Internet of Things for Smart Agriculture: A Review

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Abstract: Now a day's agriculture may be a business or occupation which has an excellent need for the survival of citizenry. The prime need of human survival is food and it's fulfilled by agriculture. Similarly, India belongs to an agro-based economy. But today also in Indian agriculture domestic or traditional methods are highly applied by Indian farmers. But at the present if they're using new smart and advanced technologies in their farms or agro-based industry then they might save extra cash, time also as energy. Today agricultural production decreasing day by day and on the opposite side, the population of India also because the world is increasing. Obviously in future person get problems to living his life on the items which developed by himself i.e., smartphones, computers, smart vehicles, etc. therefore the end of the day person needs food to survive. And in present-day food is producing only through farming. Currently, we live during a modern or smart era where all the items which are important for us for our lifestyle like smart homes, smart vehicles, industries, health, etc. Accordingly, if the Internet of Things (IoT) would be utilized in agriculture then it's going to became more profitable for the planet and its society.

Keywords: Human Survival, Smart era, IoT, ICT, Agro based Industry

I. INTRODUCTION

With the increasing use of the Internet of Things (IoT), connected devices have utilized in all sides of our life, from health and fitness, home automation, automotive and provision, to smart cities and industrial IoT. By mistreatment of various good agriculture gadgets, farmers have gained higher management over the tactic of raising placental and grooving crops, creating tons of certain and economical. Smart farming through the utilization of IoT technologies will help farmers to scale back generated wastes and enhance productivity. which will come from the number of fertilizers that has been utilized to the number of journeys the farm vehicles have made. So, smart farming is essentially a hi-tech system of growing food that's clean and is sustainable for the masses. it's the induction also because of the application of recent ICT (Information and Communication Technologies) into agriculture. Internet of Things (IoT) has the potential to influence the world we have a bent to measure in; connected vehicles, advanced industries, smart cities, and towns are all parts of the IoT.

However, applying technology like IoT to the agriculture field may need the simplest impact. Smart farming-supported IoT technologies can alter growers and farmers to reduce waste and enhance productivity ranging from the fertilizer utilized to the number of journeys the farm vehicles have created. Smart farming might be a capital-intensive and high-tech system of growing food cleanly and property for the plenty. It's the appliance of up-to-date Information and Communication Technology (ICT) into agriculture.

In IoT-based sensible farming, a system is made for observation of the crop field with the help of varied sensors like humidity, temperature, light, soil wetness, etc., and automation of the water irrigation system. The farmers will monitor the sector conditions from anywhere within the world. IoT-based smart farming is extremely economical as compared with the normal approach. The applications of IoT-based sensible farming not solely target typical, huge farming operations, however might even be new levers of uplift different growing or common trends in agriculture like organic farming, family farming and enhance extremely clear farming. In terms of environmental problems, IoT-based smart farming will provide a nice edge alongside additional economical water usage or optimization of inputs and coverings. the most applications of IoT-based smart farming that are revolutionizing the agriculture field are as follows.

II. APPLICATIONS OF IOT IN AGRICULTURE

Various projects and applications are integrated into Agricultural fields resulting in efficient management and controlling of varied activities are as follows.

a. Climate conditions – Climate plays a very vital role in farming. And having improper data concerning climate heavily deteriorates the quantity and quality of crop production. However, IoT solutions change you to know the period of time climate. Sensors are placed within and out of doors of the agriculture fields. They collect information or data from the atmosphere that's employed to choose the right crops which can grow and sustain within the specific climate. the complete IoT scheme is made from sensors which will notice period of time climate like rainfall, wetness, temperature, and extra terribly accurately. There are various numbers of sensors offered to note these parameters and put them together consequently to suit your sensible farming necessities. These sensors monitor the condition of the crops and also the weather encompassing them. If any worrying climate is found, then an alert signal is shipped. What gets eliminated is that might like of the physical presence throughout worrying climate that eventually will increase the productivity and facilitate farmers to reap additional agriculture edges.

b. Precision Farming – Precision Agriculture/Precision Farming is one of the foremost renowned utilizations of IoT in Agriculture. Exactness cultivating may be a procedure or training that creates the cultivating methodology increasingly precise and controlled for raising domesticated animals and developing yields. Its utilization and things like sensors, self-governing vehicles, computerized equipment, control frameworks, mechanical technology, then forth during this methodology are key parts. It makes the cultivating practice increasingly exact and constrained by acknowledging savvy cultivating applications, for instance, animal checking, vehicle following, field perception, and stock observing. Precision agriculture within the ongoing years has gotten one among the foremost popular utilization of IoT within the agriculture segment and countless associations have begun utilizing this procedure around the globe.

The products and services offered by IoT systems include soil moisture probes, VRI optimization, and virtual optimizer PRO, and so on. VRI (Variable Rate Irrigation) optimization may be a process that maximizes the profitability of irrigated crop fields with soil variability, thereby improving yields and increasing water use efficiency.

c. Agricultural Drones – Agricultural drones are a generally excellent case of IoT applications in Agriculture. Agribusiness businesses today have gotten one among the many ventures where automatons can fuse. Two kinds of automatons, that is, ground-based and flying-based automatons are being joined from various perspectives, for instance, for crop wellbeing appraisal, water system, planting, and soil and field examination. Drones with numerous sensors as warm, camera, lidar, and multispectral are carrying significant advantages to the agrarian business. Horticultural automatons with sensors enable ranchers to ascertain their fields from the sky. Data and knowledge gathered from the automatons uncover such issues as water system issues, soil variety, and hassle and contagious invasions. the excellence among solid and unfortunate plants is in some cases hard to differentiate with unaided eyes. Multispectral pictures can help with separating between solid and undesirable plants, and empower ranchers to require convenient activities.

III. BENEFITS OF IOT IN AGRICULTURE

The following are the advantages of IoT in Agriculture:

a) With IoT, various factors would also cause the protection of the environment.
b) With IoT productions costs are often reduced to an interesting level which can successively increase profitability and sustainability.
c) IoT enables easy collection and management of plenty of data collected from sensors and with the mixing of cloud computing services like Agriculture fields maps, cloud storage, etc., data are often accessed live from anywhere and everywhere enabling live monitoring and end to finish connectivity among all the parties concerned.
d) With IoT, efficiency level would be increased in terms of usage of Soil, Water, Fertilizers, and Pesticides, etc.
e) IoT is considered a key component for Smart Farming like accurate sensors and smart equipment, farmers can increase food production by 70% till the year 2050 as depicted by experts.

IV. IOT AND AGRICULTURE CURRENT SCENARIO AND FUTURE FORECASTS

The following table shows the growth of IoT based adoption in Agriculture sector from Year 2000 to 2050

Table 1: The growth of IoT based adoption in Agriculture sector from Year 2000 to 2050. [1]

Sr. No.	Year	Data Analysis
1	2000	525 million Farms connected to IoT
2	2016	540 million Farms till Date are connected to IoT
3	2035	780 million Farms would be connected to IoT
4	2050	2 billion Farms are likely to be connected to IoT

V. CONCLUSION

Here an effort has been made to assess the impact of the appliance of advanced technologies in traditional agriculture. This research paper describes how agriculture fields are benefitted from IoT systems, the various IoT Applications in Agriculture, and the way they're made use of such things. IoT-enabled agriculture has helped execute modern technological solutions to time-tested knowledge. Data Ingested by obtaining and importing information from the varied sensors for real-time use or storage during a database ensures swift action and fewer damage to the crops. This paper will assist farmers in increasing the agriculture yield and take efficient care of food production.

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