Arduino Based Moisture Sensing Automatic Plant Watering System

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Abstract: - Water is something important for the trees to be growth. The trees produce the oxygen which is important for the people. Trees would die if the water is not enough but if we use water a lot, there would be a waste. By using automatic plant watering system reduce a lot of water usage and to prevent lack water for the plant. In this system, moisture sensor is used for sensing the moisture level of soil and then auto watering the require amount of water for the plants by motor-1. When soil reaches threshold, motor-1 will automatically stop watering. When the plant needs the water to be ready to supply, there is must be sufficient water for pump motor-1. So the system add-on a sub system, automatic controlled the water level in the tank. Ultra sonic sensor is used in this sub system to sense the water level in the tank and auto filling the water in the tank. When water reach under the low level or the desire level in the tank, automatically switch on/off motor-2. This system uses Arduino Uno board to control all hardware components.

Keywords - moisture sensor, Arduino Uno, Ultrasonic sensor, motor, relay, plant watering

I. INTRODUCTION

There will be more time to the important things for people if they use automatic systems in daily works. Most of the factories use automatic systems to increase the products. Nowadays, even the houses use automatic systems. The good point of using automatic system is getting the exact result. We can grow trees and plants on the yards of the houses and large areas of the city. We can get not only mental freshness but also the benefits of cleaning the atmospheres naturally. The main reason is to grow plants and get enough water regularly. People grow plants in the environment but they easily forget to water plants and sometime over watering. To water the plants as much as they need, the automatic watering system would be very useful. We can use many automated systems which are able of replacing or reducing human effort in their daily activities and works. A system called Arduino based moisture sensing automatic plant watering system, a model of controlling automatic watering which uses sensor technology to sense soil moisture with moisture sensor to make a smart switching device for helping the millions of people.

II. HARDWARE COMPONENTS

In this system some hardware components use for sensing the inputs signal and operate accurately to get the exact outputs. Arduino Uno are control the components by programming the software code.

A. Soil Moisture Sensor

The soil moisture sensor has two conducting plates to sense the moisture level in the soil. The sensor measures the moisture level of the soil by passing electric current through the two plates. The soil conducts more electricity, lower resistance when there is more water. The soil conducts less electricity, higher resistance when there is dry, less water. The moisture sensor placed in the soil to measure the moisture level of the soil.
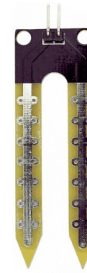

Fig. 1 Moisture Sensor

B. Arduino Uno

Arduino Uno possible used for digital electronics, embedded system, robotics, or IoT projects. It may be interfaced to various expansion boards and other circuits. The Arduino UNO has 14 digital in/out pins and 6 Analog in/out pins. This analog in/out pins are best useful for analog sensor. In this system Arduino UNO board use as the brain that read input signal from the sensors and then process and generate output signal to the motor driver relay. Perform the necessary functions by connected the various components.

Fig. 2 Arduino Uno Board

C. Ultrasonic Sensor

The ultrasonic sensor uses sonar method to determine the distance to an object. It has transmitter, receiver and

control circuit. The transmitter emits a high frequency ultrasonic sound wave which bounces off from any solid object and receiver receives it as an echo. The echo is then processed by the control circuit to calculate the time and the difference between the transmitter and receiver signal. This time can subsequently be used to measure the distance between the sensor and the reflecting object.

Fig. 3 Ultrasonic Sensor

D. Relay

Relay is devices that used low power signal to control another high powered circuit while they are completely separate. It is electromagnetic device which is used to connect two circuits magnetically and isolate them electrically. A relay switch can be divided into input and output. The input section has a coil which generates magnetic field when a small voltage from an electronic circuit is applied to it. This voltage is called the operating voltage. Commonly used relays are available in different configuration of operating voltages.
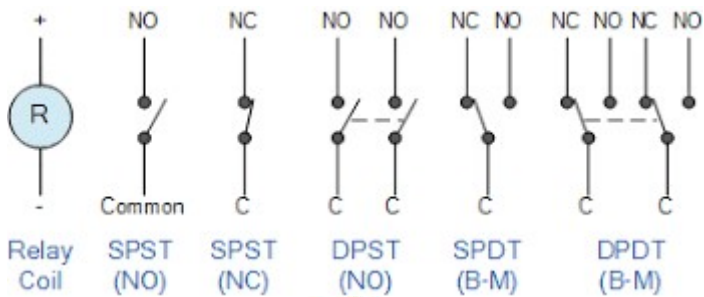

