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Smart Agriculture Monitoring through IOT with Cloud Computing

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ABSTRACT

To improve the agricultural yield with fewer resources and labor efforts, substantial innovations have been made throughout human history. Recently, the Internet-of-Things (IOT) is beginning to impact a wide array of sectors and industries, ranging from manufacturing, health, communications, and energy to the agriculture industry, in order to reduce inefficiencies and improve the performance across all markets. This project highlights the potential of wireless sensors and IOT in agriculture, as well as the challenges expected to be faced when integrating this technology with the traditional farming practices. This technology helps the growers throughout the crop stages, from sowing until harvesting, packing and transportation is explained. State-of-the-art IOT - based architectures and platforms used in agriculture are also highlighted wherever suitable. This system has temperature and humidity sensor to detect the climate of the environment where the crop is cultivated. Further the moisture level in the soil will be sensed using moisture sensor. PH level of the soil condition is monitoring based on PH sensor. Crop climate condition and moisture level of the sensed data will be sent to the online website through IOT. Then, the automatic water pouring system will pour water and make the soil wet whenever it is detected as dry and also online notification send to farmer. Further, the system detects the type of the soil and suggests the type of crop to be cultivated in it by using PH sensor data values. Thus this system ensures the crop yield effectively by monitoring essential parameters for the crop growth. After completing this project we will be attaining the all Pos.

Keywords: *Internet of Things (IoT), Smart Agriculture and Sensors*

1. INTRODUCTION

Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy. It also provides large ample employment opportunities to the people. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield. Most of the papers signifies the use of wireless sensor network which collects the data from different types of sensors and then send it to main server using wireless protocol. The collected data provides the information about different environmental factors which in turns helps to monitor the system.

In order to improve the yield and productivity, it is necessary to develop integrated system which will continuously monitor the required growth related parameters in every stages like; cultivation, harvesting and post harvesting storage. This protect therefore proposes a system which is useful in monitoring the field data as well as controlling the field operations which provides the flexibility.

The crop climate condition and moisture level sensed data in the system will be send to the website through the Internet of things through think speak website that is used for the purpose of continuous monitoring the water level for the crops. The main objectives of the system are:

1. To improve the crop yield by ensuring continuous monitoring of the soil quality using multiple sensors.
2. To implement a system that can assist farmers in the whole process of cultivation.
3. To reduce the work of farmers in an effective manner.

2. LITERATURE SURVEY

[1] Aqeel-ur Rehman, "Smart Agriculture"

Use of technology in different areas to get numerous benefits is itself a valuable research. Use of Sensor network in the area of agriculture is not new. But due to the different weather, soil, water and land conditions, diverse models, methods of analysis and solutions are needed on which different communities of researchers are working and proposing several solutions. That instigates need of some different ways specifically for agriculture that can be helpful in developing solution for different conditions. Ubiquitous Computing and Context-Aware Computing are highlighting the approaches to deal with variability in conditions, situations and problems. The combination of different technologies and their application towards certain area is always been a challenging task.

[2] Snigdha Sen , Madhu B, "Smart Agriculture: A Bliss To Farmers"

In developing nations like India, despite of technological advancement we have been less attentive towards our agriculture. Present condition of agriculture is not so satisfactory to produce maximum crop yield because of lack of technology awareness among farmers. As the literacy rates of farmers those involved in agricultural field is significantly low, applying and working with new technology is a major concern. If farmers can embrace new technologies properly, agriculture sector can be a major sector for generating employment as well as increasing GDP in developing countries like India. As of 2012, this sector contributes about 18% of the total G.D.P. of India but around 50% people are involved in this. IoT will help us to increase the productivity of this huge % of people involved in this sector. Application of IoT ecosystem can bring renaissance in agricultural field. IoT will aid in predicting crop yield, crop price, soil temperature, real time data about air quality, water level and proper timing of crop to be delivered to market, which will help to increase productivity. Study says we will have 9.6 billion people on Earth by 2050 which will increase demand for food and IoT in agriculture should be an important driver to meet this requirement. Therefore we need to develop such system which will enhance farming procedure. Objective of this

paper is to present an idea how IoT ecosystem can enhance the overall farming output as well as increase GDP.

[3] Nandurkar, S. R., Thool, V. R., &Thool, R. C. , "Design and development of precision agriculture system using wireless sensor network". The proposed an ease and proficient remote sensor arrange system to obtain the dirt dampness and temperature from different areas of homestead and according to the need of harvest controller take the choice to make water system ON or OFF. Smart precision based horticulture makes utilization of remote sensor systems to screen the farming condition.

