First Person View Drone - FPV

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Abstract– First Person View Drones or FPV drones allow the user to get a visual perspective other than the one the user normally has. They have great potential in many different areas such as in: military applications, cinematography, firefighting, and so much more. In FPV drone technology, the user can wear special goggles to see through the drone's point of view via it's attached camera. Thus, in certain configurations, a user can control a drone and see through its eyes for up to 10 kilometers away, and even be able to record the video footage for future reference. Furthermore, FPV drone could also be used to help disabled individuals by extending their visual reach to locations they cannot reach physically. FPV drone are typically controlled using a Motion Controller. The Motion Controller allows the user to control the FPV drone and maneuver it based on natural hand motion.

This paper is a demonstration paper for the FPV technology and its applications in human lives.

Keywords-- Drones, Motion, - Controller, FPV Goggles, Advanced Military Technologies.

I. INTRODUCTION

Engineers are always looking for ways to save human lives, and/or improving the quality of life via time inventing new technologies. Many human lives can be saved by implementing certain technologies and inventions that replace humans in dangerous or far to reach areas. Drones are a perfect example of a technology that can potentially shape the future of our lives. The FPV Drone is the newest innovation in the drone Industry, allowing the user to see through the drone's eyes using FPV Goggles. They can be lifesaving in Military Applications for example. Also, they are very useful and, time saving in Cinematography.

II. HISTORY OF DRONES

Drones, which were originally designed for military use, have seen fast growth and advancements and have made their way into consumer gadgets. Originally, they were used as weapons, in the form of remotely-guided aerial missile launchers. But they evolved over the years for so much more. Drones, have a wide range of civilian applications nowadays, particularly in the form of small quadcopters and octocopters. Drones are being utilized for a variety of purposes, including climate monitoring, transporting goods, assisting in search and rescue efforts, and filmmaking and photography.

Unmanned aerial vehicles (UAVs) are, of course, becoming a more vital part of the military in many countries. In comparison to just a few decades ago, the USA armed forces now operate a fleet of tens of thousands of drones. According to the FAA, 1.1 million drones were registered in the United States in 2019. [1]

Drones are known to have originated in 1849, when Austria assaulted Venice using unmanned balloons laden with explosives. Around 200 of these incendiary balloons were launched over Venice by Austrian forces besieging the city at the time.
Bombs weighing between 11 and 14 kg were carried by each balloon. These bombs were dropped from their carrier balloons once they were in position, wreaking havoc on the city below. Only one bomb hit its intended target, fortunately for the Venetians, while the majority of the balloons were blown off course due to a rapid change in wind direction. The deployment of balloons, as revolutionary as this event was in the area of military technology, does not fully satisfy the current notion of drones, but its historical reference is still of interest.[2]

This leads us to believe the basic concept of drones was studied by military experts almost 170 years ago.

More recent technology is the quadcopter which is a prevalent drone technology of many modern commercial drones. In 1907, brothers Jacques and Louis Breguet invented an early version of this technology with their gyroplane, a predecessor of the helicopter, with the help of French physiologist Professor Charles Richet. [3]

The quadcopter's design was revolutionary at the time. It was the first vertical-flight aircraft to reach a height of 0.6 meters, despite being the first to do it without a pilot. It wasn't a free flight, either, because four guys were required to keep the construction stable. However, it did demonstrate that the notion of a quadcopter could be used for flight; all that is needed now is additional technological advancement.

Again, unlike the incendiary balloon used by the Austrian army more than 170 years ago, this was not a drone in the traditional sense. [4]

III. TERMINOLOGY

When it comes to drones, one of the most crucial considerations is nomenclature. The term "drone" usually refers to an aircraft that does not have a pilot on board and is instead controlled by a ground control system or can fly autonomously to some extent. Drones are referred to by a variety of terms in the literature and in practice. In this section, we'll go through some of the most commonly used terms and how they're utilized.

Drones

Drone is the term used by the media and, as a result, is the most well-known among the general public. A male bee is referred to as a drone in English. The word drone is also extensively used in other languages such as French, German, Italian, Spanish, Russian, and Dutch, but it is occasionally spelt slightly differently (Drohne in German, dron in Spanish, дрон in Russian). Drones were first utilized in military purposes, and for many people, the name still has a military connotation. According to Clarke (2014), the term "drone" was originally used by the USA Navy in 1935.

This military connotation is gradually fading, and drones are becoming more associated with civil drones used closer to home. As a result, the image of a drone is progressively moving from a military unmanned plane flying above Afghanistan to a miniature helicopter, usually equipped with a camera, that is operated remotely via a smartphone. Unmanned airplanes and helicopters are included in the term drone, however unmanned balloons, unmanned flying platforms, rockets, and unmanned jetpacks are usually excluded. The term "drone" does not appear in any statute.

