Approach to Proper Flow of Water Management in Agriculture Using Ardiuno Uno

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ABSTRACT

India is known to be as land of farmers. There is a lot of importance of farming in India as it contributes 17.86% in total GDP of our country till date. If water is supplied in extra amount or water is not supplied on time to plant then, plant will obviously damaged and could not be survived and ends up dying in last. An important factor in proper growing of crops is weather which has to be monitored constantly. In today's Modern Technology, Farmers have to adopt this modern farming technology for a good crop growth and a quality yield. The main goal of proposed work is to automatically supply water to plants as they could have an effective growth without deficiency of water. As we all know, Water is first and the most important need of any plant/ crop growth, without water any plant couldn't survive. There are many plants watering system in India based on timer but they do not sense the moisture of the soil to know the actual need of water is there or not. . For helping farmers we have decided to make this automatic water supplying system using soil moisture sensor and Ardiuno Uno.

Keywords: - Ardiuno Uno, Modern Technology.

INTRODUCTION

When it comes to hardware, there are n number of products currently available in market which fulfil all the requirements of hardware side for making this project. Best example of such types of projects are Automatic Sprinkling System. Buying of products depends on the need of project requirement. There is also an another problem which our project will be a solution to it is that Fresh Water Wastage. As only 0.01% water is of human usage rest of the water is either sea water or freezed fresh water. In this project, we are using microcontroller interfaced with soil moisture sensor, water pump and motor relay which is pre-coded as per operation of project. All the input pins and operation of sensor are pre-defined in the code uploaded to microcontroller. We can also vary the limit of water flow through the pump[1].

Measurement of Soil Moisture
Moisture in soil plays an important role in plant growth, mostly in irrigation system. Nowadays, there are many ways for knowing the water content presence in soil by volume described by waterboy. Main goal is to minimize watering stress of excessive watering or under watering. Soil moisture measurement manipulates the process of cell elongation and cell reproduction for improved quality of plant yield.[2]. In order to save water supplies and comprehend how our environment is changing, soil moisture monitors are crucial[3].

Types Of Soil Moisture Measurement
The Neutron Probe
This way is based on calculation of fast moving neutron which are slowed by soil by an clash with existing hydrogen particles in the soil. Hydrogen (H+) is present in the soil as a element of:-

1. Soil organic matter
2. Soil clay minerals
3. Moisture content

Tensiometer
Movable and immobile tensiometers measure the moisture present in the soil by measuring the tension or pressure ranging (from limit 0 to 100kPa). Tensiometers basically acts as in a similar way as measurement of force which is exerted by plant for attaining the moisture of soil. Water will be flown out from a ceramic cup as soil dries. Vacuum is created in

tensiometer due to loss of water and pressure reading is shown in pressure gauge. Less irrigated the soil, higher will be the pressure reading. An analog or digital output will be given by the tensiometer which could be placed in soil permanently.

OVEN DRYING METHOD

Soil sample is placed in HOT AIR OVEN for drying at 1050°C upto constant weight is attained and weight of dry soil is recorded.

Moisture content (on weight basis) = Wet weight-Dry weight X 100/ Dry weight

All of the above methods are a bit time consuming for resulting the soil moisture. In order to measure the moisture of soil quickly the soil moisture sensor is used as it is capable of measuring soil moisture without consuming as much time as of above methods.

Soil Moisture Sensor

The soil moisture sensor is a kind of sensor used to measure the water's volumetric content present in the soil. Elimination, drying as well as sample weighting needs to be the straight gravimetric dimension of soil moisture. Volumetric water content is measured by sensor without help of dielectric constant, electrical resistance or have to interaction with neutrons, and replacement of moisture content.

Pin Definition

1. The notation "+" on the soil moisture sensor denotes positive supply for the interface. A current less than 0.8mA is supplied through probe.
2. The notation "-"on the soil moisture sensor denotes negative supply for the interface. It is used to supply the extra power which will be grounded.

