



INNOVATIVE ASSIGNMENT

Digital Electronics-2CS507

Project Title: Automatic Plant Watering System

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Introduction

Plants need regular care and maintenance. They need to be watered regularly so that they remain green and healthy and provide us with fresh fruits and flowers. But what happens to them when we get out of the home for a 2-3 days trip! Who will water the plants? So, to solve this problem we have created this automatic plant watering system so that someone can step out their home without any worries for their beautiful plants.

Project Description

The main objective of our project is to develop an automatic plant watering system using Arduino uno. This system will use moisture sensor to keep a track of the moisture in the soil. So, when the soil will dry, the system will switch on the water pump and will water the plant until the soil is wet again.

Components used in the Project

The components which we used in the project are:

1. An Arduino Uno board:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2. A Soil moisture sensor:

A soil moisture sensor is a type of sensor used to measure the volumetric water content of the soil. Because, a direct gravimetric amount of soil moisture must be removed, dried and weighed. These sensors do not directly measure volumetric water content using other soil laws such as permittivity, electrical resistivity, interaction with neutrons, and water content displacement.

3. A 6v water pump and a small pipe attached with it:

A mini water pump is a 6v dc submersible type water pump motor that use centrifugal force to transfer, boost or circulate water for various water application systems or machines. It also named miniature water pump, tiny water pump.

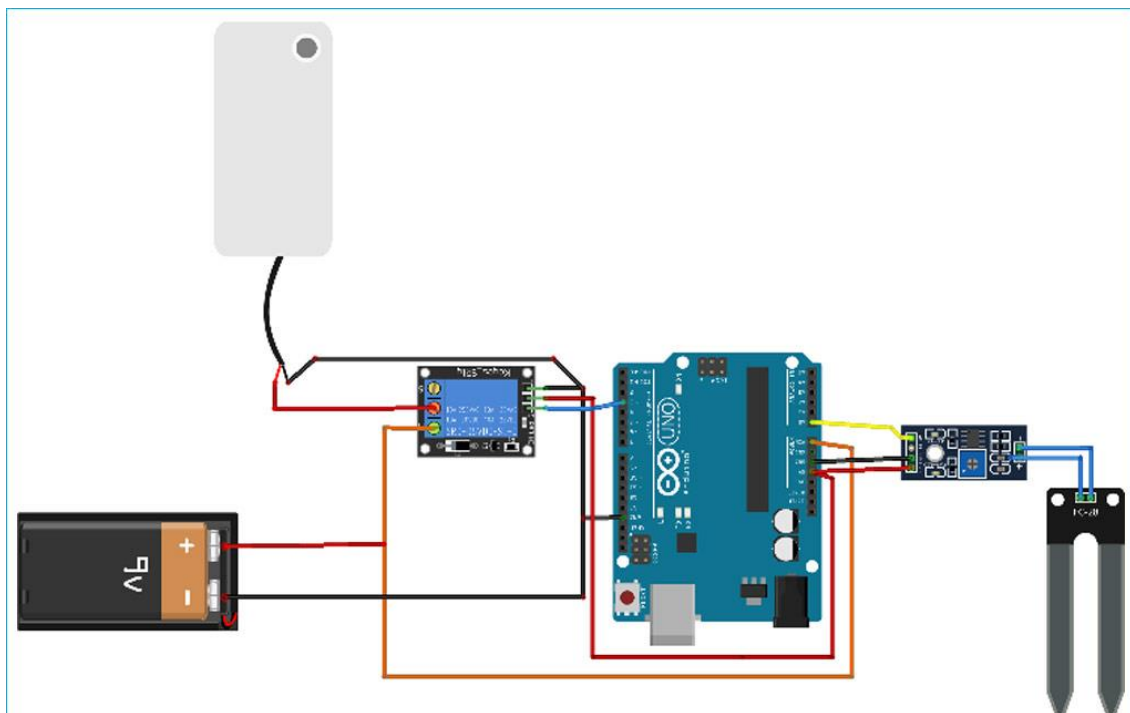
4. A 4 channel 5v relay module

Relay is an electromechanical device that uses an electric current to open or close the contacts of a switch. The single-channel relay module is much more than just a plain relay, it comprises of components that make switching and connection easier and act as indicators to show if the module is powered and if the relay is active or not. The 4 Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal.

5. A 12v Battery

6. Some connecting wires

Circuit Diagram



Connect the VCC of the relay module to the 5v pin of the Arduino and connect the ground of the relay to the ground of Arduino. Now connect the relay signal pin to pin number 3.

