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Soil Moisture Counter in Smart Farming

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ABSTRACT

Agriculture has been the primary occupation in our country for ages. But now due to migration of people from rural to urban there is hindrance in agriculture. To overcome this problem, it will be better to go for smart agriculture techniques using IoT. To bring this concept into reality, various sensors are used and deployed at different locations in the farm. IoT gives a platform to researchers to maintain real time data. Soil moisture monitoring is an area of growing study for dryland farming and irrigators alike. Accurate monitoring of soil moisture penetration into the soil depth profile is key to efficient and effective irrigation techniques by access to information that comes from sensors. In this paper we are showing practical demonstration of Soil Moisture Counter in Smart Farming so that effective irrigation can lead to increased yields by preventing plant stress days and keeping nutrients in the fibrous root zone.

Keywords: IoT, Smart Farming, Soil moisture sensor, Arduino

I. INTRODUCTION

The smart agriculture revolution refers to the use, integration and deployment of the latest technologies such as Internet of Things (IoT) in agriculture, with the aim of improving and increasing the quantity and quality of crop harvest [1][2].

Soil moisture monitoring is an area of growing study for dryland farming and irrigators alike. Accurate monitoring of soil moisture penetration into the soil depth profile is key to efficient and effective irrigation techniques [4][5].

Efficient irrigation management can improve yields, grain quality, conserve water and energy, and reduce nutrient leaching. One of the easiest and most effective ways to improve irrigation efficiency is to implement soil sensor technology in irrigation scheduling.

Soil moisture sensors are divided into two categories depending on the technology they use: 1) Sensors that measure volumetric water content and 2) Sensors that measure soil tension when placed in the soil profile.

II. METHODS AND MATERIAL

Smart agriculture is an automated and directed information technology implemented with the Internet of Things (IoT). It aims at making agriculture smart using automation and IoT technologies. This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology

[7]. It proposes a low cost and efficient wireless sensor network technique to acquire the soil moisture from various location of farm and as per the need of crop controller to take the decision whether the irrigation is enabled or not [6]. It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural crops [8].

Soil moisture monitoring is an area of growing study for dryland farming and irrigators alike. Accurate monitoring of soil moisture penetration into the soil depth profile is key to efficient and effective irrigation techniques. As a result, optimum timing of effective irrigation can lead to increased yields by preventing plant stress days. This also keeps nutrients in the fibrous root zone [3].

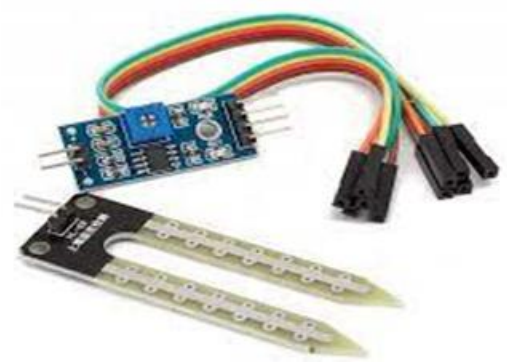
Coupling soil moisture readings with weather station parameters such as wind, temperature, RH, rainfall, and solar irradiance provides more detailed information. As a result, it greatly aids modelling and the prediction of plant-soil moisture requirements ahead of time.

Water is a crucial factor in plant development. That's why irrigation requires a thoughtful approach, as it should be neither excessive nor insufficient. Soil moisture sensors are extremely useful in determining water levels, considerably facilitating farmers' efforts and reducing costs.

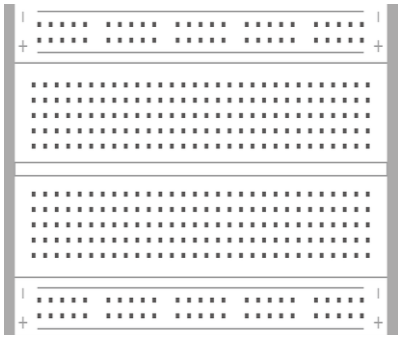
A soil sensor enables you to schedule irrigation events more efficiently by either increasing or decreasing their frequency and/or intensity, not to wash off valuable nutrients or, on the contrary, leave the plants thirsty. A remote soil moisture sensor empowers agriculturalists to estimate the water levels without the need to be physically present in the field.

