INTRODUCTION

MOTIVATION/ORIGIN

1. Agriculture is a necessary thing for living beings as it forms the basis for food and security.
2. To have a **decent crop production**, the most important things that should be present in the land is -**accurate fertilizer -irrigation facilities - appropriate methods for cultivation.**
3. This project is on **smart agriculture** based on the Internet of Things which has brought changes to every field of common man's life by making everything smart and intelligent.
4. The Internet of Things (IoT) refers to physical devices around the world that have sensors and software embedded in it and also are connected to the internet.
5. It has various applications and development of an IoT based infrastructure is one such application in precision agriculture.

DEFINITION OF PROBLEM

1.Conventional methods like crop investigation and soil analyses are more time consuming, costly and less effective.
2.There has been an urgency to provide important soil parameters that influence overall crop growth and in turn the farm produce.

3.Soil moisture' monitoring in various regions of a farm may be helpful in managing overall irrigation.

4.Soil temperature is also a vital factor to determine crop growth.

5.The availability of different nutrients to the plants may vary in numerous ways due to the variation in acidity of soil. Solubility of ions such as Fe, Al, Mn, Cu, and Zn becomes less due to increases in the pH of soil

INTRODUCTION

OBJECTIVES

1. The objective of this project to innovate a IoT based smart agriculture system which provides the farmers the updated data of his/her field every time.

2. The data may include likes of temperature, moisture in the environment/soil, humidity, pH value and nutrient detection of soil which will make farmers intelligent and they will understand the conditions better.

3. It enables farmers to do smart agriculture and enhance the production of crops.

4. A farmer can earn high profits and use his field more efficiently by using IoT and provided data.

5. This is a way of helping farmers in optimizing yield, minimizing input costs and decreasing environmental impact on crop growth.

SIMILAR SOLUTION

1. Previously, Farmers take soil to the geological technicians who collect and analyse the **soil samples to determine** whether they are suitable for agricultural, developmental or Natural uses.

2. Further, the concept of IOT is introduced in Agriculture. There are **numerous gadgets** introduced in the market that permit farmers to get information about the nature of the soil through mobile phones.

3. **Earth thermometer** is a device for the temperature measurement of soil. A soil temperature thermometer by and large incorporates a covered test that can oppose erosion.

4. **For moisture monitoring Gravimetric method** is generally used.

5. Various analysts and manufacturers have created sensors to gauge the mechanical, chemical and electrical properties of soils.

6. In another work, Mirell and Hummel developed an ongoing soil investigation framework dependent on Ion Selective Field Effect Transistor (ISFET) innovation. An automated soil extraction framework was utilized and ISFETs were utilized to figure the soil pH and nitrate content.

7.Adamchuk have also developed an automated soil inspecting framework which was mounted on a shank and had a pH meter with a level surface terminal.

8.**An overall pattern found in the previously mentioned considerations was that electrical or electromagnetic sensors were utilized for estimating pH worth, temperature and moisture content of soil. However there has been a failure in carrying out an reasonable, exact and a continuous sensor framework for this reason. Our study is the extension of the current framework.**

9.As we are using the latest IOT technology, which helps in gathering data are utilized for the identification of the plant conditions and microcontrollers are used to control and computerize the farm processing.

10. GSM Module is used for sending and getting the updated message through smartphones to the farmers with the continuous states of their agricultural land utilizing IOT at any time. This will consume less time, easily affordable and also accurate.

PROJECT WORK BREAKDOWN

This project consists of many hardware components. This proposed technology helps to enable the different types of sensors through the communication with the Microcontroller in Arduino Uno.

HARDWARE

1 **Arduino Uno-**Arduino Uno [7] is a microcontroller that is referred to as an actual mini-board. It has various types of pins i.e.; analog and digital pins. There are 14 digital and 6 analog pins.

2.**Soil Moisture Senso**r-The Soil Moisture Sensor is used to detect the moisture content in the soil for the better yielding of crops.

3. **pH Sensor**-pH (Potential Hydrogen) [9] meter is a device used to measure acidity and alkalinity levels in water, soil and photo chemicals. The solutions having pH value between 0 to 7 are acidic solutions with large concentration of hydrogen ions whereas solutions having pH value between 8 to 14 have basic solutions with small hydrogen concentration

4. **DHT11 Sensor**-This sensor indicates the Humidity and Temperature of the soil. It helps the farmers to respond immediately according to the soil conditions.

5.**Color Sensor**-Color sensor is used to identify the color of various components, minerals present in the field. This sensor detects color usually in RGB scale. RGB scale is a combination of red, green and blue colors. Each color has its unique wavelength. Combination of these colors at different properties creates different colors.

