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A Short Review of the Drone Technology

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Abstract

This article talks about drones and their uses, first discussing the construction of the drone, the most important components of which are the frame, propeller, engine, power system, electronic control, and communication system. A drone is a type of aircraft. A drone is also known as an unmanned aerial vehicle (UAV). A drone is "unmanned" because it doesn't need a pilot on board to fly it. Due to the popularity of drones and the fact that many of them are easy and cheap to buy, it is generally expected that the ubiquity of drones will increase significantly in the next few years. The main danger of using a drone is the fall of a drone from a great height, which can be caused by battery discharge, damage due to weather conditions (low air temperature, rain), or hitting an obstacle (trees, buildings, high-voltage lines). The US military has used drones since the mid-1990s. Since the beginning of 2013, many people have started flying drones for fun.

Keywords: - Drone Technology, GPS, Unmanned Aerial Vehicle, Aircraft

INTRODUCTION

The term "drone" generally refers to any unmanned aircraft, sometimes referred to as "unmanned aerial vehicles" (UAVs). A drone is a flying robot. Drones can be remotely controlled using onboard sensors and GPS. In the past, UAVs were often

Once associated with the military, intelligence gathering, and then, more controversially, as weapons platforms. Drones are now being used for tasks ranging from search and rescue, surveillance, traffic monitoring, weather monitoring and firefighting, and even

personal tasks. In today's world, drones are used in the film industry and have become an important part and news reporters are also using them to carry information from remote locations. An unmanned aerial vehicle system consists of two parts, the drone itself and the control system.

What is Drone Technology?

The word "drone" is taken straight from the sci-fi world. Another name for drones is Unmanned Aerial Vehicle (UAV) [1]. A drone is an unmanned aircraft. Which is known as an unmanned aerial system? Drones are used for filming, military surveillance, and recreational activities and drones work at the intersection of aerospace, robotics, and mechatronics. A drone is a flying robot that can fly and operate remotely. Drones have become important to several businesses and government agencies. In rapid delivery, from industries to out-of-reach locations to military bases, drone technology plays a crucial role and has proven to be extremely beneficial. A drone can be piloted using a remote or using a mobile application. Drones can work in conditions where dry, dull, or dangerous for human pilots. We can use drones to work very easily. This is why most countries around the world are adopting drones.

How Do Drones Work?

Drones are unmanned aerial vehicles; drones are commonly referred to as unmanned aerial vehicles (UAV) where the entire system allows a drone to operate. Drones have two basic functions: flight mode and navigation [2]. To fly, drones must have a power source, such as batteries or fuel [3]. There will also be rotors, propellers, and a frame. The drone's frame is made of lightweight, composite materials to reduce weight and increase maneuverability. Drones require a controller, which is used to launch, navigate and land the aircraft, known as a remote controller [4]. The controller communicates with the drone using radio waves, such as Wi-Fi. Drones can travel at high altitudes. The most important parts of a drone are the operating system and the flight controller [5].

Batteries power the rotors which in turn spin the propellers and generate lift. Flight controllers use accelerometers, barometers, magnetometers, gyroscopes, and data collected by controllers to stay in the air. Some other important features that enhance drone performance include GPS, obstacle detection and collision avoidance, cameras, and software. A drone has an infrared camera, landing gear, rotor, connectivity, motor, accelerometer, and

altimeter. Simply put, a drone is like a flying robot. Airplanes are usually controlled by a dedicated remote unit and they can manage everything in the air thanks to an intelligent software program [6]. It has many onboard working sensors like GPS etc. which help in controlling the correct flight mode [7].

Parts of the Drones

Drones have many parts; a drone consists of 10 parts. Below are the parts of the drone.

1. Quad-copter frame

It is a structure (frame) into which all other drone parts fit.

2. Motor

Motors are essential in making drones as they generate the force to rotate the propellers and propel the drone

3. Electronic Speed Controller (ESC)

It is an electronic control board that varies the speed of the motor. It also works as a dynamic brake.

4. Flight Control

Flight control creates a log of the takeoff location that guides the drone and thereby the need to return to the takeoff location. This has become known as the 'back home' feature.

5. Propeller

Drones can fly with the help of propellers; propellers are designed to create a difference in air pressure.

6. Radio transmitter

It is used as a channelized transmitter and communicator with drones.

7. Battery, electronics, and power distribution cables

This battery acts as the power source for the drone. It supplies power to all electronics through power distribution cables.

