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Center for Smart Agriculture Agriculture Drone



**Module 3: APPLICATION OF DRONE IN
AGRICULTURE**



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- Agriculture sector is the most promising sector, dealing with the lot of problems.
- The Use of advanced technologies such as drone in agriculture offer potential for facing several major or minor challenges.
- The major applications of drone in agriculture are irrigation, crop monitoring, soil and field analysis and bird control.



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Soil and field analysis

- Drones can be instrumental at the start of the crop cycle.
- They produce precise 3-D maps for early soil analysis, useful in planning seed planting pattern After planting, drone-driven soil analysis provides data for irrigation and nitrogen-level management.



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PLANTING

- Start up shave created drone planting systems that achieve an uptake rate of 75 percent and decrease planting costs by 85 percent.
- These systems shoot pods with seeds and plant nutrients into the soil, providing the plant all the nutrients necessary to sustain life.



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Crop spraying

- Drones can scan the ground and spray the correct amount of liquid, modulating distance from the ground and spraying in real time for even coverage.
- The result is increased efficiency with a reduction in the amount of chemicals penetrating into groundwater.
- Aerial spraying can be completed up to five times faster with drones than with traditional machinery.



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Crop monitoring

- Vast fields and low efficiency in crop monitoring together create farming's largest obstacle.
- Monitoring challenges are exacerbated by increasingly unpredictable weather conditions, which drive risk and field maintenance costs.



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Irrigation

- Drones with hyper-spectral, multispectral, or thermal sensors can identify which parts of a field are dry or need improvements.
- Additionally, once the crop is growing, drones allow the calculation of the vegetation index, which describes the relative density and health of the crop, and show the heat signature, the amount of energy or heat the crop emits.



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Health assessment

- It's essential to assess crop health and spot bacterial or fungal infections on trees.
- By scanning a crop using both visible and near-infrared light, drone carried devices can identify which plants reflect different amounts of green light and NIR light.
- This information can produce multispectral images that track changes in plants and indicate their health.



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CURRENT USES OF DRONE TECHNOLOGY

- In current scenario it is also being used for
 1. surveillance
 2. traffic monitoring
 3. weather monitoring.



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VISUAL SENSOR

It is used for

- Aerial mapping and imaging
- Photogrammetric and 3D reconstruction
- Plant counting
- Surveillance
- Surveying and Land use application



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MULTISPECTRAL SENSOR

It is used for

- Plant health measurement
- Water quality assessment
- Vegetation index
- Plant counting



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THERMAL SENSOR

It is used for

- Heat signature detection
- Livestock detection
- Surveillance and security
- Water temperature detection and water source detection
- Emergency response



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LIDAR SENSOR

- It is used for
 - Useful in 3D digital surface modelling stockpile calculation
 - Surface variation detection and flood mapping
 - Penetrates through vegetation: It can perform plant height measurement by collecting range information from the plant canopy and the ground below (as opposed to the passive optical imagers that provide height data from the canopy)



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HYPERSENSPECTRAL SENSOR

- It is used for
 - Plant health measurement
 - Water quality assessment
 - Vegetation index calculation
 - Full spectral sensing
 - Spectral research and development
 - Mineral and surface composition surveys



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Drone in Precision (Site- Specific) Agriculture

- Yield monitoring and mapping
- Soil condition mapping (variable rate fertilizer)
- Weed mapping



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Conclusion

- Agricultural drone changes farmer's ability to monitor and manage the key aspect of farm business that is impossible to sustain in remote place.
- Conclusively, we can say Drone, which started as a technology may end up better known as a green-tech technology.