

Aerial Inspection Report

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UAV

Unmanned Aerial Vehicle

Drone:

It is an aircraft without a human pilot on board.

History of Drones:

The drone was invented in 1903 for war. But due to some inconvenience the British government of British banned it. After a year America invented the same drone and named it as an automatic aeroplane. And used for the military application successfully. The US built the "Kettering bug" named drone for world war 1. But due to some technical problem it wasn't used in war. In 1929 the navy of the UK invented the drone which was used as a cruise missile due to this successful concept US and Britain decided to build radio controlled target drone in 1930 it is also used for the military. Male bees are known as drones. That's why the pilot has fewer aircraft named as drones. In world war 2 the US used drones.

Components used in:

1. UAV
2. Ground Control station
3. Radio controller/ transmitter

The flight of UAV's may operate with various degrees of autonomy:

1. Remote control by humans.
2. Autonomously by onboard computer.

Drones classified on the basis of usages:

1. Drone photography
2. Drone mapping
3. Drone surveillance

The best classification of drone is on Aerial Platforms Based on aerial platform used:

1. Single rotor Drone
2. Multi Rotor Drone
3. Fixed wing Drone
4. Fixed wing Hybrid VTOL(vertical take-off and landing) Drone

Weight Categories of UAV as per DGCA(Directorate General of Civil Aviation) India:

1. Nano: $\leq 250\text{gms}$
2. Micro: $>250\text{ gms} \leq 2\text{kgs}$
3. Small: $>2\text{kg} \leq 25\text{kgs}$
4. Medium: $>25\text{kg} \leq 250\text{kgs}$
5. Large: $>150\text{kg}$

Applications of UAV:

1. Civil Applications:
 - a. Recreation
 - b. Disaster Relief
 - c. Archeology
 - d. Conservation of biodiversity & habitat
 - e. Law enforcement & crime
2. Commercial Applications:
 - a. Aerial surveillance
 - b. Film making
 - c. Scientific research
 - d. Cargo transport
 - e. Mining
 - f. Agriculture
3. Military Applications:
 - a. Reconnaissance
 - b. Attack
 - c. Demining

Advantage, Disadvantages & limitations of UAV's:

1. Advantages :
 - a. Maintain safe environment:

Drones monitor hazards threatening conditions like oil and gas leakage, flare stakes.
 - b. Cost saving:

Drone is pocket friendly, sustains and fuels more than airplanes than inspection.
 - c. Reach at hazardous area:

At high alert areas in industries the drone is more effective than the traditional method like workers' life in danger.
 - d. Flexible for quick inspections:

Drone is suitable for emergency scenarios at construction sites specially in roof inspections.
 - e. Security :
 - f. Easy controllable and deployable:
 - g. In depth in detail and data in place:

h. Minimize obvious dangers and health risks:

2. Disadvantages:

- a. Privacy :
- b. Safety :
- c. Spying:
- d. Software issues:
- e. Easy to hack:
- f. Weather dependent:
- g. Data transfer speed is low:
- h. Vulnerable to animals and birds:

3. Limitations:

- a. Limited capabilities :
- b. Legal limitations :
- c. Training :

What's new and use:

The next generation of drones, 7th Generation, is the world's first all-in-one Smart Drone called Solo. completely commercial fully compliant safety and regulatory , standard designs, automated safety modes, improved quality in piloting models and full autonomy, full airspace awareness, auto takeoff, landing, and execution of the mission. Smart accurate sensors are the next big revolution in drone technology that would provide new opportunities in transport, military, logistics, and commercial sectors.

Aerial inspection:

Aerial inspection is nothing but the examination of the particular area by using the drone. Collecting the data by photos and videos to rescue the emergency.

The process of aerial inspection starts with collecting high-resolution photos of land using drones. It gives information about land from various angles. It makes it easy for the humans to get rid from the danger without any harm.

How aerial inspection used:

Aerial inspection is visual inspection. Collecting the visual data from the drone helps to avoid the dangerous conditions.

In a chemical company there are pressure vessels, pipelines, powerlines. The general procedure is first inspect and then repair. In that case drone help with the first step i.e. inspect. By the sending person in this condition is dangerous do its better way that sent the drone and take visual images from that case and repair the problem. Drone is the perfect tool for the job.

Where aerial inspection used :

1. Agriculture inspection:

- a. crops (monitor, health, maturity, damage and related issues)
 - b. Irrigation conditions
 - c. Overall land conditions
 - d. Soil health
- 2. Chemical industries :
 - a. Pipelines
 - b. Cables
 - c. Pressure vessels
 - d. Storage tank
 - e. Fireglass storage tank
 - f. Suction ducts
 - g. Heat exchanges
 - h. Chimney
- 3. Construction inspection:
 - a. Land
 - b. Overall site
 - c. Roof inspection
 - d. Safety conditions
 - e. Stockpiles
- 4. Infrastructures
 - a. Railways
 - b. Tunnels
 - c. Dams
 - d. Bridge
 - e. Wind turbine
 - f. Airports
- 5. Public safety:
 - a. Roof
 - b. Car accident scenes
 - c. Building damages
 - d. Investigation and forensic data collection
 - e. Ongoing fires
 - f. Pre-planning accidents and emergency scenarios
- 6. Power generations:
 - a. Coal fired boilers
 - b. Nuclear power plants
 - c. Heat recovery steam generators
 - d. Hydropower plants
 - e. Transformer
 - f. Chimneys

- g. Solar panels
 - h. Smoke stacks
- 7. Mining inspection
 - a. Stops
 - b. Convey belt
 - c. Crushers
 - d. Stockpile feeders
- 8. Oil and gas inspection
 - a. Chimney and smokestacks
 - b. Storage tanks
 - c. Refineries
 - d. Jetties
- 9. Other inspections are:
 - a. Maritime drone inspection
 - b. Sawyer water treatment

Advantages of aerial inspection:

- 1. Safety environment
- 2. Easy to control
- 3. Cost saving
- 4. Quality images and live streaming

Disadvantages of aerial inspection:

- 1. Privacy violation
- 2. Endangering public safety
- 3. Potential threat to nature
- 4. Unclear legislation

Importance Of aerial inspection:

- 1. It is probable to survey the data from areas that may pose health or safety risks to labours
- 2. It allows us to reach the area where human life is at risk.
- 3. It decreases the risks and cost and reduces the workforce on field.
- 4. It takes quick action and gives accurate surveys.

Available software for aerial inspections:

The UAV software collects and analyses the data. It helps to provide and manage the visibility of monitoring particular areas. It automates and maintains UAV flight plans.

Following softwares is used for inspection:

- 1. Field agent

2. mdMapper
3. Solvi
4. Survey360

Drawbacks of existing software or tool:

1. Sometimes it difficult to maintain and understand
2. Inconsistent processing
3. Unreliable performance or result
4. No longer supported by vendor
5. Data searches that yield incorrect result
6. Inadequate security control
7. Unreliable performance
8. Visibility of data is confusing or misleading
9. Slow speed of transferring the data.

Conclusion :

I've studied the details about the UAV and aerial inspection.