



Connecting Farms and Data: The Role of Internet of Things in Modern Agriculture

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DESCRIPTION

The Internet of Things (IoT) is changing the way agricultural activities are monitored, managed, and evaluated. In agriculture, IoT refers to the use of connected devices, sensors, communication networks, software, and data platforms to collect and exchange information from farms, greenhouses, livestock areas, irrigation systems, and storage facilities. These technologies allow farmers and agricultural professionals to observe field conditions more frequently and make decisions based on measurements rather than relying only on visual inspection or previous experience.

Agricultural production is influenced by many changing factors, including soil moisture, temperature, humidity, rainfall, sunlight, crop growth, pest activity, water availability, and nutrient conditions. Traditional farming practices may require farmers to inspect different areas manually to identify changes. This approach can be difficult when farms cover large areas or when environmental conditions change rapidly. IoT devices can provide continuous information from selected locations, allowing farmers to identify changes at an earlier stage.

Soil sensors are among the commonly used Internet of Things (IoT) devices in agricultural systems. These sensors can measure moisture content, temperature, electrical conductivity, and other soil characteristics. Information collected by the sensors can be transferred to a mobile application or computer platform through wireless communication networks. Farmers can then examine the readings and determine whether irrigation is required. This approach can reduce unnecessary watering and support better use of available water resources.

Weather monitoring is another important application of Internet of Things (IoT) in agriculture. Small weather stations can collect information about temperature, humidity, rainfall, wind speed, and solar radiation. Data from several points across a farm can reveal local differences in environmental conditions. Farmers can use this information when planning irrigation, planting, spraying, harvesting, and other field operations.

Weather information can also support the identification of conditions that may increase the risk of fungal diseases or other crop problems.

IoT applications are not limited to crops. Livestock production can also benefit from connected monitoring devices. Wearable sensors can record movement, body temperature, feeding behaviour, and other measurable characteristics of animals. Changes in these measurements may indicate alterations in health or behaviour that require attention. Location tracking devices can also help farmers monitor the movement of animals within grazing areas. Such systems can reduce the need for continuous physical observation while still providing regular information about livestock.

Equipment monitoring is another useful application. Tractors, pumps, harvesters, and other agricultural machines can be equipped with sensors that record operating hours, fuel use, engine temperature, vibration, and other parameters. The collected information can help operators identify unusual equipment behaviour. Regular monitoring may also support maintenance planning and reduce the likelihood of unexpected machine failure during important farming operations.

Internet of Things (IoT) systems can contribute to post-harvest management as well. Temperature and humidity sensors can be installed in storage facilities, warehouses, and transportation units. Stored crops are sensitive to environmental conditions, and unsuitable temperature or humidity may increase deterioration and quality loss. Continuous monitoring can alert storage managers when conditions move beyond selected limits. Similar systems can be used during transportation to monitor environmental conditions from the farm to the processing or market location.

CONCLUSION

Internet of Things technology is therefore becoming an important component of digital agriculture. Its applications range from soil and weather monitoring to irrigation control,

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greenhouse management, livestock observation, equipment maintenance, and storage monitoring. When implemented appropriately, Internet of Things (IoT) can provide timely information, reduce unnecessary resource use, improve operational monitoring, and support more informed

agricultural decisions. Its long-term value will depend not only on technological development but also on affordability, reliable connectivity, farmer training, data protection, and practical integration with existing agricultural systems.