

Summarize of the Development of UAV

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Abstract: An unmanned aerial vehicle is an unmanned aerial vehicle that, compared to a piloted aircraft, does not require a pilot to fly, and is therefore also called an unmanned aerial vehicle. UAVs have a wide range of applications in both military and civilian fields. In the military field, UAVs are capable of performing a variety of missions such as reconnaissance, surveillance, target location. This article will analyze the current application of unmanned aerial vehicles in military and civilian fields from the development history and current situation of unmanned aerial vehicles, and prospect its future development trend.

Keywords: UAV; Military Fields; Civilian Fields; Future Development.

1. Literature Review

An unmanned aerial vehicle (UAV) is a new type of unmanned aerial vehicle that differs from an organism in technology, structure, performance, and use. Drones work the same way fixed wing vehicles do, relying on buoyancy and gravity on the wings to drive the vehicle. However, the wings used by unmanned aircraft have no lift and rely on a lifting surface on the wingtips to provide lift, then use aerodynamic propulsion. Drones typically consist of a main wing, horizontal tail, vertical tail, and rudder. The main wing consists of a wing, a vertical tail, and a vertical tail, in which the transverse and vertical tail are set on the left and right sides of the fuselage and aerodynamic surfaces are set on the leading and trailing edges of the main wing. Currently, unmanned aerial vehicles mainly rely on attitude control of the vehicle, and also have GPS, inertial navigation and other functions. [1]

1.1. Research on UAVs

At present, domestic and foreign studies of UAVs are focused on this aspect.

1) In addition, some papers will study the UAV and control algorithm, particle swarm optimization algorithm, UAV autonomous navigation and collision avoidance algorithm.

2) The overall design of the UAV system, including the overall scheme design, navigation, control and flight control.

3) Flight quality control of UAVs, including route planning, obstacle avoidance, etc.

4) Load and load control of unmanned aerial vehicles, including load weight calculation and load distribution optimization.

5) Including the route determination technology of UAVs and autonomous flight algorithms, including autonomous hover, autonomous flight, autonomous landing, etc., which has been studied by domestic and foreign scholars.[2]

1.2. The Evolution of UAVs

There are three stages in the development of UAVs.

The development of UAVs spanned nearly 60 years. The early exploration of UAVs began in the United States in the early 1950s, when American aerospace or electronic technology was relatively backward. It is believed that the UAV should be controlled by the ground control station, the UAV can not fly remotely, the U. S. military held a wait-and-

see attitude.

In the 1950s, the US military launched a series of unmanned aerial vehicle development programs. However, due to the limitations of military aviation technology and the US government's restrictions on the export of military technology to other countries, the possibility of mass production of unmanned aerial vehicles is not available.

In 1982, the Persian Gulf War succeeded in reconnaissance and guidance with drones. Unmanned aerial vehicles have been rapidly developed and popularized under multinational deployment. The U. S. National Defense Commission, which is expected to complete its ongoing Tactical Reconnaissance and Logistics Surveillance Program in 1989, forms an advanced high-level tactical reconnaissance system. From August 1982 to February 1985, the U. S. War Lab program carried more than 3000 drones and assigned ground test equipment. In 1986, a new unmanned reconnaissance system was born in the U.S. Army.[3]

Stage development of UAVs (from the 1990s): After the 1990s, with the rapid development of stealth technology, computer technology and civil aviation industry, UAVs have really entered a new period of rapid development. The United States and Western countries have developed various forms of unmanned aerial vehicles and the success of the test flight models.[4]

1.3. Types and Characteristics of UAV

According to its operation mode, it can be divided into two kinds: one is automatic manipulation, the other is manual manipulation. According to its characteristics, it can be divided into autonomous type and non-autonomous type. Most unmanned aerial vehicles are fully autonomous, and most of their control is achieved through ground receiving stations; however, in practical applications, unmanned aerial vehicles are usually composed of onboard sensors, flight controllers and workloads.

Human-machine aircraft is a kind of aircraft with autonomous control function, which can accomplish reconnaissance, surveillance, communication relay and fire support. According to the operation mode, it can be divided into complete operation and half operation. Fully maneuverable unmanned aerial vehicles usually communicate with the ground, and semi-controlled unmanned aerial vehicles usually communicate with the aircraft.

