Automatic Soil Irrigation Using Arduino

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Abstract: **"An Automated Irrigation System Using Arduino Microcontroller" by Arlinda et al. proposes an automated irrigation using Arduino microcontroller system which is cost effective and can be used farm field or average home garden. The proposed system is developed to automatically water the plants when the soil moisture sensor has detected the soil is insufficient of water by using the Arduino as the center core. The automated irrigation system is a fully functional prototype which consists of a soil moisture sensor; an LCD display to show the moisture percentage and pump status; a relay module which used to control the on and off switch of the water pump; and a water pump. When the soil moisture sensor senses the dry soil, it will show the moisture percentage on the LCD display, and the relay module will switch on the water pump automatically to start the watering process, or vice versa. Hardware testing is conducted to ensure the proposed system is fully functional.**

Keywords: **soil irrigation, arduino**

1. Introduction

- The continuous increasing in population of the world demands massive amount of food which is a major cause of concern in coming future.
- To meet the need of huge food production there is an urgent need of rapid improvement in food production technology, a system that makes the agriculture process easier and burden free from the framer's prospective.
- In country like India, where the country is mainly based on agriculture and the climate condition are isotropic, still we are not able to make full use of agriculture resources, so we introduce the MBIS.
- MBIS is a manually controlled micro controller-based irrigation system by which framer can irrigate their field very easily from anywhere in the world.
- It is a simple system, using Arduino to automate the irrigation and watering of small potted plants or crops.
- The system does the control of soil moisture, doing indications via LEDs. In case of dry soil, it will activate automatically the pumping of water for plants.
- We get the data and status of the humidity and plants in our Gmail, Twitter & Facebook.
- Solar energy is the most abundant source of energy in the world. Solar power is not only an answer to today's energy crisis but also an environmentally friendly form of energy.
- A model of controlling irrigation facilities to help millions of people. The model uses sensor technology with
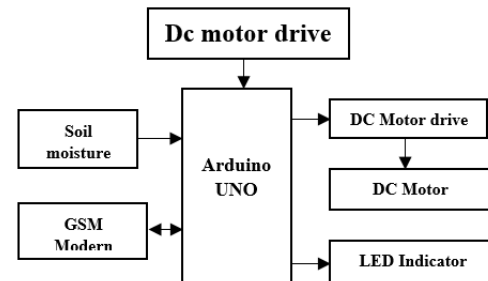
microcontroller to make a smart switching device

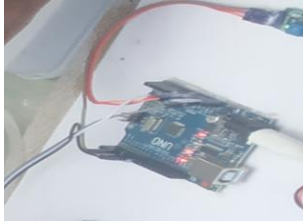Fig. 1. Arduino Uno and peripherals

2. Hardware components

1) Soil moisture

The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil.
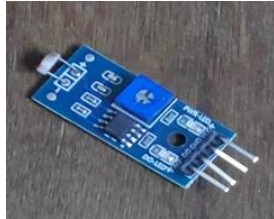

2) Arduino

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller.

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3) Relay

This is the component is used in Automatic soil irrigation system and named as Relay.


3. Working

- This project uses Arduino Uno to controls the motor. The Arduino Board is programmed using Arduino IDE software
- The moisture sensor measures the level of moisture in the soil and sends the signals to the Arduino if watering is required
- The motor/water pump supplies water to the plants until the desired moisture level is reached

At first a pump will stream water to hydroponic media cyclical. When nutrients into the water container, the ultrasonic sensors mounted in the water reservoir will read the fall of the flow of nutrients and ultrasonic sensors will turn off the pump and run a DC motor for stirring the water and nutrients that exists in the container until water nutrients mixed (such nutrients obtained from group previous), so that red LED will light up. When the distribution of nutrients has been exhausted, the ultrasonic sensor will not read the flow rate or not functioning. DC motors do not work when the distribution of nutrients have been depleted, but the pump will work as before, and the white LED will light up as an indicator that the pump is working.

Working of this Automatic Plant Irrigation System is quite simple. First of all, it is a Completely Automated System and there is no need of manpower to control the system. Arduino is used for controlling the whole process and GSM module is used for sending alert messages to user on his Cellphone.


If moisture is present in soil then there is conduction between the two probes of Soil Moisture sensor and due to this conduction, transistor Q2 remains in triggered/on state and Arduino Pin D7 remains Low. When Arduino reads LOW signal at D7, then it sends SMS to user about "Soil Moisture is Normal. Motor turned OFF" and water pump remains in Off state.
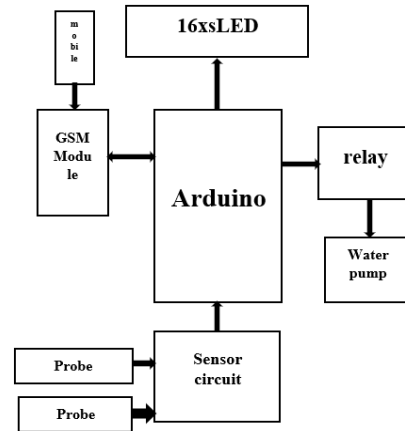
Now if there is no Moisture in soil then Transistor Q2 becomes Off and Pin D7 becomes High. Then Arduino reads the Pin D7 and turns on the water motor and sends message to user about "Low Soil Moisture detected. Motor turned ON". Motor will automatically turn off when there is enough moisture in the soil. Further check the Demonstration Video and Code (given at the end) for better understanding the project working process.

4. Block Diagram
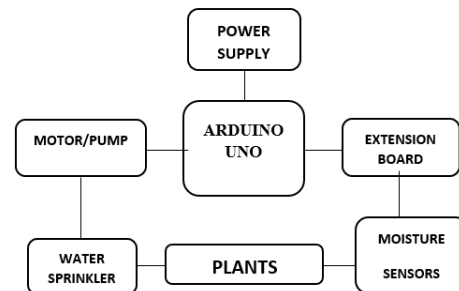
5. Conclusion

This paper presented the implementation of automatic soil irrigation using Arduino.

References

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