

AERO2ASTRO

Task 1:

UAV stands for **Unmanned Aerial Vehicle** that is, a vehicle that can travel in air without a human pilot. It is commonly known as **drone**. UAVs are basically a component of UAS (Unmanned Aircraft System).

UAVs flights can be operated in three different ways;

- Remote control (operated by human)
- Autopilot (with some limitations)
- Autonomous (like self-driving car)

UAVs can be classified on the basis of size and range.

1. Based on size

- Very small UAVs
- Small UAVs
- Medium UAVs
- Large UAVs

2. Based on range

- Close-range UAVs
- Short-range UAVs
- Mid-range UAVs
- Long-range UAVs

Types of Drones	Advantages	Disadvantages	Uses
Multi-Rotor	--Easy to control and operate in a confined area -- Good camera control --cheapest and easiest to manufacture	--short flight time --small payload capacity --huge portion of energy needed just to fight gravity and stabilize it in air	Aerial photography and aerial video surveillance
Fixed-Wing	--large area coverage --fast flight speed	--harder to fly; more training needed --launch and recovery needs a lot of space --expensive	Aerial mapping, power line inspection
Single-Rotor	--long endurance (with gas power) --heavier payload capacity --much efficient in sense of stability	--more dangerous -- harder to fly; special training needed to fly properly --expensive	Aerial LIDAR laser scanning
Fixed-Wing Hybrid	--long endurance flight	--still in development	Delivery system

Overall, we got to know that UAVs are one of the most exciting and useful technology for our future. Apart from its application in military, their uses are getting exponential fire in the field of aerial photography, surveillance, infrastructure inspections, science, various power-plants, agriculture, product deliveries, filming movies, protecting animals, etc.

What is Aerial Inspection?

Aerial Inspection is a process of inspecting various image data collected with the help of different types of UAVs and sensors at different places for better analysis and working of that field.

How Aerial Inspection is used?

In Aerial Inspection, we feed the collected data into an AI model after performing some operations on data such as data cleaning, data pre-processing, feature engineering and once we get the result, we do some analysis and inspection on that to make the overall result better and better.

Where aerial inspection is used?

Aerial Inspection is used in different fields such as mining, geographical survey's, self-driving cars, agriculture, large-scale area project surveillance, etc.

Industrial application for aerial inspection:

UAVs are revolutionizing the inspection industry.

Industries can perform inspections from a safe distance without using expensive ladders is a priceless win.

Large areas can be covered in less time as earlier which include complicated inspections.

Almost every industry is benefiting from Aerial Inspection-

- Mining
- Infrastructure
- Railways
- Highways and roads
- Agriculture
- Power plant
- Transport
- Military

Taking agriculture drone inspection (use-case):

Drones are being used in agriculture to provide regular monitoring of crops and livestock,

To better understand irrigation conditions and related issues

A drone can provide a regular snapshot of crop conditions on a large farm, giving the owner quick insights into failing crops so that issues can be addressed before they become worse.

In agriculture, one big benefit of drone inspections is improving crop yield.

Data collected by drone can be used to ensure that crops and soil receive exactly what they need for optimum health and productivity.

Drones also help farmers save time—lots of it. A drone can provide visual crop data in a quick flight that might otherwise take hours of walking the field. And because data capture is so much quicker by drone, it can be performed more often, thus leading to improved conditions for crops and bigger yields.

Drone data can also be used to provide a record of crop health over time, allowing farmers to compare crops from one year to the next or across seasons in order to optimize their yield in various conditions.

Advantages of Aerial Inspection:

- Reduce risk
- Better records
- Boost Security
- Better future prediction and planning
- Fast recovery of damages
- Money and time saving

Disadvantages of Aerial Inspection:

- Using data for illegal purpose
- Data storage maintenance

Available software for Aerial Inspection:

- ArcGIS
- Agisoft PhotoScan
- Recap
- Mapware
- Pix4Dmapper

- DroneDeploy
- Micmac
- MATLAB

Drawbacks of existing tools and software:

- Less resources to learn
- Some are not even open-source

Questions that are confusing:

1. Whats the main difference btw aerial inspection and drone inspection?
2. I'm not getting; "what exactly could be the possible disadvantages of aerial inspection?"

Thank You

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