



Utilization of Drones for Crop Disease and Stress Management and Monitoring

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Abstract

Drone technology has had a lasting effect on the productivity of India's agriculture sector. We provide farmers drone-powered solutions to boost productivity in a variety of farming operations, including precision farming, livestock management, pesticide application, crop stress assessment, treatment planning, plant growth monitoring, and scouting. To get exact data, we employ high-tech aerial surveying drones fitted with cutting-edge RGB and multispectral sensors. High-resolution agricultural data is gathered by drones like the DJI Inspire 2 to spot any problems with the crops and alert growers so they may take prompt action before harm occurs. Aerial image geotagging provides useful data that lowers costs and significantly increases production.

Crop yields are increased thanks to advanced drone technology and machine learning for precision agriculture.

and financial success. As a result, less normal input from farmers is needed to maintain and grow crops as well as the land, water, fertiliser, herbicides, and insecticides. For agricultural yield estimates, an accurate crop count, crop emergence analysis, irrigation monitoring, crop health, crop damage assessment, field soil analysis, and other purposes, we combine UAV aerial imagery with machine learning algorithms. To ensure production and provide farmers with all available advantages, high-quality drone data and photogrammetric crop protection are used.

Introduction

One of the most important factors in ensuring the longevity of human civilisation is agriculture. It has been predicted that due to population growth, agricultural consumption will rise by 69% between 2010 and 2050. Small land holdings, which are typical in developing nations, are not fit for the technical advancements in agricultural operations now in use. As a result, it appears that such countries will have a difficult time satisfying future food demands. It is necessary to investigate and incorporate the ideas of advanced agricultural practises into agriculture in order to maintain sustainability, enhance production, and optimise land areas. Drones equipped with data

collection tools for agriculture, or precision agriculture, illnesses, allergies, and other health issues brought on by the use of chemicals (fungicides, pesticides, insecticides, etc.) or by insect or animal bites. is one such idea. Extreme weather conditions, insufficient fertiliser use, illness, and other issues or challenges are also present.

The use of cutting-edge technology in agriculture, like drones, has the possibility of encountering a number of significant or small difficulties. The main uses of drones in agriculture are bird control, soil and field studies, crop monitoring, and irrigation.

Methodology

1. Drones may be used for a variety of tasks, including pesticide application and soil and agricultural field analysis.
2. Drones may be employed with a variety of imaging technologies, including as hyper spectral, multispectral, thermal, etc., to give farmers site- and time-specific information on the health of their crops, as well as information about fungus infections and growth barriers.
3. Drones may also be used to locate drier areas of a field so that better irrigation methods can be used there. Farmers can make more informed decisions and make
4. better use of their resources thanks to the tangible knowledge that precision agriculture gives them.
4. To satisfy the diverse needs of our clients throughout various phases of the crop cycle, drones are outfitted with cutting-edge automation and extremely precise GPS guiding systems.
5. Monitoring crop health, soil analysis, fungal infestation detection, and other processes have all been updated by drones. Drones are the best option for precision agriculture since they can be employed in a variety of weather situations.

Results

Drones are useful in the beginning of the agricultural cycle. For early soil investigation, they create exact 3-D maps that are helpful for organising seed planting patterns. Drone-driven soil analysis after planting gives information for managing nitrogen levels and irrigation.

Startup Shave has developed drone planting devices that have a 75 percent adoption rate and an 85 percent reduction in planting expenses. These devices launch seed- and nutrient-filled pods into the soil, giving the plant everything it needs to survive.

Drones are able to scan the ground and accurately dispense liquid while varying their distance from the surface and spraying in real time for uniform coverage. The end outcome was improved efficiency with less chemical penetration into groundwater. In reality According to experts, drones can perform aerial spraying up to five times more quickly than conventional apparatus.

The biggest challenge in farming is caused by huge fields and ineffective crop monitoring. Weather conditions that are becoming more unpredictable make monitoring difficulties

more difficult to manage and increase risk and field maintenance expenses.

Which areas of a field are dry or require improvement can be determined by drones equipped with hyper-spectral, multispectral, or thermal sensors. Drones also make it possible to

Conclusion

Agriculture is an input-output issue. By employing drones, farmers may use less water and pesticides while still producing the same amount of food, therefore addressing the food issue. The use of agricultural drones transforms farmers' capacity to oversee and control the

calculate the vegetation index, which defines the crop's relative density and health, and to visualise its heat signature, or the amount of energy or heat it releases, after it has begun to develop.

crucial component of farming that is impossible to maintain in remote locations. In conclusion, we may claim that drones, which were first developed as military technology, may become better recognised as green technologies.

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