[4] Lakshmisudha, K., Hegde, S., Kale, N., &Iyer, S. , "Smart Precisio Based Agriculture Using Sensors"

Zigbee and raspberry pi-based agribusiness observing framework fills in as a dependable and proficient technique for checking rural parameters. Remote checking of field not just enables client to diminish the human power, however it likewise enables client to see exact changes in it. A keen framework in light of exactness horticulture would make ready to another transformation in farming. The client can screen the farming condition from a remote area, hence giving a nursery condition to the plants.

[5] Gutiérrez, J., Villa-Medina, J. F., Nieto-Garibay, A., & Porta-Gándara, M.Á . "Automated irrigation system using a wireless sensor network and GPRS module"

Proposed amechanized water system framework was made to enhance water use for green yields. The structure has a dispersed remote arrangement of soil- moistness and hot sensors put into the root zone of the plants. Authors builtup the choice openly solid framework to gauge farming creation utilizing IoT sensors.

3. EXISTING SYSTEM

This existing system mainly focuses on analyzing the number of micro- nutrients present in the farmland and maintaining the crops within the safe bounds of moisture level. The idea is to manage the excess waterlog in the farmland which may cause during rainfall and floods. Also, measure the number of micronutrients present in the farmland. The system has three sensors. Soil Moisture sensor, Water level sensor, DHT-11 sensor. The soil moisture sensor measures the soil moisture level. The water level sensor is used to measure the water level in the farmland. The DHT-11 sensor measures humidity and temperature. The idea is to manage the excess water log in the farmland which may cause during rainfall and floods. Also, Measure the number of micronutrients present in the farmland and improve fertility by measuring the PH Level of the soil.

3.1.1. Limitations:

- This system only does the monitoring operation but not the controlling operation.
- It has no implementation for the detection of type of soil that can be used for the effective cultivation purpose.

4. PROPOSED SYSTEM

It uses the multiple sensors like temperature and humidity sensor to detect, climate and moisture sensor to sense the moisture level in the soil. Whenever the soil is detected as dry, by sensing the low moisture content in the soil the relay will be activated on receiving the signal from the controller. The activated relay will automatically wet the soil by pouring water to the soil using centrifugal pump and also online notification send to farmer. Further the system will detect the type of soil and also suggest the type of crop to be cultivated there to ensure effective growth of the crops based on PH sensor data values.

The crop climate condition and moisture level sensed data in the system will be sent to the website through internet of Things for the purpose of continuous monitoring of the soil

quality. This can also be performed manually using an application. This application allows the user to monitor the moisture level in the soil and the humidity (i.e.) moisture level in the air and the water level in the farmland and the number of nutrients present in the soil, as well. The factors are analysed and the excess water is removed from the farmland using the suction motor by controlling the relay from the application. And find the crops lifetime using the prediction algorithm.

This helps in proper maintenance of the crops in case of water and micronutrients' availability. This results in an excellent yield of good crops which in turn gets the farmer more profit. A Smart Irrigation and Monitoring System have been proposed so as to reduce wastage of water and to automate the irrigation structure of large areas of crops. The system mainly monitors the behavior of soil moisture, air humidity, and air temperature and sees how it contributes to evaluate the needs of water in a plant.

The system uses machine learning and compares actual values obtained from sensors with a threshold value that has been fed to the machine learning for analysis and so it will start automatic water irrigation using relay andcentrifugal pump. Also, the pH level of the soil will be monitored using pH sensor and displayed in LCD display. Climatic conditions of the field area will be monitored using temperature and humidity sensor measurements. The sensor values will be sent to the user at distance using IP address and API key pairing. The user can view those data which is stored in cloud storage and the data will be represented in graphical view as the data is in EXCEL format. Thus our system ensures smart technique which will help farmers to improve yield in cultivation.

4.1 Advantages

- It automatically wets the soil when dry soil is detected which is not present in existing methods.
- It also suggests the type of crop suitable for the type of soil which prevent the mistake in the middle of the process of cultivation.

