

Arduino Based Automatic Soil Moisture Monitoring System

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Abstract: - The research aim was to study the intelligent soil moisture control system in agricultural greenhouse based on Arduino Uno microcontroller automation control. This kind of intelligent soil moisture control system helps to control the moisture level of the field and supply the water if required. In this research embedding a control system into an automatic water pump controller depend upon the moisture of the soil. This system also ability to detect the level of methane gas in the green house. The intelligent soil moisture control system in agricultural greenhouse designed in the research had wonderful effort of man-machine interface, it is very simple, cheap and convenient high degree of automation system. Not only that this system helps to prevent wastage of water. This system is a prototype, which makes this self-sufficient, watering itself from a reservoir.

Key Words: — Agriculture, Arduino Uno, Automation, Environment Friendly, Soil Moisture, Self-Sufficient.

I. INTRODUCTION

India is a country where majority of our population are dependable on the agriculture to live their daily life. In this modern technological era poor farmers of India cannot get enough assistance from others to help them with technology and make their work easier. This project made automatic field monitoring & controlling system that can be utilize to improve the condition of green houses. Arduino Uno microcontroller is the main controlling unit of whole system. This system performed the following task:

- Supply water according to moisture level of soil.
- Automatic alarming system to avoid the burning of plants by excessive temperature of atmosphere.
- Automatic methane gas detecting system in green house.
- Reusing process of excessive water in the field.

II. WORKING

The main component of the project (apart from the Arduino UNO) is the Soil Moisture Sensor. It consists of two parts: The main Sensor and the Control Board. Sensor part of the Soil Moisture Sensor consists of a couple of conductive probes that can be used to measure the volumetric content of water in soil. Coming to the control board, it is made up of LM393 IC, which is a voltage comparator. The board also consists of all the necessary components like connectors,

LEDs, resistors etc. to measure the Soil Moisture. The working of the Soil Moisture Sensor is very simple. It works on the principle of voltage comparison. The following circuit will be helpful in understanding the working of a typical soil moisture sensor.

As you can see, one input of the comparator is connected to a 10KΩ Potentiometer while the other input is connected to a voltage divider network formed by a 10KΩ Resistor and the Soil Moisture Probe. Based on the amount of water in the soil, the conductivity in the probe varies. If the water content is less, the conductivity through the probe is also less and hence the input to the comparator will be high. This means that the output of the comparator is HIGH and as a result, the LED will be OFF.

Similarly, when there is adequate water, the conductivity of the probe increases and the output of the comparator becomes LOW. The LED then starts glowing. Now that we have seen how a typical soil moisture sensor works, let me take you through the steps of Interfacing Soil Moisture with Arduino. The main advantage of this soil moisture module is that you can get the analog output from it. By using this analog signal and giving it to the Analog IN of Arduino, you can precisely calculate the percentage of moisture in the soil. Coming to the setup for testing the project, I have used to plastic cups filled with soil from my garden. The amount of water in each cup is more than the previous one.

III. PROGRAMMING

```

int sensor Pin = A0

int sensor Value;

int limit = 300;

Void setup ()
{
  serial. Begin (9600);

  pinMode (13, OUTPUT);
}

void loop ()
{
  sensorValue = analogRead(sensorPin);

  serial.println("Analog Value:");

  serial.println(sensor Value);

  if(sensorValue<limit)
  {
    digitalWrite(13,HIGH);
  }

  else
  {
    digitalWrite(13, LOW);
  }

  delay (1000);
}

```

IV. RESULTS AND DISCUSSION

The application of greenhouse monitoring system in agricultural aspect is immense. The automated greenhouse monitoring system will help to reduce the efforts and workloads of human and will be helping to produce plants at the absolute parameters they want them to plant and it will reduce the error. Its ability to control appliances through internet maybe integrated for further case. In near future the system can be made 100% autonomous so that it can take all the necessary actions and will result in a effective plant growth. And if we use the bi-directional motor pump, but the rest of the project set up will be same, in that case the system will be cost effective.

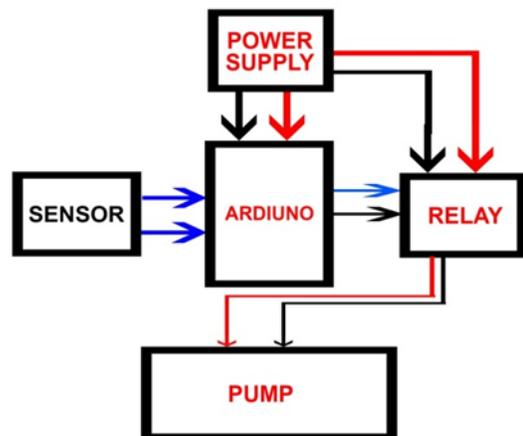


Fig.1. Block diagram of Soil moisture monitoring system

V. CONCLUSION

This project of greenhouse monitoring system has been developed based on the arduino Uno. After verifying the data that was got in monitor, assured about the success of the project. Presence of each module has been systematic out and placed carefully, thus contributing to the best working of every unit. Thus, the Arduino Based Automatic soil moisture monitoring system has been designed and tested successfully.

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