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Unmanned Aerial Vehicle (Uav) Future Domestic Aviation of Drones

K. Vamshee Krishna[1],
[1]Department of Computer Science and Engineering,
[1]Samskruti College of Engineering and Technology,
JNTUH, Hyderabad.

Abstract:
The drones will take a major role in the connected smart cities of the future. They will be delivering goods and merchandise, serving as mobile hot spots for broadband wireless access, and maintaining surveillance and security of smart cities. However, common use of drones for future impertinent cities also brings together distinct technical and societal involvements and challenges that need to be addressed, including in the areas of cyber security, privacy, and public safety. Drones, while can be used for the betterment of the society, can also be used by malicious entities to conduct physical and cyber attacks, and threaten the society. The goal of this survey paper is to review various aspects of drone's in future smart cities, relating to cyber security, privacy, and public safety. We will also provide representative results on cyber attacks using drones.

INTRODUCTION

Say the word ''aircraft,'' and most people will envision an airplane or a helicopter with an onboard human pilot. But we are rapidly moving toward a future in which a majority of aircraft will be unmanned. ''Drones,'' or more formally, unmanned aircraft systems (UAS) are poised to revolutionize the domestic1 aviation landscape, raising complex questions regarding privacy, property rights, and airspace safety.UAS have been around for a very long time. In fact, the earliest work on unmanned aircraft predates the Wright Brothers' 1903 demonstration of sustained, powered, heavier-than-air flight. In the mid-1800s, for instance, there were several successful flights of steam-powered unmanned helicopters.In the decades following the Wright Brothers' first flight, both manned and unmanned aircraft grew increasingly sophisticated. In the years preceding and during World War II, military airplanes were sometimes refitted to allow them to be flown remotely for use in target practice during training. In the second half of the 20th century, countries including the United States, the Soviet Union and then Russia, France, and Japan developed unmanned aircraft for use in military reconnaissance applications. Unmanned aviation, in short, has always been a part of the aviation story.

However, over approximately the last decade a confluence of multiple rapidly maturing technologies has spurred a dramatic increase in the pace of innovation in unmanned aircraft design and use. Imaging systems developed to meet the enormous global demand for digital cameras, smart phones, and tablet computers are also well suited for use on unmanned aircraft. Integrated circuit advances have made it possible to build small, lower power chips allowing sophisticated onboard processing of high-resolution, high-frame-rate video. Advances in wireless communication and networking are making it easier than ever before to deliver real-time information from an unmanned aircraft located 50 mV or 5000 km V away from its operator. Improved airframe design and flight control methods have enabled the construction of smaller, more capable unmanned aircraft, some of which can perform highly complex maneuvers.

Today's unmanned aircraft are amazingly diverse. There are jet powered UAS that are the size of small business jets and have a range of thousands of kilometers. Video capable hobbyist ''quad copters'' costing only a few hundred dollars and weighing under a kilogram are now widely available in the consumer market. Under funding from the Agency (DARPA), California-based AeroVironment built the videocapableNano Hummingbird, which weighs less than 20 g [6]. In 2013, a team of researchers at Harvard University reported the successful flight demonstration of the RoboBee, a robotic insect weighing 80 mg (less than one three-hundredth of an ounce), and powered by electricity delivered through a thin wire attached to an

External power source [5]. In the future, advances in ultra light batteries will allow insect-like UAS to fly without needing to be tethered to a power supply.
The domestic applications for UAS are as diverse as the platforms themselves. UAS can be used for search and rescue, news reporting, crop spraying, air quality monitoring, after-the-fact crime scene investigation, surveying, disaster response, wildlife tracking, research into the dynamics of violent storms, spotting wildfires, filmmaking, and traffic monitoring. The UAS industry is large, global, and rapidly growing, with significant research and development now ongoing in dozens of countries including Australia, Brazil, Canada, China, France, Germany, India, Iran, Israel, Japan, Pakistan, Russia, Turkey, the United Kingdom, and the United States.Aviation regulations around the world are also being updated to prepare for the era in which skies are increasingly shared by both manned and unmanned aircraft. In the United States, under the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012 (FMRA), national, state, and local government agencies have had access since 2012 to expedited licenses for certain smaller (no more than 25 lb) UAS, which must be operated less than 400 ft above the ground, within the line of sight of the operator, and during daylight [4]. More comprehensive regulations for government operated UAS are due by the end of 2015. In addition, while commercial UAS use is currently prohibited in the United States, in late 2013, the FAA released a five-year roadmap [3] addressing the integration of ‘‘civil’’ UAS into the national airspace system. Other countries are also working to update their aviation regulations to address unmanned aircraft, and in some cases are already permitting commercial UAS use. In Japan, agricultural spraying is commonly performed using unmanned helicopters. In Australia, some types of commercial UAS operations have been allowed for over a decade.

