International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 10 | Oct 2019 www.irjet.net p-ISSN: 2395-0072

Role of Internet of Things in Agriculture

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Abstract – *Nowadays there is vast enhancement in technology, different tools and technique are available in agriculture sector. To improve efficiency, productivity, global market, and to reduce human intervention, time and cost there is a need to divert towards new technology called Internet Of Things. IOT is a shared network of objects, where this objects interact through internet. Through IOT we can transfer information without human involvement. Though scientists have explored about every possible innovation but there are still some changes and innovation required for betterment of agriculture. This research paper focuses on role of IOT in agriculture ,its applications ,advantages and disadvantages associated with it, and suggestion and new ideas that leads to smart and efficient farming.*

Key words*: Internet Of Things (IOT), Information Technology (IT), precision farming, sensor, efficiency, productivity, etc.*

1. Introduction

Agriculture is process of producing food, feed, fiber and other desired products by cultivation of crops and raising of livestock. Human beings started agriculture at the time of their transformation from nomadic life to social life; thousands of years ago. We came a long way from primitive techniques to new advancements in field of agriculture. We have developed all kind of ways to manipulate nature so we can produce higher yield crops and farming equipment that allow us to manufacture crops with relative ease.

Two biggest asset of technological advancement are Computer and Internet. This two serves as biggest asset in all fields. They played major role in increasing comfort of our lives. Similarly, they can serve major role in agricultural development. IT industry is growing rapidly and if used in proper and planned way then it can bring boom in agricultural sector also. However, the potential of IT is not fully utilized in agriculture.

Internet of things helps in saving time and energy of farmers by providing farmer easy access to all farming equipment from home. Farmers can turn on of their irrigation system from home, very helpful in water conservation, real time data and production insight, lower operating cost, accurate evolution and remote and equipment monitoring. Implementation of IT in agricultural sector and relative rural area is relatively slow in comparison to the other sector of economy where contemporary IT has been implemented at high speed.

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It is really difficult to find loop in use IOT in agriculture, but than also there are some drawbacks associated with it. High cost, faulty sensors can cause faulty decisions leading to over use of water, fertilizers and many more. Although there are some disadvantages associated with it but best part is that they can be eliminated when used properly.

Considering this context we aim to achieve following objectives:

1. To describe current applications of IOT.
2. Some new ideas for use of IOT.
3. Positive and negative aspects associated with it.
4. Suggestions for improvement in it.

2. Current application of IOT in agriculture world wide

2.1 Data mining

Data mining is one of the most helpful application of IOT in agriculture. This method has great scope of growth.

It involves taking records of all aspects related to agriculture, and using them for prediction as well as improvement in future. Data mining means extracting useful information from recorded data. This application can be really helpful in keeping record of data for future use.

2.2 Precision Farming

Precision farming is one of the most modern way of farming technology. Its influence is increasing day by day. Precision farming makes farming more accurate and controlled. The use of IT components like sensors, autonomous hardware, robotics, etc are key components in this approach.

The products and services offered by precision farming include soil moisture probes, VRI optimizer PRO, and so on. VRI optimization is a process that maximizes the profitability on irrigated crop field with soil variability, thereby improving yield and increasing water use efficiency

2.3 Livestock monitoring

This IOT application help farmer to collect data regarding the location, well-being, and health of their cattle. Farmers in the US lose nearly 2.4 billion dollar per year from animal illness that leads to death, according to USDA. IOT solutions help farmer closely monitoring the health of their livestock, which can be an effective way to prevent losses. Solutions generally employ livestock wearable connecting to a gateway using a low-cost, low bandwidth technology to stream data to the cloud. The feasibility of ranchers to locate their catties with the help of IOT based sensors helps in bringing down labor costs by a substantial amount. One example of an IOT system in use by a company is JMB North America. Which is an organization that provides cow monitoring solutions to cattle producers? Out of many solution provided, one of the solution is to help the cattle owners observe their cows that are pregnant and about to give birth. The sensor thus enable farmers will more focus.

2.4 Smart greenhouse

Greenhouse farming is a technique that enhances the yield of crops vegetables fruits etc. This technique control environmental parameters in two ways. Either through manual intervention or proportional control mechanism. A smart greenhouse through IOT embedded systems monitor and control climate. Thereby eliminating any need for human intervention. Inside the greenhouse, the cloud server helps in processing the data and applies a controlled action. This design provides optimal and cost effective solution to the farmers with minimal and almost no manual intervention.

2.5 Remote sensing and graphic system

Remote sensing is the process of obtaining information about objects without coming into direct contact without the object.

- Identification, area estimation, and monitoring.
- Crop nutrient deficiency detection.
- Crop condition assessment.
- Crop yield modeling and production forecasting
- Pest management.
- Agriculture draught assessment.
- Reflectance modeling.

3. Some new ideas for applications of IoT in agriculture

1. We can connect every technological equipment of our farm through on software or app, which we can operate through our computer, mobile, or remote control.
2. We can keep eye on our farming from different places.
3. We can connect through dealers online from home and keep eye in rates of products.
4. We can get all information related to crop types and fertilizers from home.

4. Positive and negative aspects associated with IOT.

4.1 Advantages of IOT in agriculture

1. Modern machine can control the efforts of farmer. .
2. They reduce time.
3. Used supply water to the crops.
4. They are used in transportation.
5. Irrigational technology.
6. Application of synthetic fertilizer.
7. Chemical pest control.
8. They increase the price and demand of goods.
9. Better marketing and exposure to the price.
10. Facilities In online trading and E-commerce.

4.2 Disadvantages of IOT in agriculture

1. The excessive use of chemicals with the help of machines reduce the fertility of the land.
2. Lack of practical knowledge the farmer can't handle the machines properly.
3. Cost of maintenance is very high.
4. Overuse of machine and lead to environmental damage.
5. It is efficient but has many side effects and drawbacks.

5. Suggestions for countering disadvantages associated with IOT

1. Decreasing cost of equipment associated with IOT by using simple thing available at home like Wi-Fi and computer etc to sensor level.
2. Workshops should be held to teach farmers about IOT and its applications by government.
3. Use of environmental friendly equipments.
4. Controlled use of chemicals in agricultural fields by machines.

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