DRONE TECHNOLOGY – An emerging technology in modern agriculture

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Times are changing and with change come new and exciting technologies.Drone technology has emerged as a significant innovation in the agricultural sector. Drones, or Unmanned Aerial Vehicles (UAVs), are proving to be indispensable tools that enhance efficiency, reduce costs, and improve yield quality and quantity.The agricultural community has positively accepted the drone technology in the era of labour shortage. Only a few years ago, the drone technology was seeming to be very unreachable facility for the poor farming community but gradually situation has changed and now it is easily achievable technology with moderate financial input.

Introduction to drone technology:

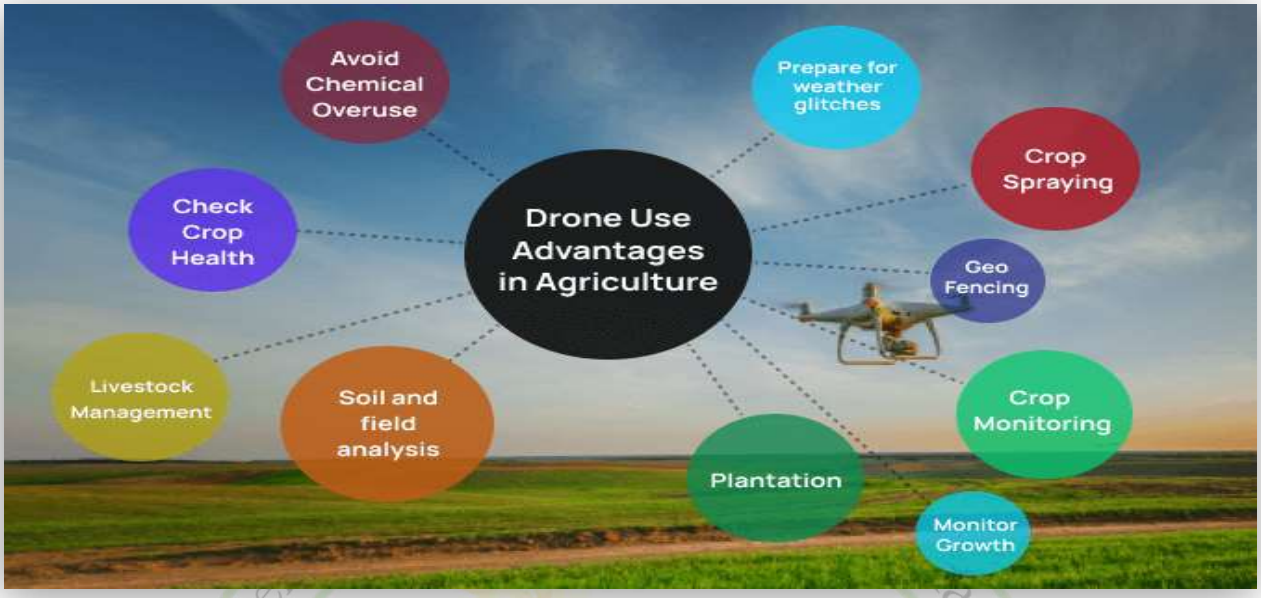
DRONE (Dynamic Remotely Operated Navigation Equipment) has been proved as the stepping stone towards sustainable agriculture. Although drones were initially designed for military purposes, but now they are becoming popular for capturing aerial images, railway track monitoring, wildlife monitoring, delivery of small packages, security purposes, disaster management and agriculture.Hence it has a very immense role in agricultural sector. Drones are equipped with all the software, sensors and hardware that a farmer will need to check the health of crop and survey farmland. Once the drone captures and processes the data, the data is sent to farmers in a readable format for management decisions. That drone data collected will have to be processed with agriculture drone software. The farmer can take the necessary actions to correct any problem.

