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Agrithozhan – Development of Android Application for Smart Farming

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ABSTRACT

The main objective of this project is to develop a Farm Field Monitoring System which will measure soil pH and suggest suitable as well as Demand crop to get better yield. This system will also predict the weather and intimate soil moisture levels to help the farmers to cultivate the proper crop and monitor their own Land. This project will give the whole data about the farm cultivation. With help of this project farmers gets much relief in farm cultivation and the growth of crops will be monitored continuously. With the sensed pH value best Suitable Crops for the corresponding farm field are predicted using predefined dataset and Demand crop will be sorted from those crops and with the sensed temperature and humidity values Weather in the farm field is also Intimated in three levels as "Normal Weather", "Chances of Rain" and "Too hot". Soil Moisture Level is also measured with moisture sensor and converted into three levels as Low, Medium and High. The validated data are sent to the cloud using IOT (Internet of Things) module and Intimated to the farmer using customized Android Application, including the time at when it was performed. If the soil Moisture level is indicated as Low or High, using Customized android application the Pumping Motor connected to the system can be turned ON or OFF from anywhere in the world using Internet.

KEYWORDS: *Agriculture, Soil Properties, Machine Learning, Android Application, IoT, pH, Weather Prediction, Soil Moisture*

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1. INTRODUCTION:

Agriculture is the most important sector of the Indian economy, but we have not been able to turn our land resources into profitable and sustainable uses. The reason is mainly due to the lack of knowledge on soil. India is gifted with a variety of soils, and each of them has a variety of properties. Therefore, it is necessary to test the properties of the soil.

There are many tools available to test the soil, but they do not give an accurate and desired result. In addition, the farmer must take the pain of visiting the Laboratory for soil analysis. Testing the soil individually can be time-consuming and also costly. Therefore, there is a great need for equipment to analyse the soil, which is available to the farmer. The main objective of this project is to develop a Farm Monitoring System which will measure soil pH and suggest suitable as well as Demand crop to get better yield. This system will also predict the weather and intimate soil moisture levels to help the farmers to cultivate the proper crop and monitor their own Land.

This project will give the whole data about the farm cultivation. With help of this project farmers gets much relief in farm cultivation and the growth of crops will be monitored continuously. With the sensed pH value data best Suitable Crops for the corresponding farm field are predicted using predefined dataset and Demand crop will be sorted from those crops and with the sensed temperature and humidity values Weather in the farm field is predicted. Soil Moisture Level is also measured with moisture sensor and converted into three levels as Low, Medium and High. The validated data's are sent to the cloud using IOT (Internet of Things) module and Intimated to the farmer using customized Android Application, including the time at when it was performed. If the soil Moisture level is indicated as Low ,using Customized android application the Pumping Motor connected to the system can be turned ON or OFF from anywhere using Internet.

2. EXISTING METHOD

In the existing system, the soil properties like pH are not measured to suggest best suitable crop for the farm field. The automated Irrigation system based on the measured soil moisture level has a disadvantage that, if accuracy of the sensor is lost then the soil will be over watered or not at all watered, so this method wastes water as well as power.

3. PROPOSED SYSTEM

As new technologies are introduced and applied in the modern world, there is a need for improvement in the agricultural sector as well. Various researches have been carried out and widely used to improve crop cultivation. To improve crop productivity efficiently, it is necessary to monitor the environmental conditions in and around the

field. Here, The proposed system will monitor the field environment and send the data to IOT. The main advantage of the proposed system is that it can be used to monitor temperature, humidity and water level. Raspberry pi can send the information of a soil to the user through IoT network.

Raspberry Requires a power supply of 5V and it acts as a brain of the system. i.e which control all the sensors connected to it with GPIO pins. The pH meter works here don't require power supply and also it can measure moisture of the soil. The Measured pH value or moisture value a given to the Comparator LM393D for comparing the voltage levels to produce output voltage.

The LM393D is given 5V power supply from ESP8266 IOT module. The Analogue output voltage from the comparator is converted into Digital by MCP3008 A/D converter as Raspberry Pi reads only Digital values. 5V power Supply is given to the MCP3008 module from Raspberry pi. MCP3008 also gives power supply of 5V to the ESP8266 and Hence Low power consumption is achieved and power supply is Efficiently used. For SPI communication between Raspberry pi and MCP3008 module MOSI, MISO and SCLK of Raspberry pi pins are connected to corresponding MCP3008 Module pins. CE0 pin is connected to enable the A/D Module.

