IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 4, April 2022

Smart Agricultural System: Improving Productivity and Better Accuracy

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ABSTRACT: ***The foundation of a nation's economic development is agriculture. For the benefit of the future, major scientific advancements have recently been applied in a variety of agricultural domains. Despite several studies, accurate evaluation and productivity couldn't be achieved. People have made an effort to concentrate on various scientific applications that may be combined in the agricultural sector for more precision and greater output while requiring less manpower. It will need significant modifications in agricultural production techniques to meet the food demand of a population that is predicted to grow to 9.1 billion in 2050 and over 10 billion by the end of the century. To raise agricultural output without further depleting soil and water resources, cropland management must be improved. In this paper, the author discuss about the use of a smart Agriculture system for improving productivity and better accuracy. In the future, this paper will aware people regarding the use of smart agriculture systems.***

KEYWORDS: ***Agriculture, Crop, Land, Management, Productivity.***

1. INTRODUCTION

Lands used for agriculture are the foundation of each nation's economy. Therefore, the government's principal responsibility is to safeguard the fields in every way possible. Although science and new technology have advanced, they have not been able to eliminate our need for agricultural farmlands. For the benefit of farmers, new technologies have been offered, with some restrictions, so that they can get better results with more precision and less work [1], [2]. GIGABYTE has created a smart agricultural system to aid farmers in having better control over the process of growing crops to bring agriculture efficiency through technology. Environmental sensors, monitor systems, as well as equipment controllers, receive data from the front-end environment, such as sunlight, temperature, and humidity [3]. Additionally, big data analysis may be performed on the data gathered and saved on a GIGABYTE Cloud Storage Device. To provide the best development environment for the plant, users may use the database to get data on the growth environment of each batch of crops and compare and analyze the harvests.

1.1. Internet of Things (IoT):

The development of problem-solving approaches relies heavily on the Internet of Things (IoT). The Internet of Things (IoT) was developed from a variety of building parts, including several sensors, programs, network components, and other electrical devices. It also increases the usefulness of data. IoT enables data exchange via the network without the need for human intervention. Humans may use the natural language of a normal human to explain objects in the Internet of Things, such as sensors, automobile drivers, a seamless flow of farming logistics, etc. In that it will transport data via a network, this item has been given an IP address. IoT technology is more effective for the reasons listed below [4], [5].

a) Any gadget connectivity to the world.
b) Requires fewer human efforts
c) Quicker Access;

ISSN PRINT 2319 1775 Online 2320 7876
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d) Efficiency of Time
e) Successful Communication

1.2. Difficulties in Agriculture Nowadays:

Farmers suffer significant losses due to droughts, floods, droughts, or simply the uncertainty of what crops to grow in such unpredictable weather conditions due to climate change. Agriculture is also hampered by a lack of natural resources like land and fresh water. Due to the everyday arduous tasks of field patrols, pumping water, fertilizing, or spraying insecticides without a real day off, fewer human resources are used in farming. However, as the world's population continues to expand, a crucial concern for humans is the availability of food. Therefore, managing agricultural areas or increasing crop yields cannot be done using the old methods of agriculture. IoT should participate in the agricultural revolution now [5], [6].

2. DISCUSSION

2.1.Advantages of Smart Agriculture:

a) Boost output capacity by immediately adjusting environmental conditions to provide the plants' ideal development habitat.
b) Reduce the workload on the workforce by using remote monitoring via a mobile application, notifying the appropriate staff in time for action, or using a remote control for manual processing.
c) Data gathering and analysis: To optimize agricultural growing circumstances, environmental data may be gathered and big data analysis performed using the cloud database server.

2.2.Features of the IoT Gateway:

a) ZigBee wireless technology, MCU, and GIGABYTE IoT Gateway for agriculture boards and sensors that can regulate the environment are used to create a plant's ideal habitat for growth.
b) By employing front-end sensors and specialized equipment to benefit the environment, greenhouse environmental data gathering, storage, and analysis may enhance the environment for plant development. IoT Gateway transmits control signals to the front-end hardware using built-in ZigBee and EDGE Computing to collect data. After controlling the (water, fan, light, or shade cloth), the data was gathered and sent to a back-end database for big data analysis.
c) Increase work efficiency to lower labor expenses. In the past, the farmer was required to maintain a constant watch on the crop, patrol the water, provide fertilizer, and monitor the day. Through the Internet of Things IoT Gateway eco-box, farmers may now employ technology to cut down on agricultural losses. Increased output.

2.3.Smart Agriculture IoT System:

With the help of the IoT ECO Box from the GIGABYTE Smart Agriculture System, the IoT Gateway System, farmers may improve the production and quality of their crops while extending people's healthy lives [6]–[9]. Figure 1 illustrate the smart agriculture using IoT system.

