



Smart Irrigation system using Arduino

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Abstract— Agriculture is a field where a lot of human physical effort is needed in order to cultivate land. It is high time that we made devices that can help farmers in reducing the human effort involved in agriculture. One such device is a smart irrigation system using Arduino. This is very simple to build and also works very effectively and its manufacturing cost is also low. Smart irrigation systems are revolutionary devices that can minimize the work and produce great results. The problem with traditional irrigation systems is that they cannot utilize the water available completely and it needs workers to look over it all the time. This Project is made using Arduino board, soil moisture sensor, motors, Arduino software for programming the arduino board. An arduino is a microcontroller which is used as a computing device in the project. It takes the input value from the soil moisture sensor. The value from the sensor is the moisture content present in the soil.

Keywords— Arduino, Soil moisture sensor, motors, cost effectiveness, reliability.

I. INTRODUCTION

The main objective of this project is to build a simple and low cost device that can be affordable and easy to build so that it can be implemented all over the country even in remote villages. The biggest advantage of this project is its reliability. One can use this device and gain the benefits of having less human intervention as it works with detailed data about the soil. In this project the value from soil moisture sensor is given as an input to the arduino and the arduino performs necessary calculations through the if condition program given by us and alters the motor accordingly so the soil gets enough moisture.

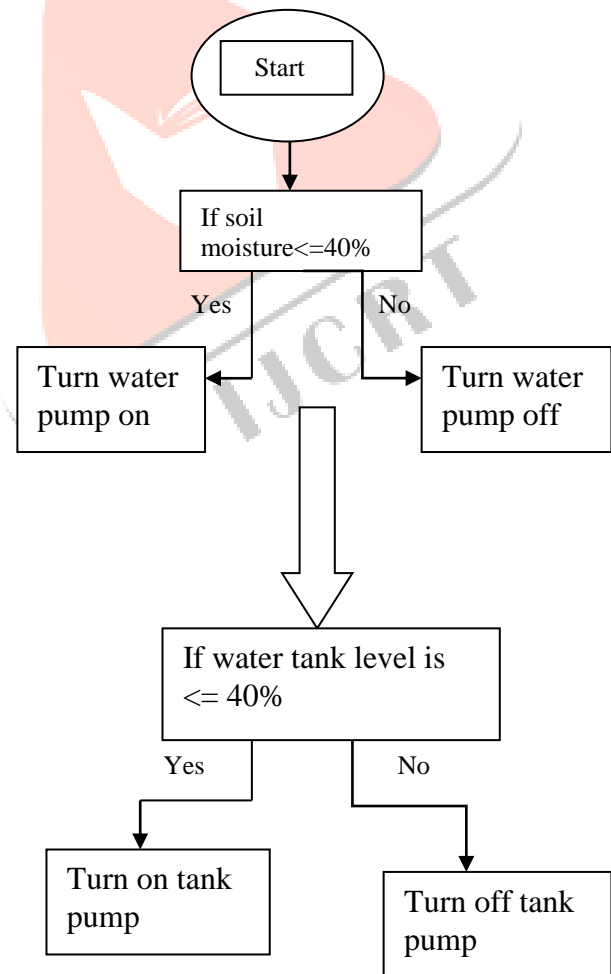
COMPONENTS USED

S.NO	COMPONENTS
1	ARDUINO BOARD
2	SOIL MOISTURE SENSOR
3	MOTORS
4	TRANSISTORS
5	ARDUINO IDE
6	LCD

The arduino is programmed through an Arduino IDE software in which we make a reference value for the soil moisture content and we perform the action motors accordingly.

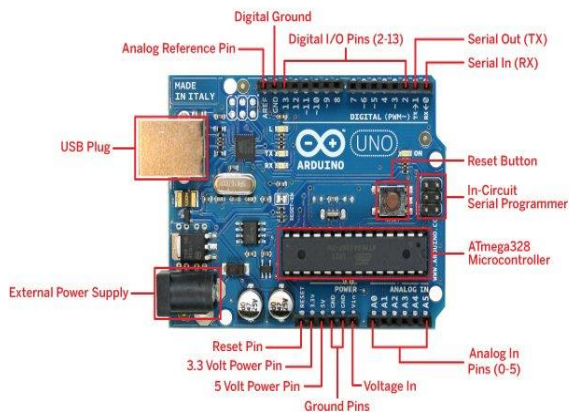
This project has two motors one motor is for watering the land and the other one is for filling the backup water tank.

AN ultrasonic sensor is used to measure the water level of tank so that when the tank level is low the motor to fill water in the tank will get running and water gets filled in the tank.



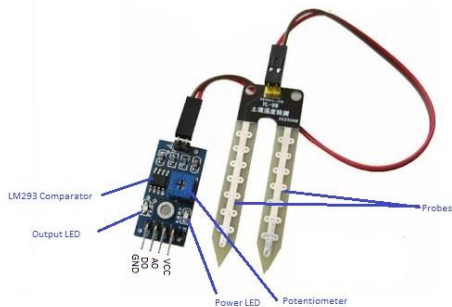
I. Arduino Board

It is a microcontroller based on Atmega 328P. It has 14 digital input and output pins. A reset pin, Rx and Tx for serial data transfer two interrupts, and several other pins. its clock speed is 16 MHz.



