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IOT BASED ADVANCE AGRICULTURAL LAND MONITORING SYSTEM

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Abstract

Agriculture is the basic source of livelihood People in India. It plays a major role in the economy of a country. But nowadays due to migration of people from rural to urban there is hindrance in agriculture. In order to increase the yield of crops, environmental monitoring is not the complete solution. There are no variables that minimize efficiency to a large degree. Therefore, to solve these issues, automation must be applied in agriculture. An automated irrigation system that saves farmers time, money and electricity. Manual intervention is required by Conventional Farmland Irrigation Techniques. Human interference can be reduced with automated irrigation technology. Continuous sensing and monitoring of crops by convergence of sensors with Internet of things (IOT) and making farmers aware about crops growth, harvest time periodically and in turn making high productivity of crops and also ensuring correct delivery of products to end consumers at the right place and right time.

Keywords: *Agriculture, Crop, Monitoring, IoT, Farmer*

I. INTRODUCTION

Food is one of the basic needs of any living being. By 2050, the world needs to supply food for around 9.5 billion people. Agriculture plays a significant role in all of the food supplies available. Therefore, agriculture is the backbone of the growth of any country. Developing and heavily populated countries, such as India, China, etc., depend mainly on agriculture for economic development. Around 70 percent of the Indian population relies on farming to make a living. Most farmers still adopt traditional and conventional farming approaches that require enormous manpower, but one of the key problems facing farmers today is the lack of manpower. Also in irrigation, weather is a crucial factor. Due to uncertainties of the weather, continuous remote monitoring of environmental factors will surely improve the productivity of

agriculture and minimize the rate of diseases. Hence there exists necessity for stupendous technologies in the field of agriculture.

In conventional farming, there are distinct communities and variations. The majority obey one of the two water supply schemes below. One is an irrigation flow system. The water flow would be supported by reservoirs, dams, or tanks built on higher ground than the irrigation area, and gravity. In the second method, using pumps, water is withdrawn from lower levels, such as wells or ground water. Excess water is simply flown onto the field in the two described systems. The waste of water in those two systems is immense. To reduce water wastage now-a-days, sprinklers are used that will distribute the water more efficiently to the fields. Highly populated nations such as China have already switched to greenhouse farming and precision farming, removing the need for vast amounts of capital and manpower. This also decreases the use of pesticides by a significant amount. Compared to conventional agriculture, greenhouse farming combined with precision farming gives better yields[1].

The difference in the amount of water required and the amount of water supplied will regulate the production of crops and the diseases of plants. If the water levels and humidity in the air in a field can be managed according to the type of crop, the productivity of the crop will surely increase. In addition to this, field temperature also plays a very crucial role in a field. Most of the productivity of a disease resistance plant depends on climatic changes and the services given. The network-based wireless sensor solution uses electromagnetic sensors to detect humidity and humidity. Watering is automated by the use of data from the sensor network[2]. Compared to the conventional water fed method, it saves 53 per cent of water than the sprinkler system and more than 80 per cent of water. Crop production can be improved through the combination of humidity, moisture, and light sensors. Apart from such approaches, there are very few methods to improve the irrigation up to some extent. The real time monitoring and controlling system have used IoT technology in designing a real time system to automatically detect fire accidents, which showed that embedding IoT technologies will improve the performance of any real time systems[3], [4].

The system proposed in this work is an embedded system designed to obtain data from the irrigation field using Raspberry pi connected with various kinds of sensors. The data will be sent by the device to a centralized web server. A farmer, a field specialist, or a researcher may be contacted. It also helps the farmer to monitor the equipment on the farms remotely, such as lights, water engines, heat and ventilation systems, etc. To get suggestions too, the farmer can contact the agricultural expert. This is not a single, basic method, but rather a whole structure. This system works very efficiently in guiding the farmer, reducing water usage by 90%, and also automating the irrigation to some extent which is more efficient than any other traditional systems. An image recognition system to automatically identify pests from photographs taken in the field is also included in the framework. The use of image processing with machine learning approaches has already been shown to automate the identification of pests and thus eliminate the use of inexperienced pesticides that cause other side effects in the field.

A Raspberry pi 3 and a series of temperature, humidity, soil moisture, water level, and light sensors are used in the device suggested in this work. It also has a small camera and a module

connected to it by GSM/GPRS. The Raspberry pi regularly collects and sends data from the sensors to the server, uses the GSM/GPRS module to store it in the local database and optionally to the farmer. The web server collects data from various devices and provides both the farmer and any expert with a web interface. It also sends a Short Message Service (SMS) to the farmer by processing the data obtained from the farmer in critical situations. When a farmer logs into the server, it returns a user interface that shows the data from his field and options to control water and light in the corresponding field.

It also shows options to change the threshold levels of some sensors in the field. When the farmer clicks on any option like lights ON or OFF, the server triggers a small Python program that sends the command to the corresponding I-SAM system to do the task. In a Unix server using the Python programming language, the web server and image classification model to detect pests are implemented. Four major diseases (Aphids, Rust, Mosaic, Woolly Aphids) in sugarcane and four major diseases in cotton (Leaf Spot, Mildew, Wilt, Reddening) were analyzed to test the efficiency of this model. A series of images are fed to train the image classification model of all eight diseases. The farmer may be able to recognize any new diseases that are unknown to him by the use of this method. Production of the sugarcane crop model for disease prediction.

Internet of Things (IoT) is the interconnection or network of physical devices that are interrelated computing devices, digital and mechanical machines, people or animals, objects that can sense, accumulate and transfer data over the web without any human involvement. With a unique id, all is given. It is an advanced analysis and mechanized process that utilizes the identification, organization, enormous knowledge and creativity of man-made consciousness to convey a complete framework for an administration. IoT is simply about expanding the Internet's influence beyond mobile phones and computers. IoT has changed today's world. Smart cities, smart cars, smart homes everything around us can be turned into a smart device with the help of IoT. It also has applications in agriculture, business sectors, healthcare, transport and logistics.

There are four main components of IoT-

i. Low power embedded system- High performance and less battery consumption are the inverse factors that play an important role in the design of electronic systems
ii. Cloud computing- Data collected from devices is stored on reliable storage servers so here cloud computing comes into action.
Availability of Big Data- as IoT is highly dependent on sensors that are real time. So the usage of electronic devices is spread throughout every field that is going to trigger a massive flux of data.

A. Network connection: - For communication, internet connectivity is necessary where each physical object is assigned by an IP address. A network connection is built between the devices with the help of these addresses[5].

The paper proposes a thought of consolidating the most recent innovation into the agrarian field to turn the customary techniques for water systems to current strategies in this way making simple profitable and temperate trimming. Some degree of mechanization is presented empowering the idea of observing the field and the product conditions inside some long-separate extents utilizing cloud administrations. The points of interest like water sparing and work sparing are started utilizing sensors that work consequently as they are modified. This idea of modernization of farming is straightforward, reasonable and operable. As relying upon these parameter esteems rancher can without much of a stretch choose which fungicides and pesticides are utilized for enhancing crop creation.

II. CONCLUSION & DISCUSSION

The proposed framework will revolutionize the traditional agriculture system used by the majority of the farmers this will allow the younger generation to do farming with ease and without previous experience. If implemented in full areas, the device can produce large quantities of data that can be used in the field of data mining and further analysis. By using them more effectively, this system would preserve all the main resources. This system requires minimum human interaction at present, which can be further reduced, and can even completely be eliminated by further improving the framework. There are many machine learning algorithms for image classification. This framework has only used SVM based classifiers; hence other machine learning algorithms can be implemented and tested to further improve the system.

III. REFERENCES

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