DHT11 sensor is directly interfaced to the Raspberry pi GPIO pins and 5V supply is given from pi. DHT11 sensor gives temperature and Humidity values of the Farm field. After getting values from pH meter and DHT11 sensor best Suitable Crops for the corresponding farm field are predicted using predefined dataset and Demand ***c***rop will be sorted from those crops and weather in the farm field is intimated in three levels as "Normal weather", "Chances of rain" and "Too hot". The validated data are sent to the cloud using ESP8266 IOT module generally known as NodeMCU. This module is Interfaced with pi using USB to TTL converter. The Tx pin of TTL is connected to the Rx pin of ESP8266 Module for the Transmission of data from pi to ESP8266.

Here DC motor is used as pumping Motor which is interfaced with Pi using L293D motor driver. 5V power supply is given to the L239D and 12V supply is given to motor. Customized Android Application is being used in several real time applications. Using Android Application farm field is Monitored continuously.

Customized android application is used to view the analysis report from the Hardware Module. i.e suitable as well as demand crop, weather results and soil moisture level. These are stored with time the values are updated. So the farmers can see the report for the particular day. If the soil Moisture level is indicated as Low or High, using Customized android application the Pumping Motor connected to the system can be turned ON or OFF from anywhere in the world using Internet. The Hardware module location also can be viewed in it.

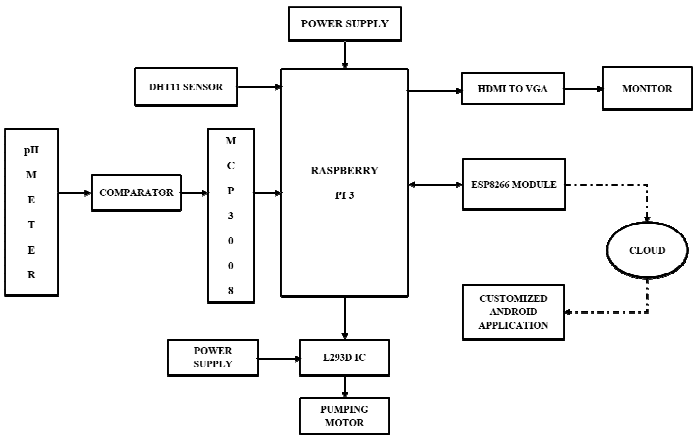

Fig.1 Block diagram of proposed system

Plant	pH Range	Plant	pH Range
Beans	6.0-6.5	Onions	6.5-7.0
Broccoli	6.0-6.5	Peas	6.0-6.8
Cabbage	6.5-7.5	Pineapple	5.0-5.5
Carrots	5.8-6.4	Pumpkin	5.0-6.5
Cucumbers	5.8-6.0	Radish	6.0-7.0
Garlic	6.0-6.5	Strawberries	5.5-6.5
Lettuce	6.0-6.5	Tomatoes	5.5-6.5

Fig.2 Predefined Data-set for pH value

4. HARDWARE IMPLEMENTATION

Raspberry Pi

Raspberry pi is a Very small portable desktop with the size of deck of cards. All of the standard ports are available, including four full-size USB 2.0 ports, a Gigabit Ethernet jack (maximum speed of 300 mbps), an HDMI output, and 3.5-millimeter, four-pole jack. It doubles as a stereo audio and composite video port. The microSD card is used to install slot storage, which means we can add as little or as much storage as we can on the microSD card. Wireless connectivity is built with 802.11ac Wi-Fi and Bluetooth 4.1. The micro USB connection that uses 5 volt power can be turned on completely, and it can run the USB adapter. A 40-pin GPIO header gives connections for attaching all sorts of sensors and add-on modules.