Full HD Quality

Technology has improved, drones are still able to shoot in full High Definition and create incredible aerial videos, 4k and higher without sacrificing any quality. In fact, there are more and more gimbals (professional 3-axis stabilization systems) Coming onto the market to accommodate the wide variety of cameras. This allows aerial to swap out the type of camera they wish to use, depending on the type of footage one is looking to capture.

UAV (Drone) Types & Advantages

1) Types of Drones

i. Multi-Rotor

We want to get a small camera in the air for a less period of time, and then it is hard to argue with a multi-rotor. They are the easiest and cheapest option for getting an ‘eye in the sky’, and because they give you such great control over position and framing they are perfect for aerial photography work. The technology is evolving all the time, multi-rotors are efficiently very ineffective and require a lot of energy just to fight gravity and keep them in the air. With current battery technology they are limited to around 20 to 30 minutes when carrying a lightweight camera payload.

ii. Fixed-Wing

Fixed-wing drones use a wing like a normal aeroplane to provide the lift rather than vertical lift rotors. Because of this they only need to use energy to move forward, not hold themselves up in the air, so are much more efficient. For this reason they are able to cover longer distances, map much larger areas, and wait for long times monitoring their point of interest. In addition to the greater effectiveness, it is also possible to use gas engines as their power source, and with the greater energy density of fuel many fixed-wing UAVs can stay aloft for 16 hours or more.

iii. Single-Rotor Helicopter

The single-rotor helicopter has the aid of much greater efficiency over a multi-rotor, and also that they can be

Powered by a gas motor for even longer staying power. It is a general rule of aerodynamics that the larger the rotor blade is and the slower it spins, the more efficient it is. This is why a quad-copter is more efficient than an octo-copter, and special long-endurance quads have a large prop diameter. A single-rotor helicopter allows for very long blades which are more like a spinning wing than a propeller, giving great efficiency.

iv. Fixed-Wing Hybrid VTOL

Fixed Wing Hybrid are various types under growth, some of which are essentially just existing fixed-wing designs with vertical lift motors bolted on. And another one is 'tail sitter' aircraft which look like a regular plane but rest on their tails on the ground, pointing straight up for takeoff before pitching over to fly generally, where the rotors or even the whole wing with propellers attached can rotate from pointing upwards for takeoff to pointing horizontally for forward flight.

Advantages

Drones sales are on the rise with each passing year and more and more people are embracing the idea of owning such devices. Through all the attention, these UAV's are now finding more practical and innovative drone use.

There are some very basic uses while there are also some really creative ideas that you could make use of. Let us find out how we can put these drones to work.

1. VERSATILITY

The drones are very flexible and easy to use and mange, due to their size, unlike manned aircraft, drones are able to fly into areas that were once not possible**.** Drones can fly from only a small number of centimeters of the ground to 400 feet in the air as one long continuous shot, whilst panning and framing a chosen subject. UAVs can fly from inside a room and out through a window or door, giving the aerial film makers a very unique shot. In addition, they can rotate on the same spot, move left, right up or down, all at the touch of the pilot's command, whilst giving the camera operator total autonomy to position the camera to frame the perfect shot.

2. MILITARY USES OF DRONES

The Drones have a number of applications in the military and defense world. This is particularly true in the case of the defense of the United States of America. In fact, the US Government was first known to start its experiments with the unmanned aerial vehicles way back in 1917.

BOMB DETECTION

The Bomb detection is major issue in present situation small size of the drones, they can usually penetrate into constricted spaces. Attach to that, efficient cameras and this makes the drones suitable for purposes of bomb detection. The aerial vehicles are apt for making us aware of unexploded bombs and save lives.