Working Principle Of Soil Moisture Sensor

The soil moisture sensor operates on capacitive property, it uses capacitance for measuring dielectric permittivity of the surrounded medium. In soil, there is a function of water content which is called dielectric permittivity. A voltage is created by sensor which is proportional to dielectric permittivity. An averages of water content is divided whole on the entire length of sensor. A zone of 2cm which influence the sensor with respect to the flat surface but th is too low or less sensitivity at the edges of sensor. Soil moisture sensor works on the principle of voltage comparison. Following circuit diagram is helpful for easy understanding of soil moisture sensor.
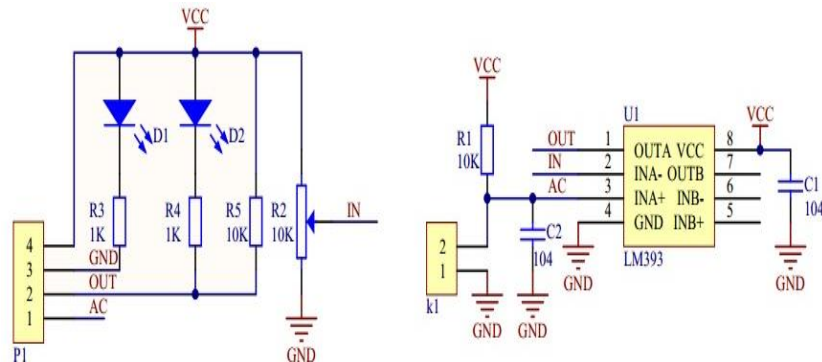

Figure.1 Principal of Soil Miosture Sensor

Specification

1. Working Voltage:5V
2. Working Current<20Ma

Block Diagram

Utilization of block diagram, could be done by a complete system design with its overall logical components presentation. A simple block diagram is able to present a complicated project into a convenient way in which it could be easily acknowledged. A recognized way such as a follow chart or sets of shapes as it enables the purposed work into a final product which will encase there efforts. The block diagram developed by the team is shown below. There are two main components in the purposed work. There is a water pump connected to motor relay interfaced with soil moisture sensor. Arduino IDE software is used for programming Arduino microcontroller[4]. The main motive of soil moisture sensor is the measure the moisture level present in soil. The motor driver intervene's the signal, which controls the water supplement to

the plant. In the purposed work, Arduino Uno board which is a microcontroller which is used to monitor the soil moisture and control the water pump interfacing with motor relay.
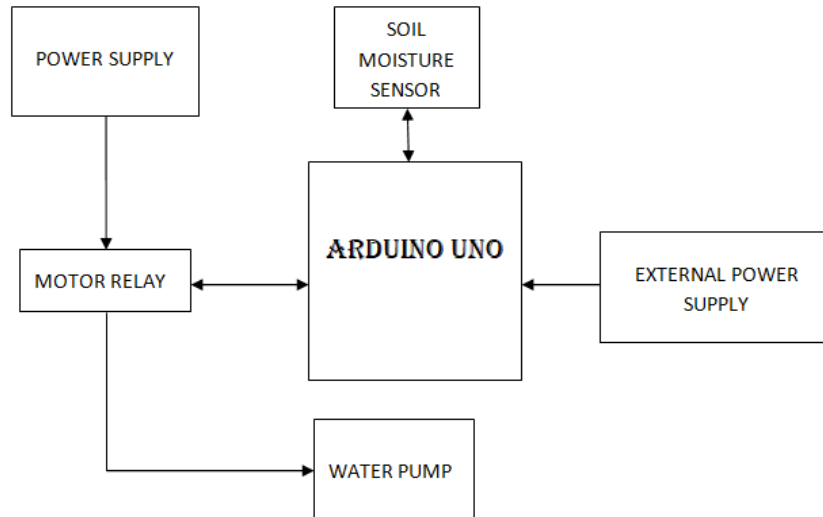
As the block diagram is shown below.