Fig.3 Raspberry pi 3

DHT11 sensor

The DHT11 is a low-cost digital sensor that can be easily connected to a micro-controller such as Raspberry Pi to instantly measure humidity and temperature. The temperature range of DHT11 ranges from 0°C to 50°C. The humidity range of this sensor is 20% to 80%. The sampling rate of this sensor is 1 Hz. i.e. it reads every second. DHT11 size is small with operating voltage of 3 to 5 volts. The DHT 11 sensor has four pins, VCC, GNT, Data Pin, and Unconnected Pin. The pulling resistor is provided from 5k to 10K ohms for communication between the sensor and the microcontroller.

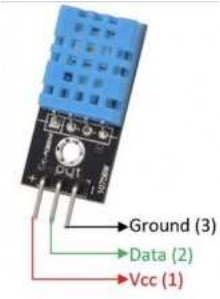

Fig.4 DHT11 Sensor

pH Meter

Three different soil test meters on one device; Measuring humidity, pH and light. PH is used to detect the acidity or alkalinity of water present in the soil. In moist soil, soil having more H^+ is acidic, and soils with more OH^- ions are alkaline. pH values range from 1 to 14. Moisture values range from 1 to 10. Values range from 1-3 is low, 4-7 is favorable moisture, and values from 8-10 is too wet.

Fig.5 pH Meter

ESP8266 IoT Module

The ESP8266 Wi-Fi module is AN autonomous SOC with an integrated TCP/IP protocol stack which will give any microcontroller access to the Wi-Fi network. ESP8266 is capable of hosting an application or offloading all Wi-Fi networking practicality from another application processor. The AT command set for every ESP8266 module is pre-packaged with the microcode. This module includes a powerful on-board process and storage capability that permits it to integrate with sensors and alternative application-specific devices through its GPIOs, leading to bottom growth and front loading throughout operation. The ESP8266 options a self-calibrated RF that permits it to control below all in operation conditions and doesn't need external RF elements.

Fig.6 ESP8266 IoT Module

5. APPLICATION DESIGN & IMPLEMENTATION

Android Studio is the official integrated development environment (IDE) for Android app development. It is based on IntelliJ IDEA, a Java integrated development environment for software and integrates its code editing and developer tools. To support application development in the Android operating system, Android Studio uses a Gradle based build system, prototype, code templates, and github integration. Every project in Android Studio has one or more methods with source code and source files. These methods include Android App Modules, Library Modules and Google App Engine Modules. Android Studio uses the Instant Push feature to push code and resource changes to a running application. A code editor helps the developer to provide code writing and code completion, distortion and analysis. Applications built into Android Studio are bundled into APK form to submit to the Google Play Store.

Fig.7 Android Studio

Agrithozhan application is deigned to interface with the Hardware module for the continuous monitoring of the farm field. The features of the Agrithozhan are shown in fig.9. Each Individual user is given an account in the application for their own monitoring of their farm field. Only they can access their account with the user name password they entered at the time of registration. The farmer can also add their Mobile number to get updates via SMS. If the sensors interfaced with the hardware module is increased then it can be added in the application's Number of sensor option to view the output from the sensor.

To view the overall report View IOT Data option is used in which details like measured pH value, Temperature, weather details, moisture level and best suitable and demand crop is updated with date and time basis. So the user can view the report at any time with date and time specified. The user can add and control up to maximum of five loads with the android application, which is connected to the raspberry pi. If the user wants to know where the hardware module is located, it can be viewed from Device Location Details tab.

Fig.8 Agrithozhan Android Application

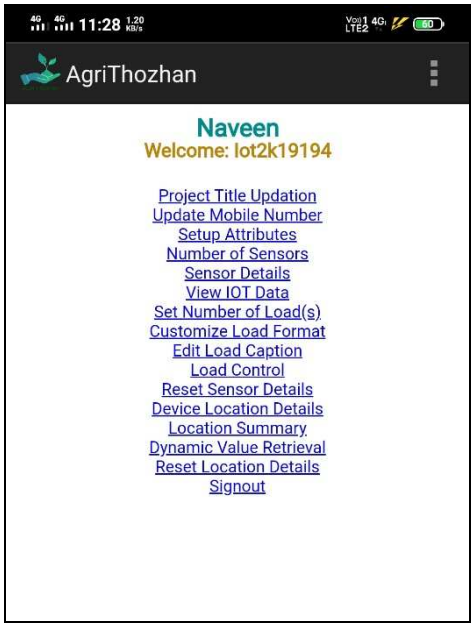

Fig.9 Agrithozhan features

6. RESULT & DISCUSSIONS

The fig.10 shows the final hardware module which measures pH of the soil and Temperature, humidity in the farm field and also soil moisture level. The best suitable crop for the respective land based on the pH value is selected, with weather and soil moisture data also sent to the cloud by IOT Module. This analysis report can be viewed in Agrithozhan Application when the user login with user name and password. Based on the soil moisture level the user can take decisions either to turn ON or OFF the pumping motor from anywhere in the world using Agrithozhan Application.