Professional drone for precision agriculture

Components of drones: -

A drone typically consists of propulsion and navigation systems, GPS, sensors, infrared cameras, software, and programmable controllers. The camera on a drone is a surveillance camera. Flying over the field, the drone takes high resolution pictures with a camera. The drone is cost-effective approach to capture data about various crop conditions. Once the drone captures and processes the data, the data is sent to farmers in a readable format for management decisions.

Applications of Drones in Agriculture: -



With the world changing at fast pace, farmers will need to utilize new-generation technologies to address emerging challenges. Drones can help farmers deal with a wide range of challenges. The use of drone technology in agriculture can become a game changer. By gaining access to a vast pool of data, farmers can increase crop yields, save time, reduce expenses, and act with accuracy and precision. Drones can provide sustainable farming, improve yield, and increase farm productivity and profitability. That can help farmers optimize the use of inputs such as seeds, fertilizers, water, pesticides and reduce wastages. Drone technology is used in crop monitoring, crop volume, generation of prescription maps, precision spraying, inspection of farm infrastructure (including irrigation), mapping and surveying of fields, crop damage assessment. Agriculture drones are useful for aerial photography in livestock operations, spraying, drought assessment, monitoring, etc.

Crop Health Monitoring: Through high-resolution cameras and infrared sensors, drones can detect unhealthy crops, even before the human eye can observe the changes.

Crop health monitoring by farmer

- **Soil and Field Analysis**: Before the starting of cropping season data collected by drone of soil analysis can help in planning the seed planting process, ensuring optimal growth conditions, time and amount of irrigation.
- **Plantation:** Some drones are designed to aid in the seeding process, optimizing the planting pattern and ensuring even distribution.
- **Irrigation Monitoring:** Detect dry areas requiring more attention, thereby conserving water and ensuring optimal growth conditions. It drives to precision application of water in field.

- **Crop spraying:** -site specific crop spraying can be done using drones equipped with sensors where it scans the cropped area on real time basis and ensures precise quantity of liquid (pesticide, herbicides and fertilisers) is sprayed on the targeted place.

Crop-spraying drones

Spraying of pesticides

- **Livestock Monitoring:** Monitor and manage livestock, track their movement, and ensure their health and safety

Challenges and Limitations:

Technical Challenges: Agriculture Drones Require Special Knowledge and Skills. He must have taken a lot of training Sessions.

Fly time Limitations: Simple Agriculture Drones Don't Fly Too Long. The average duration of its fly is 10 and 25 minutes.

Initial Cost: In general, drones are depreciating assets, but not investments. Good agriculture drones are expensive. For example, camera drones with a good payload capacity cost at least 25k. It will not be affordable by everyone.

Risks for Air Space: For the purpose of agriculture use, the drone must fly below 120 meters. Also, there are specific risks in operating drones next to special areas like airports, aerodrome or other airfields.

Weather-Sensitive: It will not be able to work in strong wind, vulnerable to adverse weather conditions. And this is one of the biggest of the disadvantages of agriculture drones. They should not fly in rain or in high humidity conditions. Fog or snowfall are also bad for operating drones.

Effectiveness: When we will spray the pesticide, from a certain height, it may not land at the particular area in heavy wind condition. As a result, it may hamper the other crops of the fields (may act as a poison). The pesticides will also be wasted.

UAVs may affect the environment in several ways, including noise pollution, air pollution, and disruption of animal and plant habitats.

Improvement:

- The farmers are need to be educated through various training programs.
- Heavy power battery is need to be used (considering the weight of drone).
- The Government need to provide subsidy on agriculture drones. So that it can be affordable by normal people. It may be available for renting purpose also. Low range drones need to use near the airbases.
- The rules and regulations should be more farmer friendly. New schemes should be introduced for the benefits of farmers.

- More advance camera should be used to get the detailing of crop image. With the advanced Artificial System, the drone may itself suggest the farmer for preventive measures.

- Noiseless blades can be introduced to avoid the noise pollution. It will not harm the ecosystem as well.

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