# **Use of IOT-Based Agriculture Equipment in India**

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#### Abstract

One of the world's top producers of agricultural goods in India. Yet, India's agriculture industry still relies heavily on outdated practices and lacks contemporary technologies. In India, the use of IoT-based agriculture equipment has become more popular in recent years. India's farming practices could undergo a transformation thanks to this technology, which will increase productivity, efficiency, and sustainability. Devices that can be connected to the internet and offer real-time data on many aspects of farming, such as soil moisture, temperature, humidity, and crop development, are included in IoT-based agriculture equipment. This information can be used to determine how best to use resources like water, fertilizer, and pesticides. Farmers can use IoT-based technology to forecast weather trends and choose the best time to grow and harvest crops. Farmers' productivity can be increased and their reliance on manual labor can be decreased by using IoT-based agricultural equipment. IoT-based irrigation systems, for instance, can be designed to autonomously irrigate crops, doing away with the need for physical work. Similarly to this, IoT-based pest management systems can recognize and stop insect infestations before they seriously harm crops. Notwithstanding the potential advantages of IoT-based farm equipment, its uptake in India is currently constrained by a number of issues, including high costs, a lack of knowledge, and inadequate infrastructure. Nonetheless, it is anticipated that the adoption of IoT-based agriculture equipment would continue to increase in India over the future years due to the growing desire for sustainable and effective farming methods.

Keywords: Internet of Things (IoT), IoT-based equipment, boosts productivity, decreases waste, increases profitability, big data, machine learning

#### Introduction

In India, the use of Internet of Things (IoT)based agricultural equipment is expanding. Crop growth, soil moisture, and temperature are being tracked by IoT-based gadgets and sensors, enabling farmers to manage irrigation and fertilization. Precision farming is another application for this technology, allowing farmers to make data-driven decisions to boost crop yield and cut costs. Farmers are able to boost productivity, decrease waste, and increase profitability thanks to the usage of IoT-based equipment. Via a number of programs and incentives, the Indian government is aggressively encouraging the use of IoT-based agricultural equipment, which is anticipated to hasten the sector's growth in the years to come.

#### **Review of literature**

According to, Singh *et al.* 2021, with a recent revolution known as "the Internet of Things (IoT)", people and objects are

connected over the internet to share data among various devices and systems. Agriculture is the main source of employment required for this society to exist. India is a "global agricultural powerhouse" that significantly contributes to the world's food resources thanks to its diverse local climates and agricultural traditions. The Internet of Things has the potential to change agriculture in a number of ways. But efficiency can be increased thanks to the Internet of Things and big data (Singh et al. 2021). IoT provides a tonne of data that has been obtained by sensing equipment that may keep an eye on a range of things, including weather patterns, crop development, growing circumstances, or even livestock health.



Figure 1: The process of tracking crops status using IoT

(Source: https://www.researchgate.net) Regretfully, there is not much of the surface area of the earth that can be used for agricultural purposes. Even the majority of the suitable places vary due to a number of limitations. including heat. weather. elevation. and growing conditions. Expanding the range of habitats and plant species introduces various new characteristics that can be difficult to explain.



**Figure 2: IoT system is used in Agriculture** (Source: https://cdn.crn.in/wp-content/uploads/2020/10/29121643/Precision-Farming\_Aeris\_CRN.png)

The figure shows the IoT system which is used in the Agriculture to develop its strategy. In India, This technology is used to increase the strategy of the Agriculture.

According to, Reddy *et al.* 2020, Users can access a cutting-edge platform called the Internet of Things (IoT) from any location to

monitor and manage devices. It can link biological and mechanical components. The Internet of Things is having a big impact on several businesses. Because the IoT has transformed, regular people may now benefit from its dynamic behavior. The agricultural industry has some of the most competitive job markets. Teenagers' lack of interest in agriculture and their limited awareness of opportunities were the main

causes of the drop in the labor force among this demographic.