According to the different targets, it can be divided into reconnaissance type, electronic type, fire support type, attack type, weather observation type.

Unmanned aerial vehicles can be divided into light unmanned aerial vehicles and heavy unmanned aerial vehicles according to their duration and load capacity. It is suitable for battlefield reconnaissance and reconnaissance mission because of its fast flying speed and light weight, while large unmanned aircraft is suitable for ground attack and reconnaissance.

UAV can be divided into "tactics" and "strategy" according to its use purposes: "tactics" and "unmanned flight" refer to the functions of "reconnaissance" and "reconnaissance", which are mainly used for "ground-to-ground", "ground-to-ground" and "ground-to-air" targets; as a new type of military aircraft, UAV can carry a variety of high-precision missiles with ground-to-air and air-to-ground targets as its main purposes.

According to its structural characteristics, it can be divided into two categories: stationary wing (UAV) and rotary wing (WR). Fixed-wing aircraft is characterized by stable flight and low noise, and rotary-wing aircraft has become a research focus due to its high speed and high control accuracy. According to its structure, it can be divided into two types: static wing aircraft, which is low in altitude, slow in speed and easy to be detected.

1.4. Key Technologies in UAV

The main technologies for pilotless aircraft are:

1.4.1. Sensor Technology.

All kinds of sensors carried by UAVs are the important basis for carrying out all kinds of detection, identification, tracking and measurement. At present, the main sensor technologies under the unmanned environment include active phased array, infrared, SAR and laser ranging.

1.4.2. Communication Technology

Airborne communication devices include wire communication, wireless communication and satellite communication.

1.4.3. Positioning and Navigation System.

The navigation and positioning system of UAV is the key to ensure its autonomous flight and efficient control.

1.4.4. Energy Technology.

The power system of UAV is the key to its success, and its driving technology and energy technology are the key to its development.

1.4.5. Manipulation Skills

In unmanned aerial vehicles, the control system is the key to ensure the autonomous flight and efficient control of unmanned aerial vehicles. [5-6]

2. Future Development of UAVs

Unmanned aerial vehicles are an important part of modern warfare.

One is wisdom. With the development of artificial intelligence technology, future UAVs will be more intelligent. It can not only independently complete the designated work, but also can accurately control its course and altitude. For example, U. S. forces used "smart glasses" in a series of battles to direct drones from Afghanistan to fight the Taliban. The US military has also developed an unmanned combat

system (UCAS) to monitor the battlefield and send real-time images to commanders via data links.

The second feature is low cost. As the demand for unmanned combat becomes more demanding, unmanned aerial vehicles will become cheaper. Because most unmanned aerial vehicles are based on private technology, they are much cheaper than pilots. In addition, with the rapid development of artificial intelligence, the future of unmanned aerial vehicles on artificial intelligence increasingly demanding, is expected to achieve the future of autonomous flight, combat capability. In future wars, unmanned combat is an inevitable direction of development.

The third is drones. At present, UAV is mainly used in cooperation with UAV, one of which is responsible for UAV scheduling and attack, the other for UAV reconnaissance, surveillance and capture. Compared with piloted aircraft, UAVs are possible because of their low operating cost and high maneuverability. However, the number of UAVs currently in use in the field is small and will take time to become fully widespread.

The fourth characteristic is modularity. This is also the trend of future development. For example, with the rapid development of artificial intelligence technology and various communication and information technologies, the military informatization level has achieved leapfrog development. In order to meet the diverse needs of future wars, it is necessary to design to a higher degree of standard and to prepare for future wars. It is even possible to say that UAVs can exert more powerful operational efficiency in order to achieve operational capability, based on some kind of in-depth demand response that the battlefield needs "fewer people" on the battlefield.

3. Conclusion

As a new industry, UAV is still in its initial phase. Because UAV is complicated, technically demanding and demanding, it needs a lot of research and development. UAVs will not be able to develop unless they are backed up by scientific and technological advances. Currently, we have made a lot of achievements in UAV domain, but there are still a lot of problems in the technical aspects as compared with the advanced countries. So, it is necessary to enhance the science and technology of UAV, so that UAV can satisfy the demand of customers.

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