Agriculture Drone: Drone in Farming

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Abstract

Drones are increasingly being used in agriculture, and it is associated with new opportunities and challenges. Drones are most commonly used as a remote sensing platform to assess and monitor crops, but emerging agricultural applications also include precision distribution of agricultural chemicals and biological control agents, livestock health monitoring, and remote sampling. Agricultural drones are used for precision agriculture, which is a modern farming method that optimises efficiency through the use of big data, aerial imagery, and other means. By generating detailed insights, farmers can make data-driven decisions that maximise yield and revenue while minimising expenses and crop failure risks.

Key Words: UAV (Unmanned Aerial Vehicle), Agricultural Drone, Percision farming.

Introduction

In an era of labour shortages and the critical importance of precision agriculture, the agricultural community has positively accepted drone technology. Only a few years ago, drone technology appeared to be an unattainable facility for the poor farming community, the situation has gradually changed and it is now an easily feasible technology with minimal financial investment. Agricultural drones are drones that are used in agriculture to increase crop production and monitor crop growth. Farmers can use these drones to help them gather a more detailed picture of their fields by utilising advanced sensors and digital imaging capabilities. The data collected by such equipment may be useful in improving crop yields and farm efficiency. Agricultural drones provide relief to today's farmers. Drone technology has the potential to reduce labour and resource requirements. Drones can also be used by farmers to capture aerial images of their fields. The Ministry of Agriculture, Forestry, and Fisheries is now focusing heavily on the use of drones in agriculture.

Role of Drone in Farming

Because the global labour force is growing faster than plant growth, there is widespread concern about the sustainability of food production. In order to address this task, growers all over the world must prepare for advanced and computerised solutions to meet the world's human population farming needs, which are constantly changing. Drones are currently used in agricultural fields to determine crop biomass, growth, and production patterns in order to determine precision application of input resources, assist in harvesting produce.
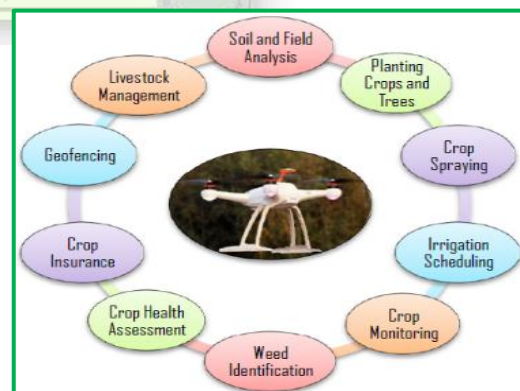

Fig. 1 Role of drones in agriculture

a) Field and soil assessment:

Before and after crop planting, data collected by drones on soil analysis is useful in planning the crop species to be sown, the pattern of planting, and determining the amount and timing of irrigation and nutrient application. These farm-level management decisions can boost the farm's overall productivity.

Fig. 2. Field assessment by using drone

b) Plant establishment

Due to labour shortages, crop sowing has become an expensive and time-consuming endeavour that has traditionally required a large amount of human labour. Drones have made large-scale crop planting more precise and accurate in a short period of time. This method of planting with drones has reduced the cost of planting by up to 85% and eliminates the strenuous work associated with on-the-ground planting.

Fig. 3. Plant establishment by using drone

c) Precision crop spraying:

Site-specific crop spraying can be accomplished with drones equipped with sensors, which scan the cropped area in real time and ensure a precise amount of liquid (such as pesticides and nutrients) is sprayed on that target location. Indeed, experts estimate that drones can complete aerial spraying up to five times faster than traditional spraying methods. It improves spraying accuracy while saving farmers time and money. It reduces pesticide pollution in groundwater in an indirect way.

Fig. 4. Pesticide spraying by using drone

d) Crop monitoring:

Crop production challenges, such as unpredictable weather extremes, are the most difficult to monitor at the field level. The simplicity and efficiency of massive-scale surveillance of crops and agricultural land are the most significant advantages of using unmanned drones. Satellite imagery has long been used to provide a large-scale view of the farm, while helping in the detection of potential issue in crop monitoring.
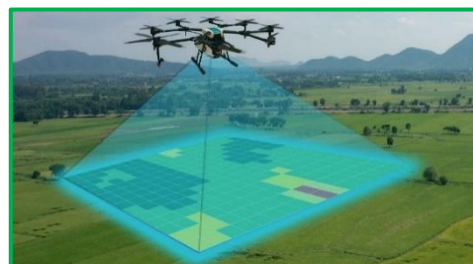

Fig. 5. Crop monitoring by using drone

e) Irrigation management:

Agricultural drones equipped with thermal sensing cameras can provide a great perspective into specific troubled areas of the farm for irrigation application. Several insights, ranging from low moisture stressed to water logged conditions, were monitored using these thermal digital cameras, allowing farmers to make irrigation management decisions based on soil water status. It encourages the precise application of water in fields. Drones can also be useful in the irrigation process.

Fig. 6. Irrigation by using drone

f) Crop health assessment:
Crop health monitoring is important for detecting crop diseases such as bacterial and fungal infections. Drones scan the crop using green visible light and near-infrared light to assess disease incidence in spatial and temporal variation based on crop reflectance. It is possible to detect disease early and make interventions to protect the crop**.**

g) Livestock monitoring:
Drones have a number of alternative uses in animal husbandry. Each animal is tagged with sensors or radio frequency identification (FRIDs) tags in order for drones to monitor feeding activity and movement. Using this, livestock tracking can be done on a much more frequent basis, with less time and investment in personnel. Remote sensing-fencing, virtual boundaries,

Fig. 8. Livestock monitoring by using drone

or remote sensing-zoning all refer to the creation of a virtual obstacle or security fence across a spatial area of interest, particularly in the free range practise of livestock grazing.

h) Crop insurance :
Drones can be used to accurately estimate and monitor crop failure. As a result, it can benefit both farmers and insurance companies. Insurance claims based on the extent of damage.

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