Figure 3: A way to use IoT in the agricultural field. (Source: https://imt.college/wp-content/uploads/2022/06/IOT\_AGRICULTURE.pdf)

Hence, in order to verify that the harvests have genuinely finished maturing, farmers who commit to cultivating crops across big regions must spend the entire day outside. In India, where agriculture is a key industry, a lot of water is needed for the crops (Reddy et al. 2020). The sole use of more than 80% of groundwater sources is agriculture. All of the different sensors from "moisture content,

heat, and humidity sensors" were employed to get the system ready to accept the provided data. The decision is communicated to the farmers through email after "the decision tree training algorithm," a member of the extended family of "standard supervised learning algorithms," has been applied to the real statistics.



**Figure 4: Monitoring system** (Source:https://www.cropin.com/hs-fs/hubfs/cropin\_2021/iot/drones.jpeg)

This figure shows the monitoring system of the field with the help of drone system. Drone is the part of IoT system which is totally worked with the help of AI technology.

## **Materials and Methodology**

The primary components used in India to develop IoT-based agricultural equipment are sensors, devices, and software. While the devices are used for data analysis and

management, the sensors are utilized to gather information such as soil moisture, temperature, and humidity (Pachayappanet al. 2020). The software is used to process and evaluate data, assisting farmers in making wise decisions. In India, secondary research techniques are applied in the IoTbased agricultural equipment development process. The secondary study entailed examining the body of knowledge already available on the subject, including reports, academic articles. and government regulations pertaining to agriculture and IoT in India. The evaluation of the prior literature assisted in identifying knowledge gaps and promising areas for further study. To find patterns and trends regarding the of uptake and efficacy IoT-based equipment agricultural in India. the secondary data collected was evaluated using qualitative and quantitative methodologies. In order to encourage the adoption of IoT-based agricultural equipment in India, governmental decisions and initiatives were based on the research's findings (Saha*et al.* 2018). So, based on the facts, this research adheres to that particular topic's mono-method technology.

#### **Results and Discussion**

adoption In India. the of IoT-based equipment agricultural has produced encouraging improvements in crop output, waste reduction, and profitability. Farmers are now able to make data-driven decisions for irrigation and fertilization, which has increased crop health and output (Raviteja, and Supriya, 2020). This is made possible by the adoption of IoT-based sensors for soil moisture and temperature monitoring. Precision farming has reduced waste and cost for farmers by enabling the efficient use of resources like water and fertilizers. This has been made possible by IoT-based technology. IoT-based equipment has also made it possible for farmers to remotely monitor their crops and act quickly in the event of pests or illnesses, minimizing agricultural damage and losses.



Figure 5: Application of IoT in the agricultural field (Source: https://www.researchgate.net)

According to the study's findings, Indian farmers are becoming more interested in utilizing IoT-based agricultural machinery (Aliaret al. 2022). However, there are a number of obstacles to adoption, including expensive upfront costs, a lack of technical

expertise, and a dearth of IoT-based equipment in rural areas. The government of India has launched a number of programs and subsidies to encourage the adoption of IoT-based agricultural equipment.



Figure 6: Future scope of the IoT system in Agriculture (Source: https://www.agrifarming.in/wp-content/uploads/2020/04/Comp2-5.jpg)

The figure shows the future scope of the agriculture with the help of IoT system. This system is very much effective in the Agriculture section to develop it.

## **Conclusion and future scope**

In finding, IoT-based agricultural equipment has demonstrated encouraging outcomes in India in terms of enhancing crop output, lowering waste, and raising profitability. However, there are a number of obstacles to adoption that must be overcome. In India, IoT-based agricultural equipment has a very broad future potential. IoT-based technology usage is anticipated to rise with the expansion of digital infrastructure and government backing. The development of more reasonably priced and widely available IoT-based technology can be the subject of

future study, along with the potential for other IoT-based agricultural applications including supply chain management and animal monitoring. The agriculture industry in India could change and farmers' quality of life could be improved if IoT-based agriculture equipment keeps expanding and developing.

## Recommendations

The government and business sector should keep funding the creation and marketing of IoT-based agricultural equipment in India, according to the research's conclusions. Farmers should be given the necessary instruction and technical support, as well as increased awareness of the advantages of IoT-based technologies (Saadhet al. 2023). Moreover, initiatives should be undertaken

to lower the cost of IoT-based equipment and provide access to it for farmers, particularly those in rural locations.

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