

Use of Advanced Technology in Enhancing Food Security

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Introduction

Farming robots are now used in practically every aspect of farming, allowing farmers to fill manpower shortages while also stocking grocery shelves and thus enhancing the food security. The image of a shabbily clad man ploughing the fields with a classic tractor and sweating it out in the blazing heat is frequently conjured up when the word "farming" is mentioned. However, that depiction does not exactly reflect the current state of affairs. Agriculture has grown high-tech today, thanks to numerous mechanical and automation instruments, such as robots, which have made farming complex and comfortable by utilising AI-ML (Artificial Intelligence- Machine Learning), IoT devices, and other technologies.

Automation is a tried-and-true method of eliminating manual work. Agricultural machines such as tractors, harvesters, weeders, and even irrigation appliances are already automated. However, this will not be enough to meet the expanding labour need in the agriculture industry. As a result, agricultural robots must be developed with the following considerations in mind viz. the robots' mechanical structure, size, and frame, communication, remotely controlled technologies that are extremely powerful and the system's agility, manoeuvrability, and flexibility etc. The situation is perfectly ripe for the entry of agriculture robots to usher the community into the world of digital farming. While designing future agri-robots, the architects and designers must consider emerging technologies along with the aspects mentioned above.

Internet of Things (IoT)

Thousands of devices connected to the internet may be found on a big, technologically advanced farm. Through numerous connectors, actuators, and sensors, the IoT ecosystem will assist in connecting the robots to its ecosystem.

Cloud Computing

IoT devices will generate petabytes of data, which will need to be processed and transferred at breakneck speed to aid robots in cognitive decision making.

AI-ML (Artificial Intelligence-Machine Learning)

Already an important aspect and foundation of robotics, AI-ML must be used to guide agri-robots.

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Benefits

Farming entails a variety of monotonous and time-consuming duties that take their toll on the farmers. With mechanical robotic arms incorporating specialised manipulators, grippers, and effectors, agricultural robots can automate such jobs, allowing farmers to focus on improving their overall yields. Here are some examples of how farming robots might make things easier for farmers.

Planting and sowing seeds

One of the most basic examples of agricultural robotics is the autonomous seed-sowing robot. This equipment can help farmers save time and effort when sowing seeds.

Harvesting and picking

Harvesting, in comparison to sowing/planting, is a specialised operation with more moving elements, such as manipulators and two-finger grippers. As the grippers do their duties, the manipulator assists in managing their position and height. Farming robots can assist increase efficiency and accuracy while minimising waste. As a result, it may result in higher yields.

Weed control

Weeds have long been farmers' worst foes since they can grow unchecked. A motorised robot can assist in the removal of these weeds and the prevention of crop damage. The machine employs artificial intelligence to differentiate between weeds and crops. The goal is aided by the continuous digitization of crop and field photos, as well as spatial and temporal information.

Robotic greenhouses

Agricultural robots' future lies in the construction of automated greenhouses. This eliminates the need for the robot to visit the farms. On the other hand, because the farms are kept indoors, it is the opposite way around. San Carlos, California is home to the world's first autonomous farm.

Seed planting drone

Drones in the air have a number of advantages. They have the ability to reach places that people cannot. Some of the best uses of robots in agriculture are seed-planting and aerial imaging drones. Aerial imaging provides a bird's eye view of the fields, allowing the farmer to monitor the condition of the vegetation.