II. Soil moisture sensor

Soil moisture sensor finds the moisture content in soil with the help of the two probes in it. Its working is very basic and simple. When the two probes are placed inside soil with moisture as electricity conduction is good in moist areas more current passes through the probes and its resistance value decreases. If the sensor is placed in dry place very less current passes through the sensor and resistance increases as a result we can use this property of the sensor in this project.



III. Motors

Here the motors are used for pumping water to land and for filling the tank. These motors working is controlled by the program and in the water tank an ultrasonic sensor detects the water level and send it as an input to the arduino and according to that the motor for pumping water into tank will get on and off.

IV. Arduino IDE

The program for controlling the motors and watering the plants according to the moisture level of soil is written on this software and uploaded to the arduino. This software is used widely for arduino even though it supports other programming languages because it is simple to write and easy to upload into the arduino.

V. LCD

In this project we use lcd for displaying the soil moisture level, motor working status and water tank level.

Working

First of all the connections has to be made correctly. LCD, Ultrasonic sensor, motors, potentiometers, transistors, soil moisture sensor have to be connected to either input or output according to their functioning. Here value from moisture sensor is given as an input to the arduino.

Arduino receives the soil moisture value from the sensor and puts it in the program. In the program there is an if loop which turns on the motor for pumping water to the land if the

moisture value is less than a given reference value and if the moisture value is greater than given reference value then it turns off the motor.

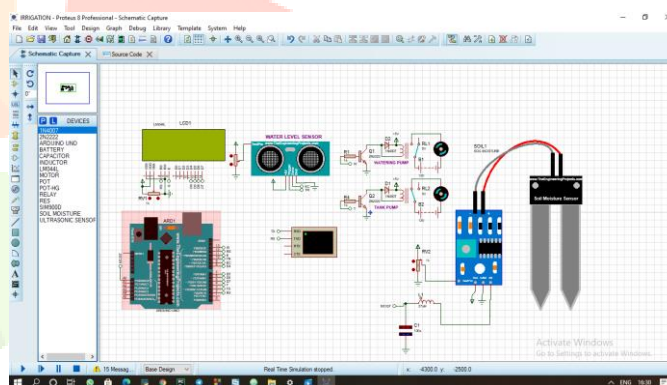
The ultrasonic sensor sends the level of water in the water tank by measuring the distance from the top of the tank to the water level by sending rays and calculating distance by using the time taken by the rays to hit the water level and return back. From this value the arduino's if loop program turns the motor for tank according to the reference water level specified in the program.

The program written for arduino contains if loops for performing the actions specified accordingly like controlling the actions of motors and it has several messages written which will be displayed on the lcd. It displays messages like water pump is on, soil moisture level is 50% and some other messages.

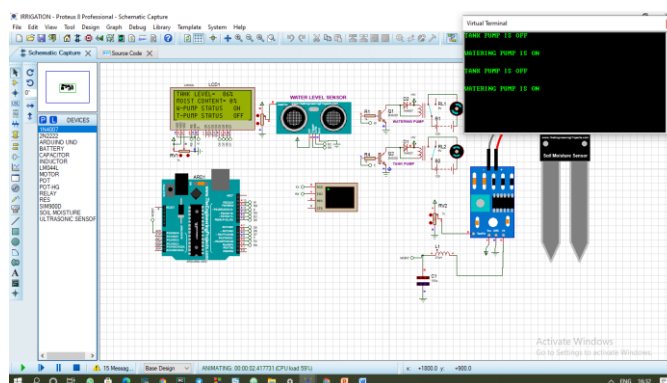
Soil moisture level	Motor pump status
Less than specified	ON
Greater than specified	OFF

Water level in tank	Tank pump status
Less than specified	ON
Greater than specified	OFF

CICUIT DIAGRAM



RESULTS



I. SCOPE

Although people are not using these kind of products for farming due to lack of knowledge and access to technically

sound people around to explain and make them for farmers this project will be huge in the upcoming days as if few people start working with them the word will spread and more farmers will implement these things in their land for irrigation.

The main reason to believe in this system is because of its simple and flexible design, its low cost of manufacturing and its ability to work with all kinds of irrigation systems like drip irrigation, sprinkler irrigation and traditional irrigation methods.

The future visibility of these kind of systems will be so high that we can see them in every field.

II. ADVANTAGES

This system has so many advantages over the traditional irrigation systems.

- i. It saves water and uses the water available very effectively
- ii. It helps in decreasing human effort
- iii. It saves money as hiring people for irrigation is way more costly
- iv. Once it is implemented it works for years and also it is easy to replace
- v. It improves the productivity
- vi. It can be programmed as we want according to the water requirement of the crop.
- vii. It helps with the problem of shortage of irrigation water in traditional irrigation methods
- viii. It is reliable
- ix. Cost effectiveness
- x. System cannot be damaged by bad weather
- xi. High quality crop production
- xii. It reduces soil erosion to a considerable extent

- xiii. It prevents the soil from losing its valuable properties and nutrients.

Conclusion

After observing the system from several perspectives and observing its working and effectiveness it is clear that this system is very helpful for the farmers. Farmers no longer need to spend hours every two days in monitoring their fields as this system does the same thing for them in much better way. Farmers can increase the productivity of their land and use the available water resources effectively with minimum wastage of water. Some other features can also be added to this system like using gsm modules to send message to the farmers mobile about the status of the motors and soil moisture level so that he knows whatever is happening in his land. This project will come in handy to them and assists them very well by saving a lot of time, money and effort.

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