ISSN PRINT 2319 1775 Online 2320 7876

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Figure 1: Illustrate the Smart Agriculture Using IoT System [Google].

2.4. Applications of IoT in Agriculture:

IoT supports a variety of applications in the field of computerized agriculture, including soil and plant analysis, crop development observation and prediction, precision horticulture, water system evaluation support, nursery climate observation and control frameworks, food store network monitoring, and others. The laid-out technological advancements used in IoT applications in farming are as follows. Agriculture and Sensor Technology A wide range of sensors are used in horticultural products, including soil moisture sensors, water-level sensors, hardware for testing the state of the environment at a given time, meteorological sensors (which check the current weather), biosensors heavy metal location sensors, (which find an Analyte), gas sensors (which detect the presence of gas, etc.), and more. RFID technology is commonly used in animal tracking and identification. It aids in carrying out cunning inspection, perception, creature recognition, and management. Agriculture and radio transmission technology With ZigBee remote sensor organizations, self-sorting distant information transfer is possible. It has been widely used for information transfer in vastly scaled farming.

2.5. Technology-Driven Water System Insight:

Based on "shallow wells subterranean linkages fields and programmed water systems framework pipe" technology and satellite positioning, it can collect water system data to automate farming water systems and monitor water systems via a comprehensive analysis of data innovation programming.

2.6. Specialized Quality Safety of Farming Products:

The recording and checking of the chain in the agricultural current chain (creation dissemination deals) might comprehend the entire guideline approach.

2.7. Accuracy Techniques for Seeding and Spraying:

Depending on the technology combined with Global Positioning System (GPS) route technology, farming technology, and preparation at a variable rate, it may achieve identical results for the showering, planting, and fine-tuning the use of pesticides, seeds, etc.

2.8. Benefits of IoT in Agriculture:

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Using IoT in the agriculture industry has several advantages and benefits, some of which are as follows:

a) It will increase the effectiveness of agricultural inputs including soil, water, fertilizers, pesticides, etc.
b) Cost savings: The price of production will go down.
c) Profitability: Farmers will become more profitable as a result.
d) Sustainable development: Enhances sustainability.
e) It will assist in achieving the food safety mission.
f) Environment protection: It is crucial to protect the environment.
g) Lower Operation Costs: Automating planting, care, and harvesting procedures can cut down on resource use, human error, and total cost.
h) Increased Product Quality: Farmers may learn to improve product quality by analyzing production quality and outcomes concerning treatment.
i) Evaluation of a Farm and Its Fields with Accuracy: Accurately tracking production rates per field over time enables precise forecasting of a Farm's future crop yield value.
j) Decreased Environmental Footprint: Every conservation effort, including reduced water use and more output per unit of land, has a beneficial impact on the environment.
k) Remote Field Monitoring: Local or commercial producers can use an internet connection to keep an eye on several fields spread around the world. Real-time decisions may be taken from anywhere.
l) Monitoring of Equipment: Production rates, labor efficiency, and failure prediction may all be used to monitor or maintain agricultural equipment.

Crop output can be affected by a combination of precise weather estimation, other strong information data sources, and other factors. The greater the degree of precision, the more advantageous better quality climate forecasts may be since there is less risk of yield harm. It makes sure that ranchers are accurately and effectively given up-to-date information on strong rural cycles (counting weather forecasts, planting, gathering, and so forth), weather statistics, soil quality, or work accessibility and costs. Ranchers who use such essential consistent data may be better able to plan their actions and take preventative or restorative action in advance for what is to come [10], [11].

3. CONCLUSION

India's progress has consistently been hampered by problems with agriculture, rural areas, and farmers. The only way to deal with these three issues is through agricultural modernization. India's agriculture is still a long way from being modernized. The challenges may be resolved with the application of IoT to modernize agriculture. Cloud services, SOA (service-oriented architecture), or visualization technologies may provide vast amounts of data used in agricultural output based on IoT or cloud computing capabilities. RFID and IoT technology may be used to develop factories that can autonomously regulate agricultural productivity. The effective application of IoT and new technologies can accelerate the modernization of the agricultural sector. The problems affecting farmers, agricultural, or rural areas might be effectively resolved by using smart IoT in agriculture. The investigation above suggests that rural researchers and data innovation specialists should be encouraged to exchange ideas. Particularly those people who comprehend how modernization in the workplace might be sparked by and advanced by IT. Modern farming may enhance rural management and effectiveness, achieving the objectives of energy protection as well as ecological conservation. Ranchers using IoT in horticulture would have the choice to understand the continuing decision of rural soil, recognize which harvests are suitable for cultivation at the current stage, or other

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Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 4, April 2022

ecological information about farmland through insightful examination and more advanced administration.

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