

# A Survey on Future Modernization of Agriculture using IOT

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**Abstract:** Agriculture plays an imperative role in country's economy and it has an extensive contribution towards human civilization. Due to the growing expansions in sensor devices, and Internet protocols the architecture of Internet of Things (IoT) has been made to support agriculture by making a Smart agriculture. A smart manner of automating farming method may be known as good Agriculture. The major emphasize will be on providing favorable atmosphere for plants. These agricultural machine-driven systems can facilitate in managing and maintain safe atmosphere particularly the agricultural areas.

**IndexTerms - Internet of Things (IoT), Smart Agriculture, Cloud Computing**

## I. 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. 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 But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved.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[1]. The collected data provides the information about different environmental factors which in turns helps to monitor the system. Monitoring environmental factors is not enough and complete solution to improve the yield of the crops [2]. There are number of other factors that affect the productivity to great extent. These factors include attack of insects and pests which can be controlled by spraying the crop with proper insecticide and pesticides. It is necessary to develop integrated system which will take care of all factors affecting the productivity in every stages like; cultivation, harvesting and post harvesting storage. The paper aims at making agriculture smart using automation and IoT technologies [3].

## II. SMART FARMING

Smart farming technologies which are include; farm management information system, precision farming and agricultural automatio and robotics are one of the promising methodologies assist to achieve agriculture sustainability.



Fig. The idea of Agriculture IoT[4]

The precision agricultural system is based on the Global Positioning Systems (GPS), Machine to Machine Communications (M2M), IoT technologies, sensors and Big Data to optimize crop yields, reduce the waste of resources and minimizing the environmental impact of farming [5].

The main summarized ideas are monitoring the fields in a more scientific way by collecting data through sensors and devices, help in smart management of fields and greenhouses with respect to watering needs, pest control etc., help achieve higher yields of crops along with enhancing their quality, better disaster control through prior information and alerts, and help improvise the whole supply chain from farmers to the market

### III. IOT BASED SENSORS FORM AGRICULTURE APPLICATIONS

Crop monitoring is one of the major factors for the development of a country. Due to less monitoring on crops led to the destruction of plants on large scale. This can be avoided by regular uses different types of sensors to monitor the crops. Sensors can detect the major threats that decrease the growth of the plants Agriculture is the backbone of the Indian economy. Mostly it uses about 1/3 of the world's largest amount of water resources in the world. The percentage of water content and consumption irrigate the land based on the different types of soil, conditions and water requirement needed for each type of soil. The continuous extraction of water from earth is reducing the water level due to which lot of land is coming slowly in the zones of un-irrigated land. Another very important reason of this is due to unplanned use of water due to which a significant amount of water goes to waste. In modern drip irrigation systems, the most significant advantage is that water is by which a large quantity of water is saved [6]. The reduction of water consumption, type of the soil with what level of water needed for irrigation can all be determined with the help of sensors monitoring on crops using automated machines

### IV. INTEGRATED PEST MANAGEMENT (IPM)

A farmers' hard work is often destroyed by pests, causing significant monetary losses. To prevent such situations, the Agricultural IoT (Internet of Things) has a system to monitor and scan the environmental parameters and plant growth. There is also data available from pest control sensors which are capable of predicting pest behavior. This information can be used by farmers to reduce damage done by pests on a large scale. Pest Management and Control works on the following fundamental bases: observation, inspection, identification, and record tracking. The Agricultural IoT aims to ensure a monitoring system over various factors like shipping time, storage temperature, and cloud-based record keeping.

### V. THE KEY ADVANTAGES OF INTELLIGENCE AGRICULTURE BENEFIT ANALYSIS

Through measuring related parameters by the IOT scheme, water resource can be saved significantly by accurate irrigation. Measuring mixed rate of integrated soil chemical fertilizer and water. Compared to conventional method, the farm IOT scheme can reduce waste of chemical fertilizer as well as soil pollution dramatically compared to conventional irrigation, the IOT scheme can save water resource up to 67% [7]. Saving chemical fertilizer expenses and increase fertilizer utilization rate up to 40% approximate annually.

### VI. MODEL FOR SMART AGRICULTURE USING INTERNET-OF-THINGS (IoT), SENSORS, CLOUD- COMPUTING, MOBILE-COMPUTING & BIG-DATA ANALYSIS

The agriculture industry in India still needs to be modernized with the involvement of technologies for better production, distribution and cost control. They have proposed a multidisciplinary model for smart agriculture based on the key technologies: Internet-of-Things (IoT), Sensors, Cloud-Computing, Mobile-Computing, Big-Data analysis. Farmers, Agro-Marketing agencies and Agro-Vendors need to be registered to the Agro Cloud module through MobileApp module. Agro Cloud storage is used to store the details of farmers, periodic soil properties of farmlands, agro-vendors and agro-marketing agencies, Agro e-governance schemes and current environmental conditions. Soil and environment properties are sensed and periodically sent to AgroCloud through IoT. Bigdata analysis on Agro Cloud data is done for fertilizer requirements, best crop sequences analysis, total production, and current stock and market requirements [8].

### VII. IMPLICATIONS OF IMPLEMENTATION

The large-scale implementation of Agriculture IoT is possible only with the support of the government. It can facilitate the adoption by introducing user-friendly schemes and policies. It can provide the devices and infrastructure at subsidized rates which can't be afforded by the farmers otherwise. The gaps in agriculture supply chain need to be managed. The role of middleman needs to be reconsidered and dealt with in order to provide maximum benefits to the farmers and the consumers. These gaps may hinder the wide-scale adoption of such technology. The lack of awareness and required skills in the farming community shall be taken very seriously. The farmers need to be made aware of the benefits of IoT in their works. Training programs can help the farmers in understanding the use of new technology and get rid of their fears. They need to come out of the traditional methods of farming in

order to survive the dynamics of the world [9]. The various implications have been: lack of knowledge and skill, lack of awareness and social farming, agriculture IoT is in the experimental phase, huge infrastructure costs, and lack of government investment and policies.

### VIII. Conclusion

In this paper, we surveyed that the IoT-based agricultural production system built on the long-standing need of farmers' to ensure their land remains productive into the future. The IoT based agricultural production system through correlation analysis between the crop statistical information and agricultural environment information has enhanced the ability of farmers, researchers, and government officials to analyze current conditions and predict future harvest. Additionally, agricultural products quality can be improved because farmers observe whole cycle from seeding to selling using this IoT based agricultural production system. The production system can be improved to support more types of products and provide more services. By taking advantage of IoT technology, the efficiency of agricultural production can get a significant improvement. With constantly improving, agriculture IoT must be able to lead agriculture production to a new era.

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