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Application of emerging technologies in agriculture

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DESCRIPTION

Technology has had a significant impact on how we live, communicate, travel, and interact in modern society. The big technological growth is having a major influence on many industries, particularly agriculture. Agriculture is the lifeblood of the majority of emerging countries. Farmers are under pressure to produce more with less in order to feed an expanding global population, minimize environmental threats, cope with rising global temperatures, survive water and energy shortages, and satisfy the new food preferences of a rising generation of digital-natives and tech-savvy customers. Sensor Technology is the most widely used technology. Farms are finding it inexpensive to strategically deploy sensors around their property in order to reap several benefits. Sensors and image recognition technology enable farmers to monitor their crops from anywhere in the globe (Borch, 2007). Sensors aid agriculture by allowing for real-time traceability. They would allow for real-time understanding of agriculture, forest, and water conditions. They aid in the monitoring and management of livestock and agricultural production. They also contribute to the farm's environmental friendliness by conserving water, controlling erosion, and lowering fertilizer levels in surrounding rivers and lakes. Radio-Frequency Identification (RFID) sensors may be used to monitor food goods from the farm to the shop once crops have been harvested. Smart farming is the agricultural industry's future. Smart farming is a use case for IoT technologies. They entail applying predictive analytics to make better agricultural decisions by gathering real-time data on weather, soil, crop maturity, equipment, and labour expenses.

The use of Information and Communication Technology (ICT) to improve and automate agricultural processes and operations is referred to as smart farming. All of these components of precision agriculture are covered by smart farming technology (Friha, et al., 2021). It is applicable to both small and complicated family farms, as well as organic farming. Traditional agricultural practices are being replaced by smart farming, which is more efficient, consistent, and dependable. It is intended to improve the proficiency of various farming operations. It employs wireless sensor networks to continually monitor soil characteristics and environmental conditions. It makes use of a smart irrigator system to spray the essential nutrients based on the crops' needs. Precision agriculture (or precision farming) is concerned with developing more precise farming techniques for planting and cultivating crops. It is the application of ICT in conjunction with optimal agricultural practices. It has the potential to increase agricultural output while decreasing environmental damage. It has the potential to make a significant difference in food production as the world population grows. Precision agriculture is made possible by a variety of technology, including drones, IoT, GPS navigation, sensors, robots, self-driving cars, and telematics. Agricultural robots are also referred to as agbots. Robotics is the employment of robots or automated equipment to undertake physical tasks instead of people. Farmers use robots to automate agricultural tasks that were previously thought to be too delicate for robotics, such as harvesting, fruit picking, soil management, weeding, planting, irrigation, spraying, weeding, and so on. Robots increase productivity and produce greater harvests (Araújo, et al., 2021). They also shrink the workforce.

Drones are multifunctional airborne vehicles that are autonomous or remotely controlled and propelled by aerodynamic forces. They are gadgets that can fly for an extended period of time without the presence of a human on board. Drones are increasingly being employed as new agricultural equipment. A plane or a drone is the only method for farmers to gain a bird's eye perspective of their land. Drones are used for agricultural monitoring and chemical spraying on crops. Drones can generate 3D imagery that may be used to predict soil condition. Drone sensors may be used to monitor crop health, soil health, and identify weed data in crops. Automation technology refers to any tool that reduces operator burden.

It makes use of sensors, computers, feeding systems, and robots. Robotics, which removes the human from the operation, receives all of the focus. Automation is the major focus of agricultural technology improvements, and it is already in use across the world. GPS-guided tractors and planters are a low-cost technology in which the driver primarily supervises systems. Because of its numerous uses, the intelligent, self-driving tractor is set to revolutionise the agricultural economy.

Automation technology has the potential to make farming safer and more productive. The majority of field crops are automated throughout the production, processing, and storage processes. Labor is unavoidable in agriculture, regardless of how mechanised the farm is. In Machine Learning (ML), a new branch of Artificial Intelligence (AI) that can be used to agriculture. It is the automatic finding of significant patterns in data. Modern agriculture is looking for methods to save water, use fertilizers and energy more effectively, and adapt to climate change (Poblete, et al., 2020). In agriculture, machine learning enables more accurate disease detection and crop disease prediction. AI and machine learning algorithms are assisting farmers in sifting through data to derive significant insights that will help them enhance efficiency, production, and yields. Machine learning algorithms may also be employed in farm manufacturing. In Internet of Things (IoT), the concept is to link everything, anytime, and everywhere via the Internet. It is a network of devices that are linked together and allow data to be exchanged between them. The Internet of Things is being used to tackle some of the world's most serious problems. The Internet of Things is positively altering the agriculture business. Farmers can regulate the actions of connected gadgets with the aid of the Internet of Things (Ali, et al., 2021). Biotechnology, artificial intelligence, Global Positioning System (GPS), Geographic Information Systems (GIS), Radio-Frequency Identification (RFID), 3D printing, genomics, satellites greenhouses, regenerative agriculture, conservation technology, aquaponics, carbon farming, microbial farming, hyper precision, remote monitoring systems, nuclear magnetic resonance, and nanotechnology are among the other emerging technologies. Progressive farmers are assisting in the spread of better agricultural technology in their geographical areas. As a result, the agriculture business will continue to grow as a dynamic and consumer-driven enterprise.

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