SURVEILLANCE

The defense of any country usually tends to conduct regular surveys in order to ensure protection of the people and the place.
This reduces physical labor and you get a wider field of view. This also does not hamper the normal lives of the people making it easier for them.

AIR STRIKES

These unmanned aerial vehicles are also used for the purpose of air strikes. It had once been confirmed by President Obama that they used drones regularly to attack militants in the tribal areas of Pakistan. They float around suspected areas, as controlled by the defense personnel and they can be operated in particular areas in order to fulfill military operations. For much more information on this topic, we suggest checking out our article about law enforcement drones.

FILMING AND JOURNALISM

The media conquered the idea of using drones to their fullest extent. A lot of movies these days are shot using quad copters and other drones.The idea has known the movie industry a completely new look and some of the names that come up when we talk about filmography with drones are James Bond's Sky fall, the well-acclaimed Leonard Di Caprio's The Wolf of Wall Street, the evergreen Harry Potter and the Chamber of Secrets, the popular television series Game of Thrones and the likes.

Above and beyond, the capability of the drones to reach places where reporters cannot reach has heightened their use in the world of journalism. The most advantage is Live broadcast is becoming increasingly useful these days by using Aerial footage, and you can get much more familiar with this topic by reading our article about the best drones for filming.

SHIPPING AND DELIVERY

The shipping and Delivery is very useful in now a days. The idea could be revolutionary for the world. This could extensively improve delivery times and reduce human labor. Be it delivering pizzas, letters, or even small parcels, these programmed drones could do the work for us.

In fact, Amazon is working on its resources to facilitate 30-minute delivery services by means of drones. If this is brought to completion, more than half of your shopping and food orders could be done within a span of a few minutes, with drones delivering your packages at your doorstep. You can find out much more about these types of drones by reading our article about delivery drones.

DISASTER MANAGEMENT

One of the most significant applications for these unmanned vehicles lies in disaster organization. It is often seen that there is utter chaos and mismanagement of resources soon after a disaster, be it a man-made or a natural calamity. Drones could help you significantly here.

Drones having commanding cameras, these devices could collect information and pictures of the debris working in a specific area. You would get clearer footages of the accident site without having to spend a lot of money on helicopters. Add to that, owing to their small size, they are able to penetrate into places that would otherwise be difficult for helicopters to enter and provide close-up views.

RESCUE OPERATIONS AND HEALTHCARE

Usually, a rescue operation is a fight against time. You need to get the work done fast and smoothly. This is where drones come in handy. Using of thermal sensors, drones can locate lost persons or any creature and are especially useful at night or even in challenging terrains.

UAVs can be deployed quickly and can travel through small spaces. In addition, these vehicles are also useful For sending in food or medical supplies to unreachable locations before the rescue team comes in to help. Hence, drones can be the first to arrive and gather information for rescue operations.

ARCHEOLOGICAL SURVEYS

Over the years, a lot of people have spent a lot of time and energy over archeological surveys. At the present, drones have made this job easier since they can bring us important footage and essential details about these archeological sites.

Unmanned Aerial Vehicles are significantly helped the archeologists to find ancient history in their mission of discovery.

GEOGRAPHIC MAPPING

Drones also have had an enormous effect in the field of 3D geographic mapping. There are regions on the earth that are not easily accessible to humans. This might include some dangerous coastlines or unattainable mountain tops. It is main for the purpose of studying the environment and preparing 3D maps, drones have been put to use.

This Drone technology is now very useful and its available to everyone to capture images for mapping these locations. Thus, geologists now find it easier to collect data from these sites to pursue mapping processes.

SAFETY INSPECTIONS

Some companies need to carry out regular inspections in order to ensure safety of their infrastructure. This includes surveying power lines, oil and gas pipelines, wind turbines, bridges and buildings under construction and the likes. Drones are being put to use for these purposes.

Regular aerial monitoring can lead to significant improvements in constructing infrastructure leading to improved performances. In addition, if the UAVs are small enough, they can get close to capturing images that can give us a more detailed idea of the construction.