PRACTICAL APPLICATION

- Get the information about the soil using our device
- Ask the user to enter name of the crop he is likely to plant in the field (can enter multiple entries of the crop names).
- In input is cotton the information shown will be like following:

Factors	Moisture	Temperature	pH	Humidity	RGB reading
Real time current condition of soil	6.2%	34 degrees	pH 6.7	55%	Image
Suitable condition for crop	6.5-8.0%	21-37 degrees	pH 5.5-7.5	43-76%	Image
Remark	Less moisture	Favourable	Favourable	Favourable	Comparison Of Images
To do	Watering	-	-	-	-

Hardware

Arduino UNO
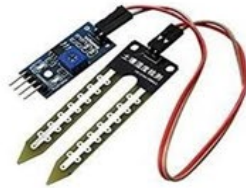
Soil Moisture Sensor

DHT11 Sensor and PH Sensor

Color Sensor

ORGANIZATION OF WORK ELEMENTS

1.This project is interconnected with both hardware and software.

The hardware consists of Arduino Uno with an inbuilt Microcontroller, Moisture sensor, DHT11 sensor, PH sensor, and GSM module whereas software includes Embedded „C‟, Eagle software for PCB designing.

2.Then we will connect the components to the Arduino Uno. The power supply will be automatically supplied from the Arduino Uno of 5V. Also, connect the Arduino Uno to GSM Module to deliver the SMS for the Farmer.

3.The results will be displayed on the LCD as well as message will convey to the farmer accordingly.

METHODOLOGY

Algorithm

Below are the steps to be followed:

Step 1: Start
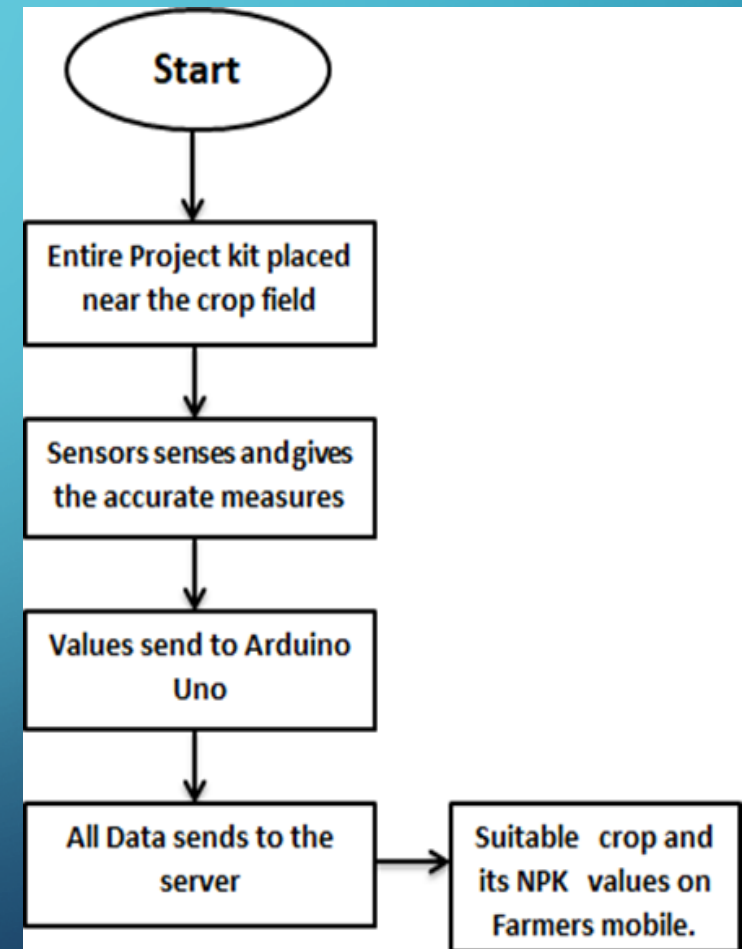
Step 2: Entire Project kit placed near the crop field

Step 3: Sensors senses and gives the accurate measures

Step 4: Values send to Arduino Uno

Step 5: All Data sends to the server

Step 6:Suitable crop and its NPK values on Farmer's mobile.

Step 7:Stop

MILESTONES

1.Farmers used to take soil the geological technicians who collect and analyze the soil samples to determine whether they are suitable for agricultural, developmental or Natural uses.

2. Further, the concept of IOT is introduced in Agriculture. This helped in **analyzing the soil in a better and efficient way** and **knowing the requirements.** With the help of modern technology the amount of moisture can be adjusted to precision.

3.Over time other factors like temperature, ph. and color of soil was able to be determined and hence contributing towards **smart agriculture.** Like Arduino UNO other microcontrollers like Arduino NANO can be used.

EXPECTED OUTCOME AND OUTPUT

1.The expected outcome of the experiment is to help in a better understanding of the soil features and adjustment of factors according to the need of the crop. Some crops require more moisture, some crops require acidic ph, some require higher temperature and all these can be done with the help of precision of technology.

2.The outputs of the experiment are moisture, ph, temperature and color of the soil to the approximate value but other things can also be estimated through the experiment like the monitoring of livestock in the fields, monitoring climate conditions etc.

3.Overall a better outcome than the past methods is expected as this method is easier, less time consuming and more accurate and hence will lead to the shaping of modern smart farming