

Smart Irrigation System

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1. Introduction to Smart Irrigation System

Nepal is an agricultural country and more than 66% of Nepalese people are engaged in agriculture. Agriculture contributes one-third of national's GDP and major part to national economy. So, the smart irrigation system is the most useful project. (Food and Agriculture Organization of United Nations, 2022)

The agricultural sector has evolved very much since the earlier time. Previously we needed to take a look at a soil whether the water is needed or not and we were also unaware how much water should be given to the plants but due to the revolution in technology the problem is solved by a smart irrigation system. This system is user friendly and easy to use. It saves the time and effort of humans and also it helps to keep the soil in good condition.

2. Tools Used

The tools used to complete this mini-project are:

- i. Fritzing
- ii. Arduino UNO
- iii. Single Channel Relay Module
- iv. Soil Moisture Sensor
- v. Water Pump Motor
- vi. Pipe for water pump motor
- vii. Jumper Wires

- Fritzing

Fritzing is an open source hardware creativity that makes electronic obtainable as a creative material for everyone. It makes us easier to make a circuit in a virtual environment so that we can be familiar to the components in the real world. (fritzing organization, 2022)

- **Arduino UNO**

Arduino is also known as the microcontroller it helps is to make/build the electronic projects easily. The UNO is popular board in the Arduino family. Arduino consists of both a physical programmable circuit board and software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. (sparkfun, 2022)

- **Water Pump Motor and water pipe**

The motor helps to send the water from water tank to the respective place through the help of water pipe.

- **Soil Moisture Sensor**

The Soil Moisture Sensor is equipped potentiometer and soil moisture thresholds. It determine the moisture of the soil and helps in automatically irrigation under soil humidity control. It has digital switching indicator LED. It can also prevent contact with the soil from rust problems and many more. (Himalayan Solutions, 2020)

- **Single Channel Relay Module**

The 1 channel 5V Relay module board is used to control high voltage and current load such as motor lamp. It is good in safety with wide range of controllable voltage. It has features like digital output manageable, wide range of controllable voltage. It has led indicator for power and status in-built. In this when jumper is connected to low pin the low level is trigger and when connected to high pin high level is trigger. (Himalayan Solution, 2020)

- **Jumper Wires**

Jumper wires are electrical wires with connector pins at each end. They are used to connect two points in a circuit without bonding. The major wire used in this projects is Male-Female wire.

3. Working Principle

Here the input pin is pin number 6 which takes the input(Moisture value of soil) from soil moisture sensor and gives the data to Arduino(microcontroller) and if the moisture is low in soil the Arduino sends the high value by pin number 13 to relay and by the help of relay the motor gets the power and it gives the water until and unless the moisture is in required amount then when the moisture is enough again pin number 6 send data to Arduino then Arduino cuts off the power supply to relay and the water stops automatically.