Fig. 4 Relay

E. Water Pump Motor

A pump is a device that transfer water, fluids or liquids from lower place to higher place or far place by mechanical action. It can be classified into three major groups according to the method they use to move the fluid direct lift, displacement, and gravity pumps. Pumps operate by some mechanism and it consume energy to perform mechanical work by moving the fluid. Pumps operate via many energy

including manual operation electricity, engines, or wind power come in many sizes, from microscopic for use in medical applications to large industrial pumps.
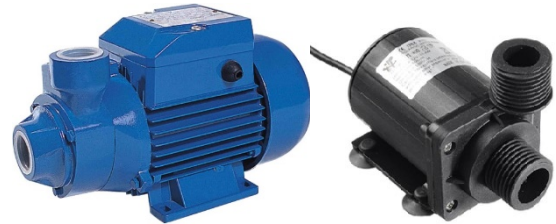

Fig. 5   Water Pump Motors

III. PROCESS OF MOISTURE SENSING AUTOMATIC PLANT WATERING SYSTEM

The system consists of the following components:

- two motors which are motor-1 use for watering the plant and motor-2 use for fill the water in the tank
- two sensors which are moisture sensor sense for soil moisture level and ultra-sonic sensor sense for water level in the tank
- ARDUINO-UNO that is used for process and control
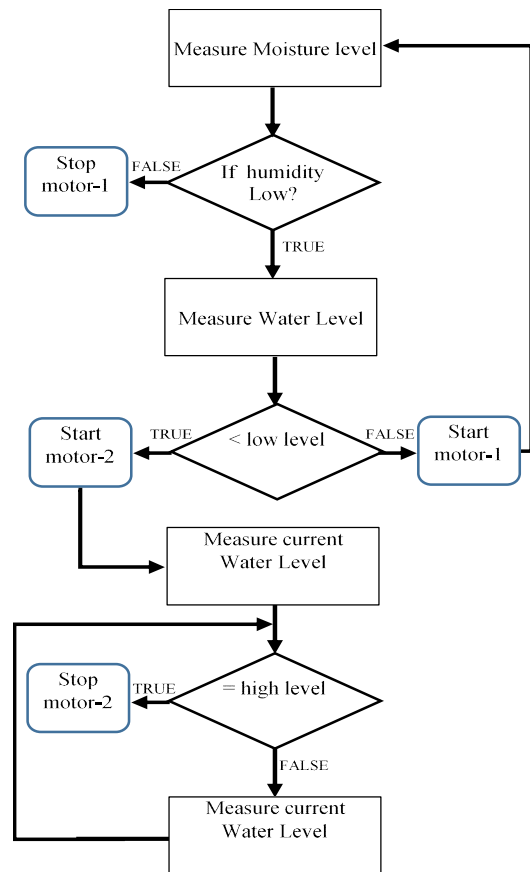- relay that is used as motor driver

Fig. 7   Flow Chart of the System

The moisture sensor senses the moisture level in the soil and generates the result as the voltage signal. If the moisture is dry, check the water level in the tank by using ultrasonic sensor. If water level is under the lower level the ultrasonic sensor generates the signal voltage and sends to the ARDUINO-UNO that drives the motor-2 with use the relay to fill the water in the tank. If water level is upper the lower level, the ARDUINO-UNO drives the motor-1 by using the relay to plant water. The ultrasonic sensor continuously checks the water level. If the water level is equal high level, motor-2 will automatically stop control by ARDUINO-UNO. The moisture sensor continuously checks the soil moisture and if soil reaches threshold motor-1 will automatically stop watering control by ARDUINO-UNO.

IV. CONCLUSION

This system very useful for the persons who want to growth the plant but do not have enough time to water their plants. The system is always checking the humidity of soil and supply water automatically to the plants. The profit of this system is not only to reduce a lot of water usage but also to prevent the plant's dehydration.

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