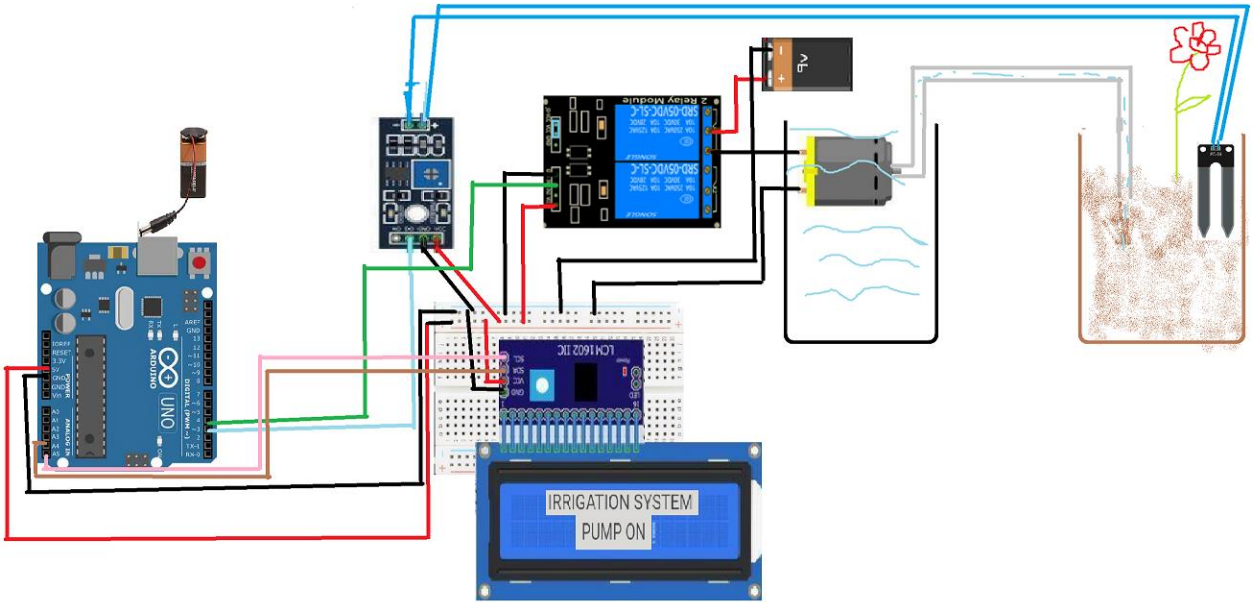
2. Components

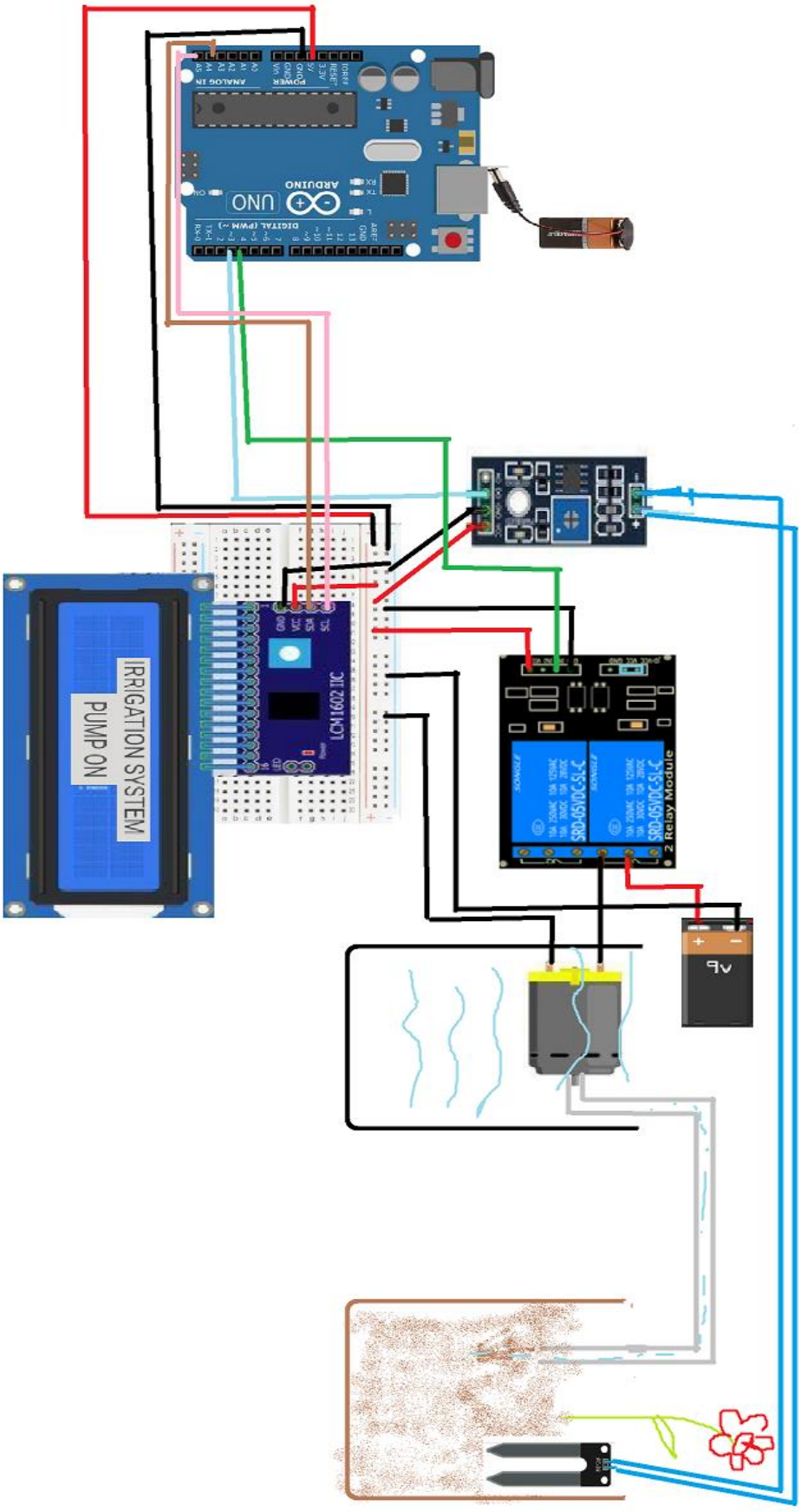
- Arduino Uno (Arduino Nano would also work)
- A moisture sensor
- A breadboard
- Jumper wires
- Relay module
- DC pump + hose
- 16*2 LCD + I2C LCD
- Jumper Wire
- Power supply (2 * 9V batteries)
- Battery housing support

3. How does it work?

The moisture sensor gives an analogical output that varies according to the moisture in the soil, it is transmitted to the comparator LM393 which has an adjustable sensitivity level. The output will be digital: ‘0’ if the soil is moist, ‘1’ if the soil is dry, this will be transmitted to the Arduino Uno on digital channel 3. The microprocessor will interpret the data and it will send ‘0’ from channel 4 to the relay to open the AC \ DC pump, or ‘1’ if there is no need to water the soil. Also, the state of the pump will be displayed on the lcd screen. I used the I2C module so that I do not have to implement the 7-segment display manually, but to use a library and to print information in a simpler manner. I used 2 * 9V batteries so that Arduino and the relay have different power sources, in order to not overload the circuit. Through trial and error I observed that the screen did not receive enough current to display information when I used only one battery.

4. Connections




ARDUINO
UNO