4. Circuit Diagram & Fritzing Schematic

4.1. Circuit Diagram

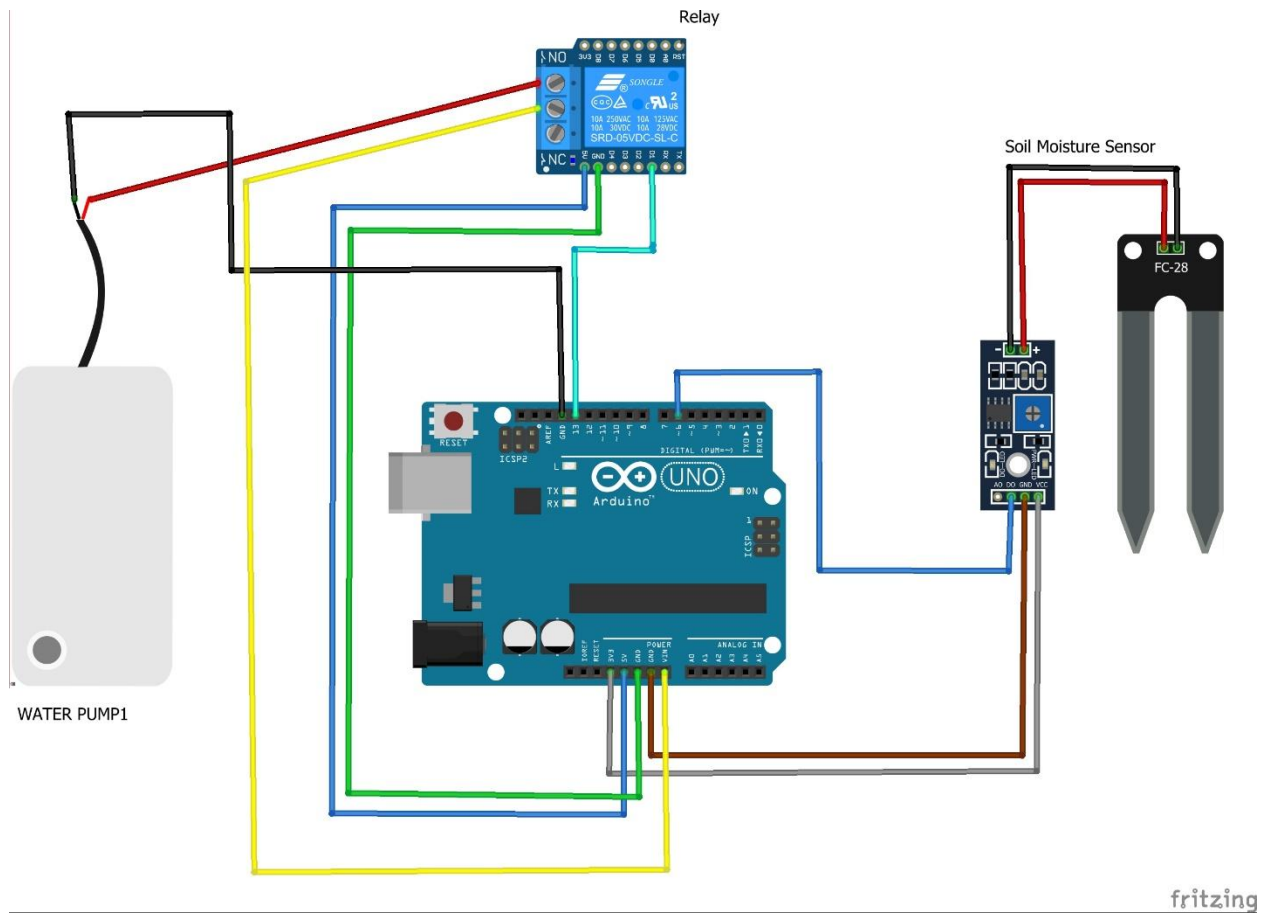


Figure 1: Circuit Diagram of Smart Irrigation System

4.2. Fritzing Schematic

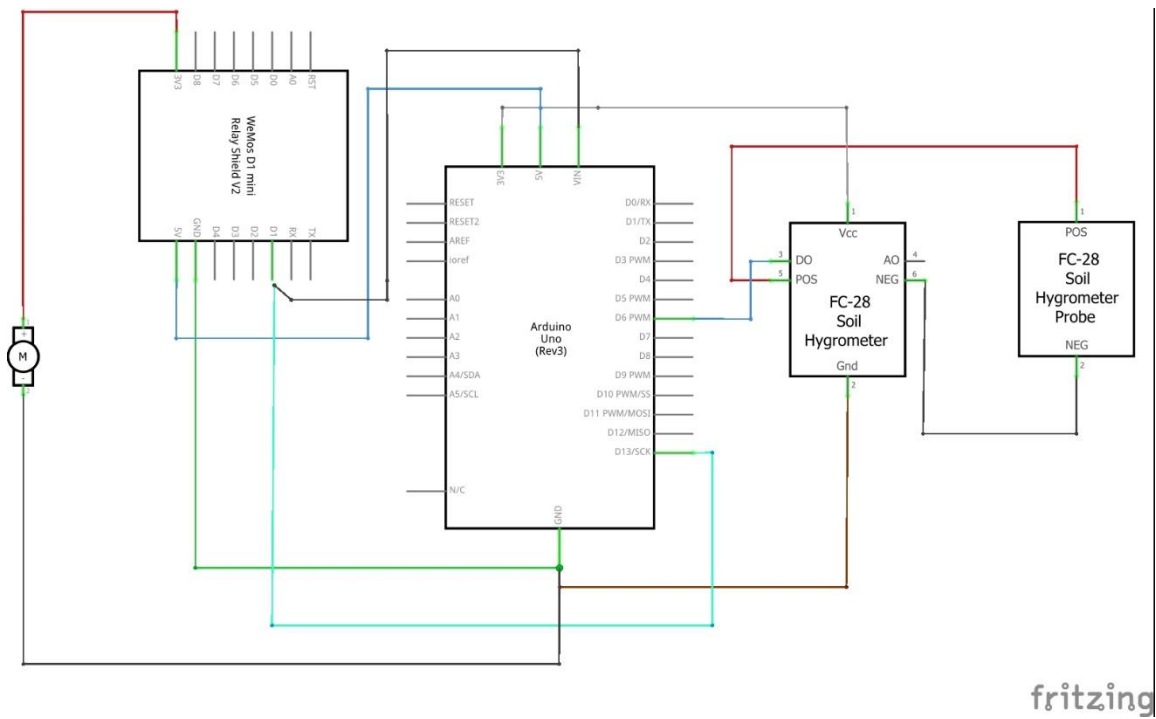


Figure 2: Fritzing Schematic of Smart Irrigation System

5. Testing



Figure 4: Indication on soil moisture sensor when dipped in soil

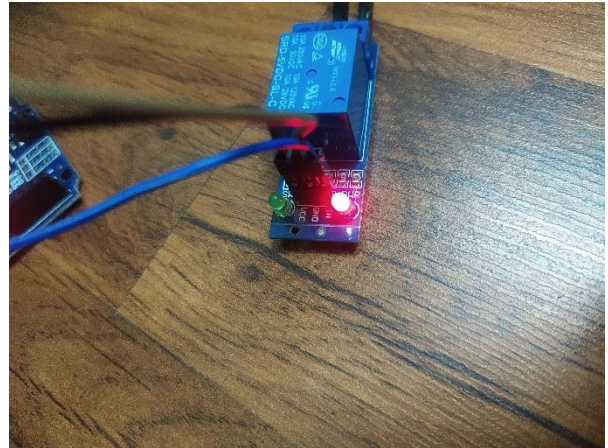


Figure 3: Indication on relay when dipped in soil

Here, in figure 4 and 5, when the moisture sensor is dipped into the soil the led of moisture sensor lights up two led of green color whereas relay's led lights up only one led of red color.

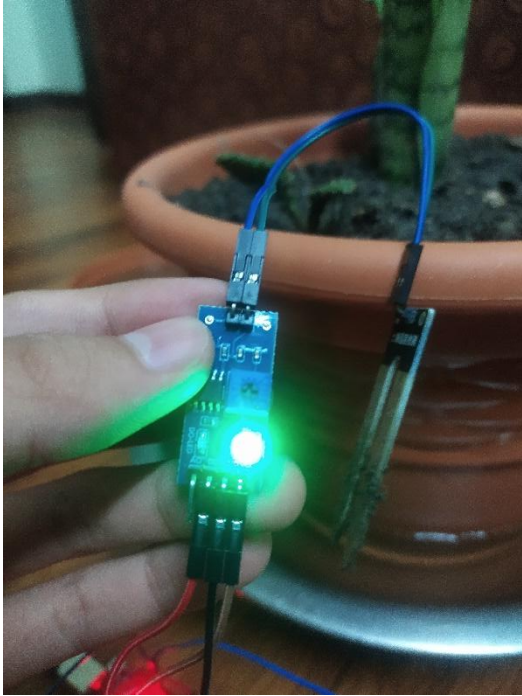


Figure 6: Indication on soil moisture sensor when sensor is out of the soil

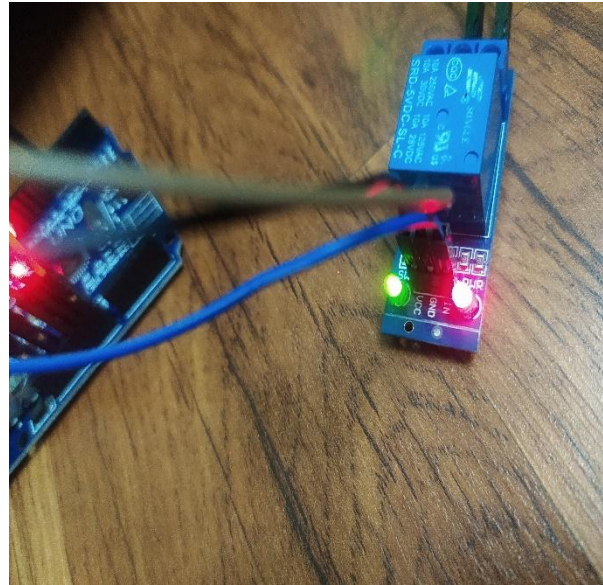


Figure 5: Indication on relay when sensor is out of the soil

Here, in figure 6 and 7 when the soil moisture sensor is taken out of the soil the soil moisture sensor turns up the light on only one led whereas in the relay module both the led of red and green lights up.

6. Conclusion

This project is very useful in our daily lives as its role is irreplaceable and has crucial role in the field of agriculture. This project helped to boost up the knowledge about the electronic components and embedded systems. The roles and responsibilities is sensors, Arduino and other component how it works and how to make it work.

The concept of making this system is as it is very necessary equipment/project all around the globe. This project is done by taking the reference from various source available on internet and self-study. Wiring the components to the correct pin, connecting through code isn't easy and simple as it looks through the ground phase/ ground view but later while doing the project it was fun doing and learning the new ideas.

YouTube video link:

<https://youtu.be/GYN6n9fRpTE>

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