AGRICULTURE

Drones have also found applications in the field of cultivation. This is particularly true for large scale farmers who have reported significant improvements in crop yields with the use of these drones. In Agricultural regular aerial monitoring of farming lands can provide us with a more in depth analysis of crop performance.

WILDLIFE MONITORING

The drones are functioning on agricultural lands to develop their yields; these unmanned aerial vehicles are

also striving towards monitoring the fauna of the regions.

There are two specific advantages of this. Initially, wildlife monitoring could lead to the avoidance of poaching, which is one of the reasons why a lot of animals are getting endangered these days. Secondly, the footage from the aerial devices could help us study animal behavior and analyze their patterns. The finest thing concerning using drones for these services is that they do not affect or disturb wildlife. In addition, they can also be used at night with thermal camera sensors to monitor them at all times. A lot of wildlife sanctuaries and protection parks are thus resorting to drones to ensure safety.

WEATHER FORECASTING

The main significant use of drones lies in weather conditions forecasting. This has, once again, given new light to the concept of predicting the weather conditions. With exceptional cameras and efficient sensors, these drones can collect important information that could aid in weather forecasts.

Such as, sending drones into the hurricanes, tornadoes and the likes could bring us essential footages to study their patterns and occurrences. These can find detailed weather parameters and are also apt for the job owing to their unmanned nature.

UNIQUE AND CREATIVE USES OF DRONES

So far, we have discussed the essential and practical applications of drones. Now focus on some of the most innovative uses that could change the way we look at drones. Here are some ideas.

THE DRONE SELFIE OR THE DRONIE

The selfie is the most popular word in the decade now with more and more people engaging into this. By using selfie sticks doing the rounds now, it would be a rather great idea to use a drone for this purpose. This is certainly one of the greatest uses of a drone. This would mean a lot more people could fit into the picture and you would get a real aerial view. Besides, you could control the camera functions right from the base. This could well work as the longest distance selfie.

DRONE RACING

This is another popular activity that is making its way into our lives. A lot more people are now engaging into this sport and pursuing it as a hobby. It is like video game racing except that you encounter real situations and you are controlling a real **drone**.

Drone racing in the forest is not an rare activity. Besides, it can closely resemble real bike racing with a lot more excitement since you would be controlling the device from a distance. For this purpose, you would need an agile drone that can make speedy turns and acrobatic

Movements.

THE BENEFITS OF CIVILIAN UNMANNED AVIATION

It is important to acknowledge and address the legitimate challenges that will accompany the growth of domestic unmanned aviation, including privacy and airspace safety. But it is also important not to let those challenges mask the many benefits that unmanned aviation will provide. In the coming years, unmanned aircraft will help save lives after natural disasters.
They will help search-and-rescue teams find lost hikers and allow police forces that cannot afford manned helicopters to obtain vital, potentially lifesaving overhead imagery during hostage standoffs. When used safely and in a manner respecting privacy, domestic UAS can become important tools for private citizens, firefighters, scientists, news reporters, filmmakers, and others to more effectively observe the world around them. More broadly, the 21st century will, in many ways, be the century of robotics, and unmanned aircraft will be an important part of that story

CONCLUSION

A nation by nation evaluation of drone laws and regulations reveals conservatism among lawmakers globally as technology for large, winged aircraft advances, so does the technology for smaller, agile reconnaissance UAVs. Such as the Black Widow and the nano-hummingbird. These are the pioneers in micro-aviation, where these drones will conduct reconnaissance that would be otherwise impossible for manned missions.This evidence proves that drones, with many advances made and many more being made in the future, are more effective than the military manned counterparts. UAVs have found a number of applications in different sectors. They are no longer restricted to just military uses and different businesses are now investing in these devices for a swifter and more approachable customer service, especially in the case of parcel deliveries. Small scale tricopters and quad copters are still used for flying indoors and also outdoors just for gaining some flight experience.Drone racing has turn into rather popular now, but drones are still used as a toy. Drones have the ability and potential to change the way sports, military operations, and businesses work, Infrastructure maintenance, streamline Agriculture Management, Protecting Wildlife, Advertising, and Inventory
Management.

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Author Profile

Mr. K Vamshee Krishna
Asst. Professor ,M-Tech,
Samskruti College of Engineering and Technology,
Ghatkesar.
vamshik825@gmail.com