The next step is to connect the soil moisture sensor with the Arduino. Connect the VCC and gnd of the sensor to the 5volt and ground pin of the Arduino. The analogue output of the sensor connects to any analogue pin of the Arduino, here I've connected it to pin A0 (according to our program).

Finally, connect the pump to the relay module. A relay module has 3 connection points which are common, normally closed, and normally open. We have to connect the pump positive to common and connect the normally open pin to the positive of the battery.

The next step is to connect the ground of the pump to the ground of the Arduino and finally, connect the small hose to the water pump. Now connect the battery to the circuit.

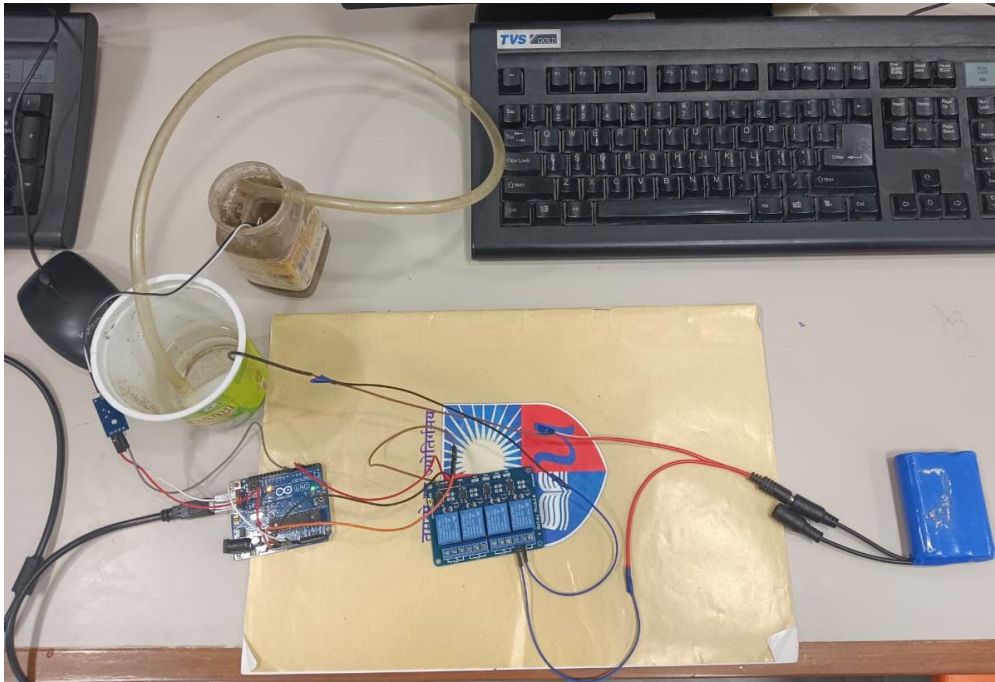
Code

```
int water; // random variable
void setup()
{
    Serial.begin(9600);
    pinMode(3, OUTPUT); // output pin for relay board, this will send signal
to the relay
    pinMode(6, INPUT); // input pin coming from soil sensor
}

void loop()
{
    water = digitalRead(6); // reading the coming signal from the soil sensor
    if (water == HIGH)      // if water level is full then cut the relay
    {
        digitalWrite(3, LOW);
        Serial.println('plant is wet'); // low is to cut the relay
    }
    else
    {
        digitalWrite(3, HIGH);
        Serial.println('plant is dry'); // low is to cut the relay

        // high to continue proving signal and water supply
    }
    delay(400);
}
```

Working of the automatic plant watering system:



The moisture sensor has to be inserted in the soil and the water pump has to be dipped in the water container. The pipe attached with the pump has to be in the pot. After uploading the code in the Arduino board and the connecting the battery to the circuit, the Automatic plant watering system is ready. As soon as the moisture sensor indicates the low level of moisture in the soil, the water pump will water the plant until the soil is wet again.

Conclusion

In summary, the Automatic Plant Watering System offers a practical and efficient solution to the challenge of plant care during short-term absences. The system autonomously monitors and waters plants based on real-time soil moisture levels. The project not only demonstrates the seamless integration of digital electronics for everyday applications but also provides a user-friendly and cost-effective solution, empowering individuals to maintain healthy plants effortlessly.

This innovative plant watering system ensures that plants receive adequate moisture, addressing a common concern for plant enthusiasts who may be away from home.