Arduino UNO

Soil moisture sensor



Breadboard



Jumper wires male to male

2.1 Hardware requirements

Software requirements

Arduino IDE

Video Link

https://www.youtube.com/watch?v=TC3qGhYpSyg

Code

```
int msensor = A1; // moisture sensor is connected with the analog pin A1 of the Arduino
int msvalue = 0; // moisture sensor value
int led = 8;
int water_pump = 1;
boolean flag = false;
void setup() {
 Serial.begin(9600);
 pinMode(msensor, INPUT);
 pinMode(led, OUTPUT);
 pinMode(water_pump, OUTPUT);
}

void loop() {
 msvalue = analogRead(msensor);
 Serial.println(msvalue);

 if ( (msvalue >= 500  ) && ( flag == false ) )
{
 digitalWrite(led, HIGH);
 digitalWrite(water_pump, LOW);
```

III.RESULTS AND DISCUSSION

The left side screen shows moisture content in the plant.

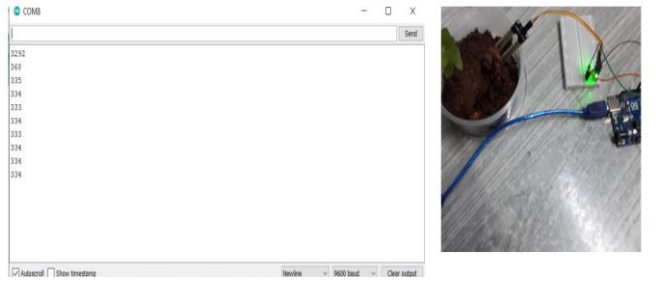


Figure 1. Soil moisture Reading

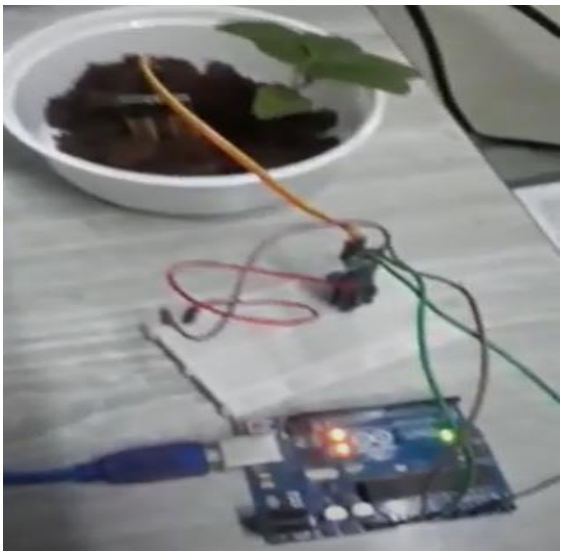


Figure 2. Circuit Diagram of Soil Moisture Sensor

Figures 3. Soil Moisture Code

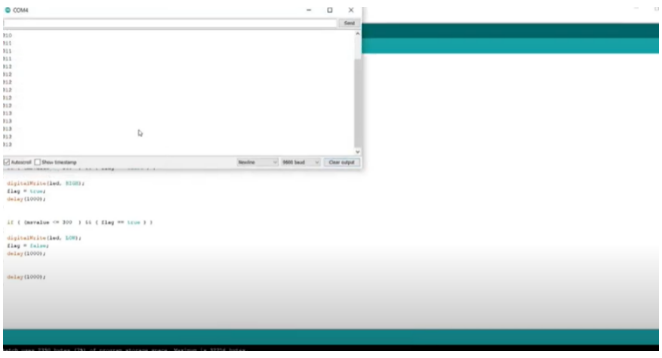
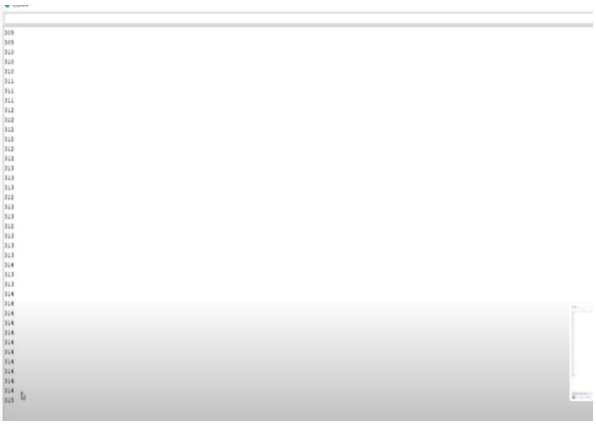


Figure 4. Soil Moisture Reading



This shows moisture content reading in the plant.

IV. CONCLUSION

The IoT agricultural applications are proving to be a boon for farmers and breeders to collect meaningful farm data. Small farmers and large landowners must understand the potential of the IoT market for agriculture by installing smart technologies to increase competitiveness and sustainability in their productions. The demand for growing population can be successfully met if the small farmers as well as breeders implement agricultural IoT solutions in a successful manner. This paper shows practical demonstration of Soil Moisture Counter in Smart Farming so that effective irrigation can lead to increased yields by preventing plant stress days and keeping nutrients in the fibrous root zone.

V. REFERENCES

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