Figure-2- Block Diagram Of Purposed Work

Project Aim

The interfacing of sensor can be divided into three main components: The Microcontroller, motor relay and sensor itself with which it communicates. As microcontroller is the main component in any project, arduino is the responsible for the collection of data signals from sensor, storing of data and transfer of data. The microcontroller is the main focus point in the purposed work. The project is designed and interfaced in such a way that it accepts a diverse variety of sensor, analog, digital, wired and IC. These sensor can also be connected to Bluetooth module as Bluetooth module give an option of wireless connectivity of sensor which can communicate and easily interfaced with microcontroller. Soil moisture of soil is monitored with the help of soil moisture sensor. Turn ON the water pump when the soil moisture is below from a certain level which is programmed in the code.

TEST RESULT OF THIS PROJECT

The testing of this project is divided into three different parts like low, medium, and high water content in the soil. The soil moisture sensor detects the soil moisture present in the soil, motor will be automatically ON when the soil moisture content is low when sensed and water will be supplied to the soil. And, if water is sufficient then motor will be turned OFF automatically.

STEP-1:

When moisture in the soil is low, then the result will be shown like this, so Motor will be Turn ON automatically and water is supplied to the plant till its sufficient soil moisture level. When water is supplying to plant both Red and Green LED will be ON, as shown in figure 3.
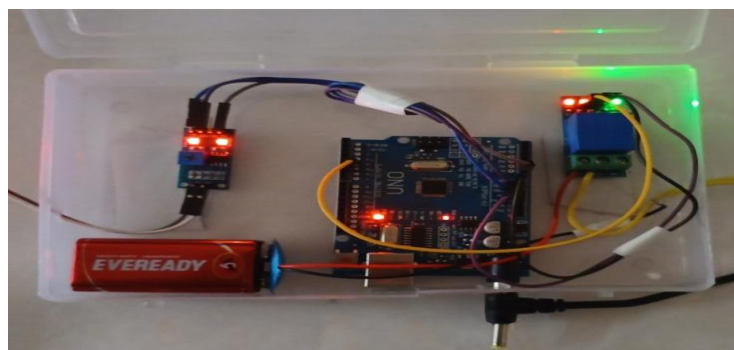

Figure 3- Circuit Model When Green and Red LED Will Glow.

STEP-2

After supplying water to the plants. The result will be like this. Then motor will be Turned OFF automatically and supply of water through the pump will be stopped or cut off. When water is supplied to plant only Red LED will be ON, as shown in figure 4.
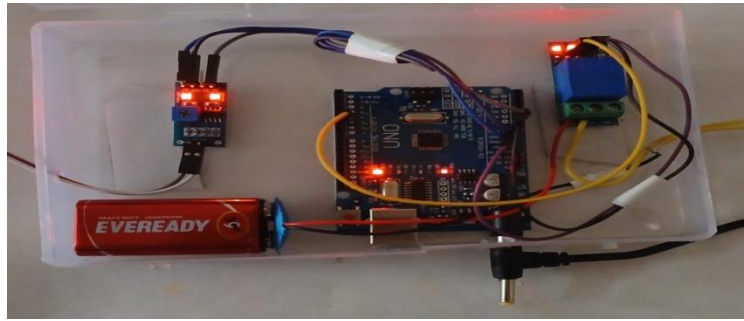

Figure 4- Circuit Model When Red LED Will Glow.

BENEFITS

1. Prevention of over-watering or under-watering.
2. Time Saving.
3. Reduce The Labour Cost.
4. In water saving project to improves the quality of crop.

CONCLUSION

Therefore, the designing and testing of "Automated Irrigation system based on soil moisture sensor using Arduino" has been developed successfully. Hardware components used in the project is of integrated features. Every component placed in project is specified above. The desiging of Automatic plant watering system based on arduino has been tested successfully. The automation process of the system is also been tested. The soil moisture sensor measure the presence of moisture content in soil of different plants. Whenever moisture level of soil goes below a set point (which is predefined in program)then the sensor sends signal to microcontroller(Arduino) which then process it and send signal to relay which then triggers the water pump and then afterwards pump will Turn ON and water will be supplied. When moisture level is reached on a suitable point, the system ends by its own and Pump will be turned OFF. This meant that the system as a whole has been tested and is said to work well.

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