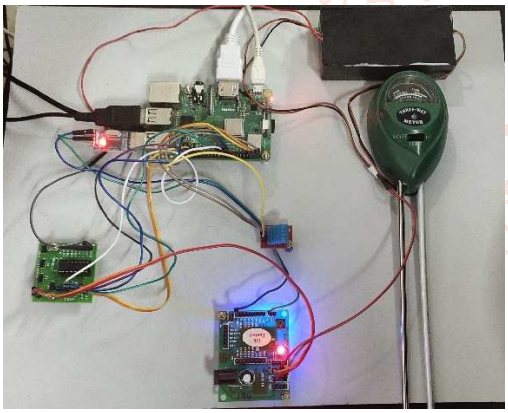

Fig.10 Smart Farming System

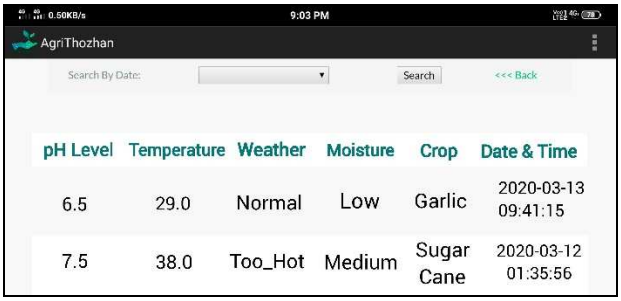

Fig.11 Crop Analysis Results

7. CONCLUSION

In this paper Smart Farming system has been designed with the advantage of very low power consumption. The load connected to it can be controlled from anywhere using the android application**.** The detailed analysis report of the farm field makes farming easier than traditional way and reduce the farmer's workload**.** The main objective of the project is to improve accuracy and implement smart farming. In future it can also be improved with various updation.

8. REFERENCES

[1] M. A. Zamora-Izquierdo, J. Santa, J. A. Martínez, V. Martínez, A. F. Skarmeta, "Smart farming IoT platform based on edge and cloud computing", Biosyst. Eng., vol. 177, pp. 4-17, Jan. 2019.

[2] S. Koduru, V. P. R. Padala, P. Padala, "Smart irrigation system using cloud and Internet of Things", Proc. 2nd Int. Conf. Commun. Comput. Netw., vol. 46, pp. 195-203, 2019.

[3] Agraj Aher, Janhavi Kasar, Palasha Ahuja , Varsha Jadhav, 'Smart Agriculture using Clustering and IOT' International Research Journal of Engineering and Technology (IRJET)e-ISSN: 2395-0056 Volume 05 Issue: 03| Mar-2018 p-ISSN: 2395-0072

[4] N. Ahmed, D. De, I. Hussain, "Internet of Things (IoT) for Smart Precision Agriculture and Farming in Rural Areas", IEEE Internet of Things Journal, vol. 5, no. 6, pp. 4890-4899, 2018.

[5] Z. Yang, T. Nakajima, "Connecting Smart Objects in IoT Architectures by Screen Remote Monitoring and Control", Computers, vol. 7, no. 4, 2018.

[6] ArunaG, G. GangaL awanya, V. AnbuNivetha, "Internet of Things Based Innovative Agriculture Automation Using AGRIBOT" International Journal of Electronics and Communication Engineering, ISSN: 2348–8549, March 2017.

[7] InfantialRubala. J, D. Anitha, "Agriculture Field Monitoring using Wireless Sensor Networks to Improving Crop Production" International Journal of Engineering Science and Computing , March 2017.

[8] S. Shyam Sundar B. Balan, "Sensor Based Smart Agriculture Using IOT", International Journal of MC Square Scientific Research, 2017.