UAV and UAS

Aside from the term drone, the phrases Unmanned Aerial Vehicle (UAV) and Unmanned Aerial System are frequently used. The word UAV refers to the flying platform (and any cargo it may carry), whereas UAS is a broader phrase that refers to both the flying platform and the base station that controls it. These more descriptive names are commonly used in the United States of America and other English-speaking countries, as well as in a few other countries. In practice, the phrases unmanned aerial vehicle (UAV) and unmanned aerial system (UAS) refer to the same aircraft as the term drone (i.e., unmanned airplanes and helicopters, but not, for instance, rockets and jetpacks). The phrases unmanned aerial vehicle (UAV) and unmanned aerial system (UAS) are usually used in legal papers.

These terminologies are less well-known among the general population, particularly when abbreviations are used.
These terms are used by professional drone users, and they are used interchangeably with the term drone.

Some believe that the phrases UAV and UAS have a weaker military connotation than the term drone, while others believe that the abbreviations UAV and UAS have a stronger military (euphemistic) meaning.[5]

IV. DRONE COMPONENTS

The FPV drone can be controlled with a traditional remote controller or with a Motion Controller. A Motion Controller allows they user to maneuver the drone using hand gestures which is easy and convenient. The FPV Goggles is a also used for the FPV Drone. It's the defining factor for the FPV Drone. It connects to the drone's camera so that the camera user can have full vision of the drone's camera.

Fig.1 FPV Drone.

Fig.2 Man wearing FPV Goggles.

A 4K – pixel camera can be used in the drone for maximum quality and clarity. A 120 degrees Field of View is also a recommended specification for the camera to feel more dramatic and alive.[6]

When connected to the internet, the FPV drone could be use to stream any content seen by its camera. This can be a helpful addition to multiple applications including several notable military applications. This can be done by adding a WIFI module to the drone.

There are also several storage options when it comes to a drone. The most notable option is a microSD card which can be attached to the drone in order to store recorded footage.
In such cases, the drone should also have multiple USB ports in order to transfer footage easily to a computer.
An obstacle avoiding sensor is also a helpful addition to the FPV drone. This ensures safety for the drone from any possible obstacles. If included, the drone can avoid obstacles automatically without user intervention.

A GPS module can be added to the FPV drone which helps it mark locations when ever it goes. This also allows it to return to the starting point automatically with only a press of a button.
It can also be used to send the drone to a particular target destination.

There is so much room for additional functions on the FPV drone which makes it a true innovation.

V. Drone Applications

In today's world, the military use of drones has become the norm. Drones have long been a feature of military forces around the world, serving as target decoys, combat operations, research and development, and surveillance. The global military drone industry is expected to reach $23.78 billion by 2027, according to research from Globe Newswire.[7]. Military funding is also more likely to be in larger amounts, as a single USA Predator drone costs around $4 million.[8]. Despite their cost, and due to their high convenience in decreasing losses and facilitating the execution of high-profile and time-sensitive missions, drones or unmanned aerial vehicles will continue to be used in various military operations.[9]. FPV Drones can be a very useful weapon in Military Applications, as the operator can fly and see through the drone's eyes will provide more accuracy of reconnaissance and scouting applications.

Commercial drone use is gaining traction and has become more common, with a variety of sectors using drones into their day-to-day operations. The drone services market is predicted to increase from $4.4 billion in 2018 to $63.6 billion in 2025, with Insider Intelligence forecasting 29 million consumer drone shipments by the end of 2021.[10] Although the commercial drone business is still in its early stages, it has seen some significant investment from industrial conglomerates, semiconductor companies, Information Technology consulting firms, and big defense contractors. For the time being, the industry leaders are a small group of early-stage manufacturers in Europe, Asia, and the United States of America.

The authors argue that if the FPV Drone is manufactured locally, it could provide a valuable source of national income, especially when marketed to other countries that uses them in all sorts of applications.

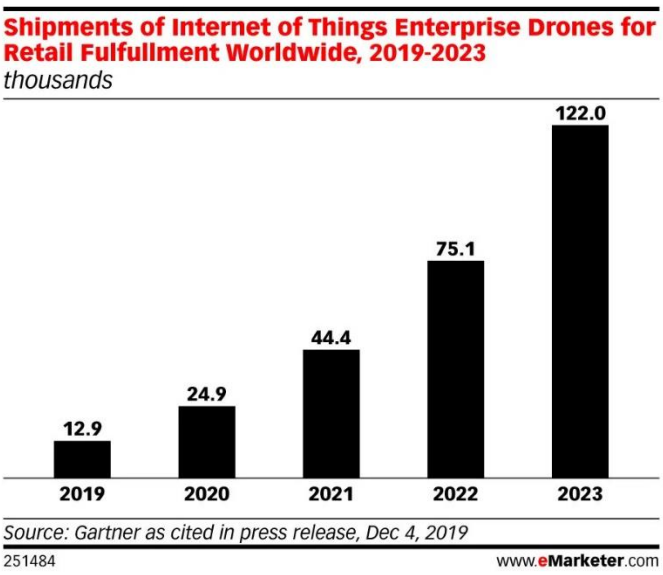

Fig.3 Drone shipments continue increasing worldwide.

In our local market, the FPV Drone can be used in various tourism activities, for example tourists can use it to be able to fly around the Pyramids
and explore the beauty of Luxor, and so on..

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