8. Camera

For video footage, a camera is attached to the drone and used to shoot, save and send video.

9. Landing gear

It is used to land the drone safely. An experienced user can balance the motor speed for a safe landing in emergencies.

10. First-person video

The control device interface (transmitter) is more expensive than the screen, giving the user an interactive 3D viewing experience. First Person View (FPV) gives an ultimate feeling as if the user thinks he is flying.



Figure: - 1 parts of the drones

Types of drones

Fourteenth have types of drones; those types of drones are discussed below.

1. Single-Rotor-Drones

The single-rotor drone type is strong and durable [8]. They resemble real helicopters in structure and design. These are the most basic drones. It has a single rotor, sometimes called a tail unit.



Figure:- 2 Single-Rotor-Drones

2. Multi-Rotor Drones

A multi-rotor drone has four rotors. When it comes to commercial drones, however, the general rule is that the more rotors you have, the less the craft can stay in the air. Multi-rotor drones are stable, but they can fly for about half an hour. Multi-rotor

drones are perfect for aerial photography and surveillance. [9]



Figure: - 3 Multi-Rotor Drones

3. Fixed-Wing Drones

A fixed-wing drone has a rigid wing that looks like an airplane; fixed-wing drones can be gas-powered [10]. Where multi-rotor units cannot stay airborne for long, a fixed-wing drone can stay in the air for up to 16 hours of continuous flight. However, fixed-wing drones are unable to hover the way drones with helicopter-style rotors can.



Figure: - 4 Fixed-Wing Drones

4. Fixed-Wing Hybrid Drones

Hybrid VTOL drone types combine the advantages of fixed-wing and rotor-based designs. This drone has rotors attached to fixed wings, allowing the drone to rotate and land vertically. These drones take inspiration from designs used in aircraft designs from the 1960s and 1950s [11]. They were not easy to make and the technology was very complex.



Figure: - 5 Fixed-Wing Hybrid Drones

5. Small drones

These drones are generally less expensive; these drones can only be used for recreational purposes [12]. They cannot perform commercial functions, which other drone models perform.



Figure: - 6 Small Drones

6. Micro drones

These small drones can entertain the eyes of consumers [13]. The most well-known example of this type of drone is the Black Hornet, developed for the British military. These tiny drones measuring 1" x 4 inches

have been used by the British military in Afghanistan to inspect walls and other structures since their introduction in 2013.



Figure:- 7 Micro Drones

7. Tactical drones

Large enough but not too heavy, these drones are often used for large missions and general combat and are used for surveillance [14]. It measures 4.5 feet and weighs 4.2 pounds.



Figure:- 8 Tactical Drones

8. Reconnaissance drones

These drones are most widely used by the world's military forces. Heron, designed by Israeli Aerospace Industries, has produced drones of this nature for military recycling for the United States, Canada, Turkey, India, Morocco, and Australia. These drones are about 16 feet in length, weigh more than 2200 pounds, and hover at 35,000 feet for 52 hours.



Figure:-9 Reconnaissance Drones

9. Large combat drones

These drones can be used for up to 14 hours and have a range of over 1,000 miles. These drones were used in operations such as strikes against Pakistan and other countries with which the US is not at war. This is one of the drones that one imagines as a military term.



Figure: - 10 Large Combat Drones

10. Non-Combat Large Drones

These drones can be used for reconnaissance and other tasks, but these drones are not intended for combat. It is used instead of surveillance like scanning mobile phone calls. Just because these drones aren't involved in combat doesn't mean they aren't expensive. They are more complex than Black Hornet and are used for larger-scalar recon missions.



Figure no. 11 non-combat large drones

11. Target and decoy drones

One of the important things about military drones is that they can serve different functions depending on the situation. These drones are used as decoys and can be used to monitor or strike targets. For example, some target and decoy drones can conduct their missions by simulating an incoming missile.



Figure:-12 Target and Decoy Drones

12. GPS drones

These drones work by connecting to satellites through a GPS hookup. It allows you to map flights and generate data, which you can use to your advantage. For example, it might be considered a great drone for mapping large topography.



Figure no. 13 GPS drones

13. Photography drones

These types of drones use automatic flight modes and precision stabilization to capture images across large areas. Some drones can take limited pictures and there are several drones capable of taking pictures for military purposes. But,

professional photographers need commercial drones that are designed for professional photography. 4K camera drones can take high-resolution photos.



