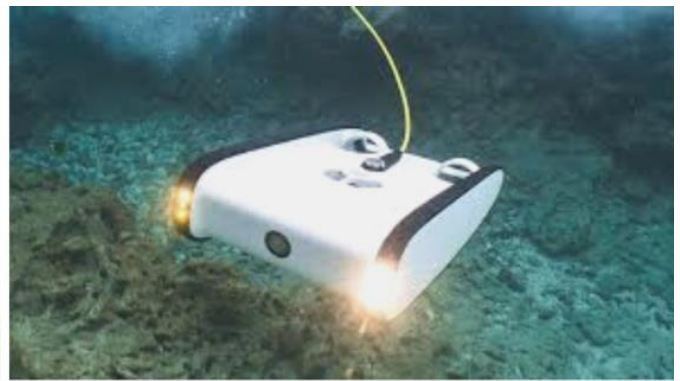


Drones Defined

Drones are by no means new technology, but their list of uses and applications appear to be never-ending. Drones can exist in a variety of forms with aerial, underwater and ground tending to be the three most popular categories.

Drones are also known as;

- Unmanned Aerial Vehicle (UAV)
- Unmanned Aerial System (UAS) - small Unmanned Aerial System (sUAS)
- Remotely Piloted Vehicles (RPVs)
- Remotely Piloted Aircraft Systems (RPAS)
- Flying Robots



MULTI-ROTOR DRONE

Multi-Rotor drones are arguably one of the most popular categories in the drone world. Known for being one of the easiest to operate styles and at the cheaper end of the scale, these are perfect for getting a camera in the air. Whilst they are easy to control, they have limited speed and endurance during flights as they are powered by batteries and electric motors. From an aerodynamic perspective, these drones are fundamentally inefficient since they require a large amount of energy to keep them in the air and the addition of weight from cameras creating the fight against gravity. Although perfect for short flights, these drones are not ideal for larger projects like aerial mapping or area inspections requiring longer time on mission.

<https://www.youtube.com/watch?v=ONdAkoemKs>

SINGLE-ROTOR DRONE

Single-rotor drones tend to resemble a more traditional helicopter, with a single rotor over the body to hold it up and a tail rotor to control its heading. Single-rotor drones tend to be more efficient than multi-rotors as they have larger rotor blades which spin slower. This format is also more capable to operate in inclement weather (e.g. wind, rain, etc). It is the helicopter format that you would see inspecting offshore oil rigs as an example. These drones are typically powered by gas motors which also improves their flight times and endurance. Whilst single-rotor drones can hover with heavy payloads and have longer endurance for flights, they tend to be more complicated to operate (they are less stable when flying and can be difficult to land) and more expensive to both purchase and maintain.

FIXED WING

Fixed wing drones follow the model of traditional airplanes, using wings to provide lift rather than vertical lift rotors. As a result, they are much more efficient as they only use energy to move forward rather than to hold themselves in the air. This enables the drone to fly long distances and stay in mission for longer periods. However, this format does not support hovering in one spot and makes both launching and landing the drone more complicated. Depending on the size of the drone runways may be required to launch and land. These drones can use gas engines supporting longer flight time. They can range in size from a very short wingspan to 9 meters or greater. The costs of these drones can also get quite high, and a fair amount of flying skill is required to safely operate the drone.

<https://www.youtube.com/watch?v=vQFVQg-PXtg>

POWERED LIFT

Powered lift drones are similar to helicopters in the way they are able to take off and land vertically, however once in the air are able to reorient the motors to allow them to fly like a typical airplane.

GPS ENABLED AUTONOMOUS FLIGHT

Some drones are capable of operating autonomously using GPS to set and guide its navigation. This means the operator of the drone can program the mission, launch the drone and have it perform the mission and return to base without any other inputs during the flight. Specific features can include autonomous flight, position hold/hover and return to base. In many cases drones will automatically return to the takeoff location when the drone running low on battery or has reached the edge of its operational range. As a result, these drones are great for mapping areas, surveying and inspections when autonomous flight has been authorized by the airspace regulator and there is not density of air traffic or people.

PHOTOGRAPHY

Photography is a very common use for drones. Most drones will have a built-in camera or a mount point to allow for a detachable professional-grade camera or sensor. These drones are generally designed with greater stability to allow them to hover over particular areas to capture high quality images or footage. Although they can be useful for capturing great images, photography drones generally tend to have limited flight time as they have to carry the extra weight of the camera and fight wind to stay level and hover to take the photos. You will also see that drones are not only used for Real Estate photography, but also by Hollywood production studios to capture more dramatic shots for movies.

MICRO

Nano or micro drones are often used by militaries given their discrete design – some being as small as 1" x 4" that can fit in a special belt. A popular example of a micro drone is the 'Black Hornet' which is used by the British military. On a single battery charge this drone can fly for 25 minutes and are fitted with micro or infrared cameras. These are used to create better situational awareness for the troops deploying them.

<https://www.youtube.com/watch?v=sdqhRGdJf4Y>

SUBMERSIBLE / UNDERWATER

Marine and sub-marine (underwater) drones are an emerging category whose uses and technology are continuing to develop rapidly. Where aerial drones go by UAV (unmanned aerial vehicles) underwater drones tend to go by ROV (remotely operated vehicles) or UMV (unmanned vehicle). Although they are mainly used by professionals for capturing underwater footage, these drones can also be used for exploration, inspecting ships, research or filmmaking. The most common practice for underwater drones is to have them tethered to a floating beacon or buoy using a cable to maintain a live feed and stop the drone from getting lost. This is because wireless signals tend not to be able to travel through water. Like submarines, underwater drones tend to have powerful headlamps to ensure better visibility for video.

GROUND

Ground drones or UGVs (unmanned ground vehicles) operate on land and are often used when situations are inconvenient, dangerous or impossible to have a human operator carry out the task. These can be used by the military or for commercial/civilian tasks (such as underground mining or crop harvesting). UGVs can be controlled remotely with handhelds, fixed stations or autonomously. These vehicles can come in a range of sizes with smaller options being more popular with defense forces and larger options being used for commercial applications. These vehicles are also being trialed for things like food and package delivery as well.

Further reading:

<https://skilledflyer.com/types-of-drones/>

<https://www.aircraftcompare.com/blog/types-of-drones/>