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IOT a Dynamic Approach for Smart System Monitoring on Soil

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ABSTRACT
The cultivation in our nation is much reduced due to lack of interest, scarcity of agriculture land and water and some farmers with their own interest they have been doing the cultivation at the present. But that also yields to very less production due to lack of awareness about the land dryness, no timely pesticide usage and suitable crops for the land. Hence the smart agriculture plays a vital role in promoting cultivation. It gives the solution by means of placing the sensor in the cultivation land to measure the soil efficiency. The paper describes how the sensed data will be processed and stored in cloud and from cloud the data will be relayed to the registered farm owners through their device in user understandable form.

KEYWORD: *IOT, Sensors, Wi-FI.*

I. INTRODUCTION

The internet of Things (IOT) is playing vital role in present world specially, the Internet of Things (IOT) is transforming the agriculture industry and enabling farmers to contend with the enormous challenges they face. The industry must overcome increasing water shortages, limited availability of lands, difficult to manage costs, while meeting the increasing consumption needs of a global population that is expected to grow by 70% by 2050. New innovative IOT applications are addressing these issues and increasing the quality, quantity, sustainability and cost effectiveness of agricultural production. Today's large and local farms can, for example, leverage IOT to remotely monitor sensors that can detect soil moisture, crop growth and livestock feed levels, remotely manage and control their smart connected harvesters and irrigation equipment, and utilize artificial intelligence based analytics to quickly analyze operational data combined with 3rd party information, such as weather services, to provide new insights and improve decision making. Solution providers looking to build and sell new smart agriculture IOT applications, agriculture equipment providers looking to add Additional value with IOT to their customers, and farmers themselves are recognizing that they can capitalize on the opportunity IOT presents to capture real economic value. In the end, it's about making the right strategic choices, selecting the right partners, and quickly delivering to market the right capabilities to create and sustain your leadership position. Sensors provide the first purpose built IOT platform designed to meet the unique needs of today's connected world. As the leading IOT platform, it delivers the security and scalability to handle millions of daily transactions. With Sensors you can deliver powerful, new smart agriculture IOT solutions in a fraction of the time of other approaches. The aim of IOT is to connect every person and every object through the internet. In IOT, every object is assigned a unique identifier; so that every object is accessible through the internet every object in the IOT has the following three capabilities: awareness, representation, and interaction. Awareness is the ability of the smart objects to understand and sense other objects. Representation is the ability of the objects to present, according to the programming concept. Interaction is the ability to communicate with each other. Every object in IOT is addressable, recognizable, readable and locatable through the internet by using RFID (Radio Frequency Identification), Wireless Sensor Network (WSN) or other means.

II. Problem Definition

A large portion of farming and agricultural activities are based on the predictions, which at times fail. Farmers have to bear huge losses and at times they end up committing suicide. To overcome this, my approach is how to make crop monitoring very efficient and dynamic or we can say digitalize farming or agricultural activities to accelerate the business and more profitable. The present farming system needs to be reliable and based on remote monitoring. This work helps farmers to check on the requirements of the crops and predict their growth accurately. The cultivation in our nation is much reduced due to lack of interest, scarcity of agriculture land and water and some farmers with their own interest they have been doing the cultivation at the present. But that also yields to very less production due to lack of awareness about the land dryness, no timely pesticide usage and suitable crops for the land. Hence the smart agriculture plays a vital role in promoting cultivation. It gives the solution by means of placing the sensor in the cultivation land to measure the soil efficiency. In this work different parameters will be collected using different sensors to make appropriate steps for better crop production.

Objectives:

The main objectives of my research work are described below:

1. The new term of smart agriculture is coined for promoting cultivation.
2. Land dryness can be identified regularly.
3. Timely spray of pesticides and suitable crops for the land.
4. Measurement of soil efficiency.
5. The availability of soil related data to farmers in understanding form.
6. The proper irrigation control.

III. Work plan and Methodology

The methodology started from data collection and analysis and for the same I am going to download number of research papers and white papers from reputed journals and corporations to understand the previous work done on the same topic because after analyzing the previous work i can only deliver the best. In my research I am going to use Arduino Uno with different types of sensors like Soil Moisture, MQ-2 Gas Sensor, Ultra Sonic Sound Sensor, MQ-7 Gas Testoretc to supply number of parameters to Arduino Uno. The system also includes LCD display with GSM Modem Module for sending notifications to farmers to take appropriate steps. In my work I am also using motor to make proper irrigation. The Keil IDE will be used for programming the complete system.