Figure no. 14 photography drones

14. Racing drones

Racing drones have an engine, chances are that people will want to compete with these drones; it has become one of the popular hobbies now for drones and people. Drones can travel at speeds up to 60 mph. However, because all of their energy is focused on one objective, they often don't enjoy the same amount of flight time as their counterparts.



Figure:- 15 Racing Drones

A BRIEF HISTORY OF DRONES

The first drones are believed to have been introduced 170 years ago, but since then, we have seen the evolution from drones serving military purposes to commercial products [15]. The military gets all the credit for the history of military drones since the 1800s. In the form of balloons,

torpedoes, and aerial targets, the military used UAVs for target practice, air strikes, bomb detection, surveillance, etc. The siege of Vienna in 1849 marked the first time balloons were used in an organized manner in warfare when 200 balloons were launched from an Austrian ship to force the Venetians to surrender. Drone - An unmanned aerial vehicle. An aircraft without a pilot on board whose flight is controlled either autonomously by the vehicle's computer or by remote control by a pilot on the ground. A.M.'s "Aerial Target" Lowe's in 1916 but the first production was a remotely piloted vehicle in 1935 by movie star Reginald Denny. The United States' UAV program began in 1959 when U.S. pilots began planning to use unmanned aircraft out of fear of losing their lives [16]. In 1964, highly classified UAVs were deployed for the Vietnam War. When photos of the destroyed drone were shown by Wide World Photo [18]. We have been using drones since 1964, and as the technology has improved the way we have used this new technology has improved [19]. The first pilotless vehicles were developed in Britain and the United States during World War I. Britain's aerial target, a small radio-controlled aircraft, was first tested in March 1917 while the American aerial torpedo known as the Kettering Bug made its first flight in

October 1918. In 1935 the British built several radio-controlled aircraft to be used as targets for training purposes [19]. The term 'drone' is thought to have come into use around this time, radio-controlled drones were also developed in the US and used for target practice and training. Drones now have many functions, from monitoring climate change to conducting search missions after natural disasters, photography, filming, and delivering goods. Use of Drones. The US military has significantly increased its use of drones for reconnaissance, surveillance, and target attack. Drones are mostly used for surveillance in areas and terrain where soldiers cannot safely go. But they are also used as weapons and are credited with killing suspected militants. In the modern era, drones have become quite common. More than 100,000 people in the United States have a drone pilot license. Unmanned aerial vehicles have been used in various capacities since the 1850s, making humans famous and reaching the pinnacle of modernity.



Figure: - 16 History of Drones

Application of Drone Technology

Drones are used in a variety of applications, initially; drones were used only by the military. Drones are unmanned aerial vehicles (UAVs) that make our lives easier than ever. They are used in situations where human flights are considered difficult and risky. Now it is used by many professionals and individuals. Drones are working in many fields and with continuous improvement in technology; these machines are going to become more powerful and useful in the future. Drones are working in many fields and with continuous improvement in technology; these machines are going to be more powerful and useful in the future.

Drones are a valuable addition to any industrial facility endeavor, enabling unlimited aerial perspectives. The potential for drones to create real value is endless. Industrial professionals are increasingly using drones to improve industrial processes. Drones are uniquely suited to capture aerial data for consistent use in large industrial facilities, enabling rapid and seamless data collection. Drones are capable of completing a wide range of applications. Automated drones can be used in oil and gas facilities for security, surveillance, emergency response, and infrastructure inspections. In seaports,

drones can perform applications such as mapping, surveying, operational surveillance, port monitoring, and traffic control. Let's discuss the importance of drone technology and the best use of drones.

1. Aerial Photography

The most common use of advanced camera-carrying drone units is to capture media coverage from remote locations, filming, aerial photography, site surveying, and 3D imaging. Only large news industries can afford helicopters. But today almost all small media houses and local journalists are capable of using drones to capture crystal clear air footage for impressive news coverage. Drones can easily move into tight areas due to their small size and are also used to record face-to-face interviews.

2. Agriculture

Drones are highly used in the field of agriculture and farming, the greatest achievement of drone technology as they are now able to serve farmers for many purposes. Agriculturalists believe that agriculture can benefit from drones in several ways. This sector is projected to be one of the largest areas of opportunity for commercial drones. Farmers can use drones to detect which crops are failing. Drone technology helps farmers save money and their crops by accurately monitoring and analyzing the performance of irrigation systems. Farmers can now expect quick updates of all information using drones and drones can help them spray fertilizers, pesticides, and water for crops at the right time.