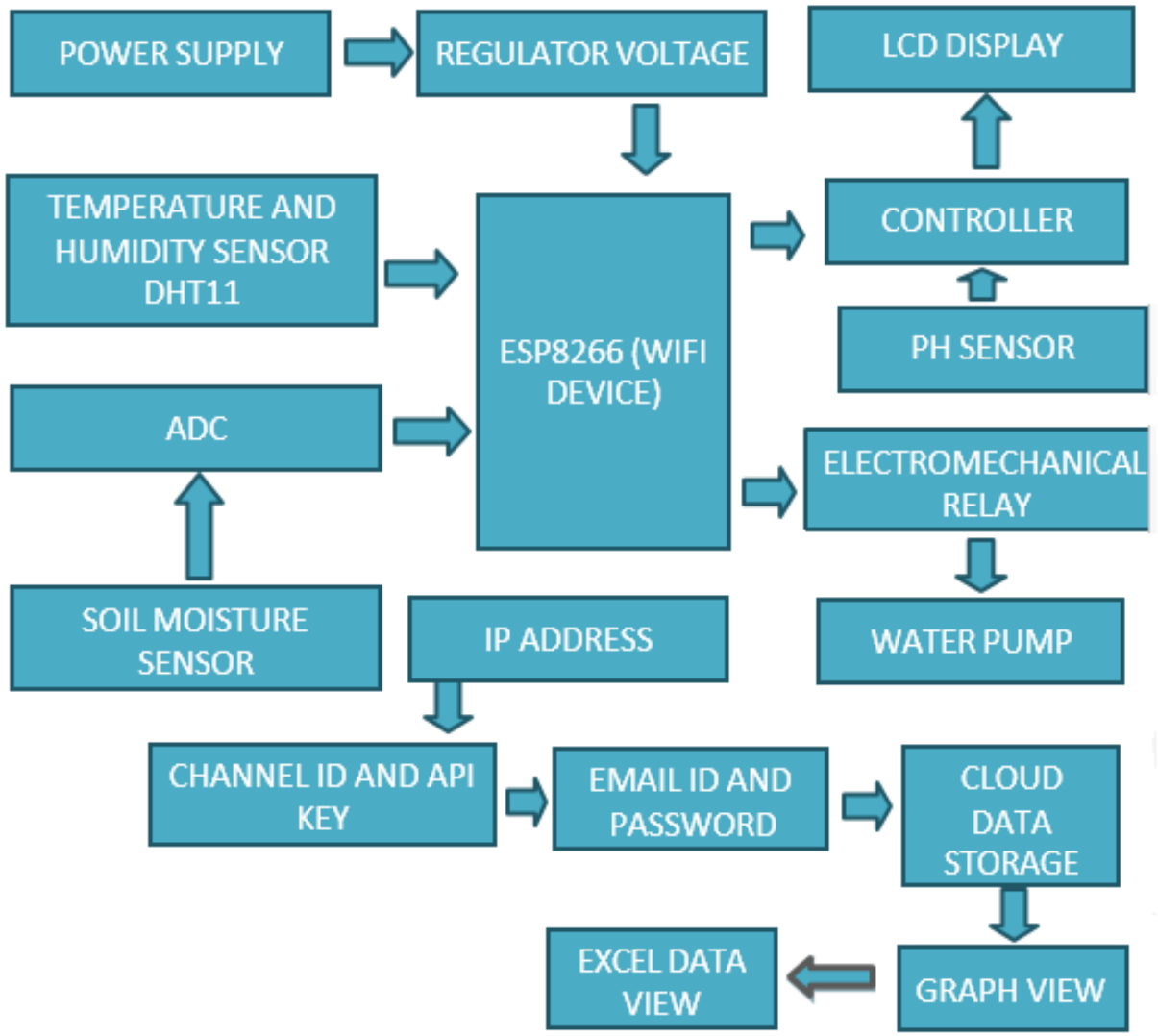

Figure 1: Architecture Design

5. CONCLUSION

A Smart Irrigation and Monitoring System have been proposed so as to reduce wastage of water and to automate the irrigation structure of large areas of crops. The system mainly monitors the behavior of soil moisture, air humidity, and air temperature and sees how it

contributes to evaluate the needs of water in a plant. The system uses machine learning and compares actual values obtained from sensors with a threshold value that has been fed to the machine learning for analysis and so it will start automatic water irrigation using relay and centrifugal pump. Also, the pH level of the soil will be monitored using pH sensor and displayed in LCD display. Climatic conditions of the field area will be monitored using temperature and humidity sensor measurements. The sensor values will be sent to the user at distance using IP address and API key pairing. The user can view those data which is stored in cloud storage and the data will be represented in graphical view as the data is in EXCEL format. Thus our system ensures smart technique which will help farmers to improve yield in cultivation. After completing this project we have attained all Pos.

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