Existing System

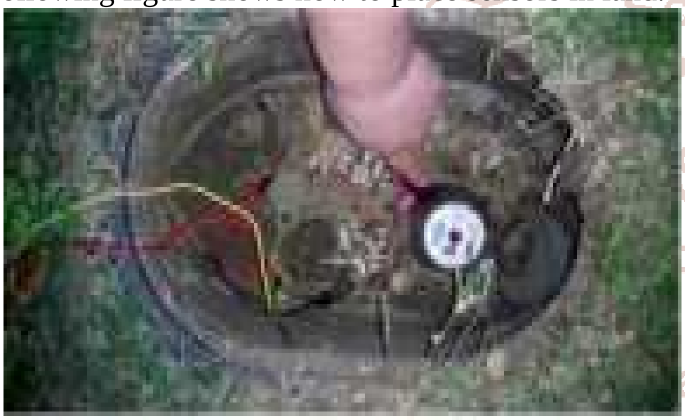
Recently climatic change and environmental monitoring and management have received much attention. The survey introduces three different IOT based wireless sensors for environmental and ambient monitoring: one employing User Datagram Protocol (UDP)-based Wi-Fi communication, one communicating through Wi-Fi and Hypertext Transfer Protocol(HTTP) and third one using Bluetooth Smart. The above presented systems help in recording data at remote locations and viewing it from every device with an Internet connection. Here Zigbee is used to monitor and control application where wireless connectivity is required. UDP based cyber physical system monitors the temperature and relative humidity. Here the losses are caused by the network itself. The Wi-Fi sends the UDP or HTTP packets to a Cloud Platform which makes it available only to the administrator who decides whether the data must be public or private. BLE consist of sensors placed at various areas at which they produce a beacon when data is received and the server takes the information from the sensors whenever the beacon is produced. The available Environmental Monitoring System (EMS) uses UDP protocol which requires the establishment of connection and IP matching every time. Direct access of the geographical information is not available since the information is sent to a centralized platform and admin plays a major role.

Proposed System

The proposed system keeps track on the parameters such as moisture, temperature, humidity, rainfall, gas content and earthquake intimation with the help of the real time sensors. These parameters are continuously monitored by an open source platform called Thing speak for an interval of every 2 minutes. The data can be viewed in any one of the three formats such as JSON, XML and CSV. The sensors in the proposed system collect the data such as the temperature, humidity, soil moisture, pollution level, rain water level and movement in the earth surface. The Wi-Fi network helps in the process of sending the collected data to the open source platform, Thing speak. Alternate to that, an app is made for the purpose of viewing the collected data in even more easier manner. Through the application/Thing speak, the user will be able to know about the status of his/her own agricultural land and counter-measures can be taken after the keen observation of the parameters of the land.

IV. Results

The first phase in my practical is placing the sensor kit. The sensors will measure the different parameters like temperature, PH rate, water level etc. of particular soil and forwards the information about abnormalities of the soil. By sensing the soil frequently suggests the pesticides to be used and helps the farmers about the crop yield and soil. This experiment will improve the crop yielding and reduces human workload. The cloud platform will be used to store data and forwarded to registered farmers using different devices. The following figure shows how to place sensors in land.



Placing Sensors in Soil

Hardware Acceptance Test:

Testing a micro-controller is very easy because it simply includes writing code for polling pins and transmitting the readings over Wi-Fi. The sensor was tested using soils with different humidity, temperature and PH properties. We determined if the sensors can pick up any deliberate changes to the physical conditions of the soil and how long it takes to do so. The soil that is used for experiments is a black soil containing high percentages of humus, nutrients, ammonia and acids and the tests were carried out in the city of Srinagar.

Software Acceptance Test:

Software Acceptance Test is divided into back-end test, front-end test and Integration test.

A. **Back-End Test:** The back-end test involves the server side test of our device. One way to test the back-end side is simply connecting multiple devices to the cloud and store and process data for long times. This way is important while dealing with Big Data hence this test is neglected. In my experiment data from single device is monitored for long time and no unusual conditions occurred like data loss, long delay between transmission of data and reception or simply communication failure of server.
B. **Front-End Test:** The most important acceptance test in the front end site is the quality of data visualization and user interface. The user can access the web page using Facebook or E-mail id. First of all, data visualization of our device meets the need for speed; however even if we find and analyze data quickly and put it in the proper context for the user, the value of data for decision making purposes will be jeopardized if the data transmitted from the device is not accurate or timely. To avoid this problem, in addition to making several hardware tests to calibrate our sensors and get correct measurements, we also created a proactive information management system to ensure that the data is clean. Besides, charts and plots were made easy to read and display meaningful results.
C. **Integration Test:** A meticulous unit test system was integrated before the demonstration of my prototype, and various facets of the functionalities were tested such as: the layout time, load time and user-friendliness

V. Conclusion:

The Agriculture is back bone of our country. The present problems faced by farmers can be minimized only by converting farming into smart farming. In smart farming modern technologies can be deployed for better production. This paper describes the technological aspects required for a modern farming system and how to increase economy of country using smart agriculture.

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