Figure: - 17 Aerial Photography Drones



Figure: - 18 Agriculture Drones

3. Search and Rescue



Figure no.19 search and rescue drones

Drones are capable of locating lost/missing persons. Drones are equipped with thermal sensors so they are able to locate missing persons. They are also capable of operating in the dark and within challenging terrain. Drones are being successfully used for post-disaster relief operations, disaster, and natural disaster monitoring, and locating people in areas affected by fire, flood, or any other natural disaster. As well as emergency communication networks can be used to

assist. With the help of visual information, rescue workers can quickly track people in distress in real-time. Search and rescue operations have been suffering for a long time due to a lack of technology but now drones can make everything possible in minutes.

4. Shipping and Delivery

Delivery by drone is one of the fastest growing and most popular applications of drones. Advanced drone units are capable

of carrying heavy payloads. These drones are used for shipping and delivery applications. It is used for improved security and reliable delivery of products, enabling people to get their purchased products at their doorsteps on time. E-commerce giants like Amazon have already invested in Amazon Prime Air,

and drone technology and will launch the service once feasibility issues are resolved. You can now get your food order delivered to your place within minutes through it. These drones can deliver goods to your doorstep, with various companies experimenting with launching services that don't even require you to leave your home.



Figure:- 20 Shipping and Delivery Drones

5. Science and Research



Figure:- 21 science And Research Drones

One of the essential features of drones is their maneuverability. They may look small in size but have impressive capabilities. Compared to traditional aircraft, drones have reduced environmental impact and provide extremely quiet operation. Drones are deployed in various science and research applications such as methane leak detection, pipeline installation monitoring, geophysical survey, archaeological and meteorological research, glacier monitoring, iceberg monitoring, plant species identification, forest management, and more. Space is no longer a problem for drones and hence they can travel to inaccessible places.

6. Drones And Engineering Applications

Most engineering firms are using drone technology these days; engineering firms can make good use of drones. Drones are needed to monitor their in-depth projects such as transmission, oil pipelines, and maintenance inspections. Also,

engineering firms are involved in several commercial projects. Drones can help engineers in complex operations like airport planning, road construction planning, etc. to increase efficiency manifold.

7. Military Drone Technology

Perhaps the oldest, most controversial and well-known use of drones is in the military. The use of drones became the primary use in the military world. The British and us militaries began using very early forms of drones in the early 1940s to spy on the Axis powers. Drones are used as targets for combat missions, research and development, and surveillance, drones have become part of militaries worldwide. Today's drones are far more advanced than the UAVs of the past, equipped with thermal imaging, laser range finders, and even air strike equipment. Unmanned aerial vehicles are applied in various military operations to reduce casualties and enable mission execution.



Figure:- 22 Engineering Application Drones



Figure: - 23 Military Drones

8. Weather forecast



Figure:-24 Weather Forecast Drones

Drone technology has also become very important for monitoring and preserving the environment around us. Natural disasters can send advance data about disasters like tornadoes, hurricanes, etc. It can help meteorologists to know detailed weather parameters. Drones with thermal sensors and gyroscopes provide insight into weather patterns. Drones have sharpened our intuition, which is why we can use drones for conservation efforts, such as habitat management, migration

tracking, conservation efforts, flood assessment, etc.

9. Entertainment

The entertainment industry has often played a leading role in the development of drone technology. Unmanned aerial vehicles (UAVs) are the latest technology that the entertainment industry is tackling. Since the inception of the film industry, storytellers, screenwriters, and producers have always looked for ways to make movies more enjoyable. With the high-



Figure:- 25 Entertainment Drones

Resolution camera, the drone can easily capture the aerial view of cricket and football matches and also helps the drone to see distant objects. Cinematographers use such drones to capture still-life and aerial shots. Nowadays, drone pilots manage to capture dramatic and cinematic scenes that were unimaginable in the film industry years ago.

CONCLUSION

The importance of drone technology is quite clear from the above discussion. Drones have found many applications in various sectors. They have become increasingly popular due to their compact size and extensive capabilities. With more weight capacity, powerful and advanced technology, longer flight duration, and maneuverability, drones could be much more effective in the future than they are now. From agriculture and construction to public safety, security, waste management, sanitation, traffic monitoring, etc., drones

have huge scope. Therefore, governments and businesses should build the necessary infrastructure and use drones with advanced capabilities to improve businesses.

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