IRRIGATION SYSTEM
PUMP ON
LCM1602 IIC
2 Relay Module
9v

5. Arduino Code

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
int val = 0 ;

void setup()
{
Serial.begin(9600);
lcd.init();
lcd.backlight();
pinMode(3,INPUT);
pinMode(4,OUTPUT);
digitalWrite(4,HIGH);
lcd.setCursor(0,0);
lcd.print("Irrigation System ");
}

void loop()
{
```

```
val = digitalRead(3);
Serial.println(val);
delay(1000);

if(val == 1 )
{
digitalWrite(4,LOW);
lcd.setCursor(0,1);
lcd.print(" PUMP ON ");
}
else
{
digitalWrite(4,HIGH);
lcd.setCursor(0,1);
lcd.print(" PUMP OFF ");
}
}
```

Code starts with initializing the library used in the project and then sets the I2C LCD address and starts it. In void setup, it set the pin modes as INPUT or OUTPUT. And start displaying on LCD.

In a loop, it then reads the value from the soil moisture sensor and according to the condition turns on or off the pump along with displaying on LCD.

6. Conclusion

This is a complex, but not complicated project. It uses different electronic components: microprocessor, sensor, relay, pump, etc. I think there are cheaper and simpler versions of this application on the market, but this one is useful for studying purposes.

7. Bibliography

https://circuitdiagrams.in/automatic-plant-watering-system-with-arduino/

https://www.instructables.com/Automated-Plant-Watering-System/