

The Effect of UAV Technology Development on Nuclear Security

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1、 Introduction

(1) 、 Definition

Unmanned aerial vehicles (UAVs) are **pilotless aircraft**, equipped with remote control equipment and automatic control device, can accomplish complicated flight, loading and other tasks under unmanned driving conditions.

It is called an aerial robot, originally, mainly used for military purposes.





1、 Introduction

(2) 、 Origin

UAVs were first widely used during wars, and their functions were to detect enemy deployments, and by colliding them, they could destroy enemy targets and avoid the pilot casualties.

With the rapid development of science and technology, UAV technology continues to improve, the key technology of flight control, navigation, power and data chain communication is becoming mature, manufacturing cost and technical difficulties are reduced, and from the military field to the civilian field, its application is being extended.



1、 Introduction

(2) 、 Characteristic

- no pilot, do not need to consider the safety of people, physical endurance and physical limitations;
- it can execute the task characterized by dull, dangerous, pollution
- it has the advantages of flexibility, small size, light weight, wide use, low cost, strong viability, convenient transportation and portability, etc..



2、 Development and Application

(1)、 Composition

- aircraft
- flight control systems
- ground control systems
- mission equipment
- power systems



2、 Development and Application

Aircraft:

The aircraft refers to the flight body of UAV



2、 Development and Application

Flight Control Systems :

- central computer
- flight control sensor (including the height / speed sensor and attitude sensor)
- Servo actuator (the actuator that changes the control order to the valve action of an engine)
- navigation locator (including inertial navigation equipment satellite positioning, sensor, inertial / Satellite positioning etc.)
- communication system



2、 Development and Application

Ground Control Systems :

- mission planning
- aircraft condition monitoring
- aircraft and mission equipment control
- information processing



2、 Development and Application

Mission Equipment :

- camera
- video camera
- thermal infrared imager
- opto-electronic reconnaissance platforms
- synthetic aperture radar (SAR)
-



2、 Development and Application

(2) 、 Development

With the development of UAV technology, at the same time as the micro sensor and small motor system is becoming mature, characterized by low flying, small size and slow speed, the UAV technology has been developed greatly, so it is also known as the "low small slow" unmanned aircraft.



2、 Development and Application

(3) 、 Application

In recent years, as a kind of high-tech and high performance aircraft, low altitude UAV in disaster assessment, power line inspection, freight transportation, farmland work, geological surveying, highway patrol, forest fire prevention, public security, maritime patrol, aerial mapping and other civilian areas has been rapidly developed and widely used.





2、 Development and Application

(3)、 Application



Power Line Inspection



**Freight
Transportation**



**Farmland
Work**





2、 Development and Application

(3)、 Application



**Disaster
Assessment**



**Measuring
and Plotting**



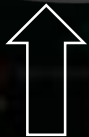
**Aerial
Photography**



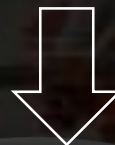
**Crashed on
the White House Lawn**



IS's Arms



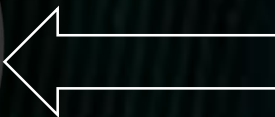
Crash Plane



UNMANNED AERIAL VEHICLE



Interfere Airport





3、 Nuclear Security

(1) 、 Definition

Nuclear security refers to the prevention, protection and dealing with theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear materials and other radioactive substances or related facilities, and to prevent terrorists from acquiring nuclear materials, sabotage of nuclear facilities.





3、 Nuclear Security

(2) 、 Purpose

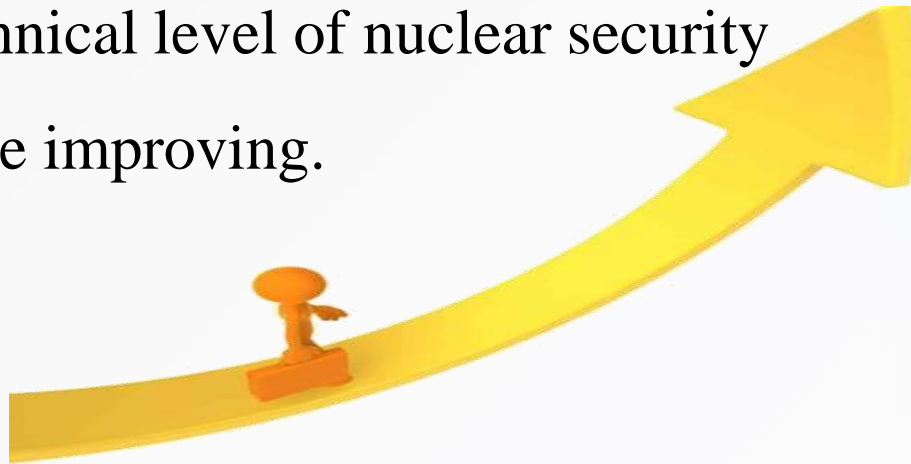
By Technical and management measures, nuclear security deal with the activities of non national organizations and groups, which are intended to obtain nuclear materials and other radioactive materials by various means, to manufacture rough nuclear weapons or dirty bombs, and to destroy nuclear facilities by various means, resulting in nuclear accidents.



3、 Nuclear Security

(3) 、 Situation

With the rapid development of the application of nuclear technology and nuclear power industry, the number and types of nuclear facilities around the world are increasing, the work of nuclear security is facing new pressures, the technical level of nuclear security management, to be improving.





3、 Nuclear Security

(3) 、 Situation

The development and application of UAV technology has brought new opportunities and challenges for nuclear security.





4、Effect

- (1)、Improvement
- (2)、Potential Threats
- (3)、Countermeasures
- (4)、Technical Measures





4、Effect

(1) 、 Improvement

- Patrols of Nuclear Security
- Providing Information Support for Responding to Nuclear Security Incidents
- The supplement of video technology to monitoring area
- Tracking and monitoring





4、Effect

(2) 、 Potential Threats

- Information Scout
- Information Steal
- Distributing Leaflets
- Malicious Interference
- Terrorist Attacking





4、Effect

(3) 、 Countermeasures

- Strengthen Management and Control, enhance the requirements of laws and regulations
- Active Guidance, Normatively and Reasonably Use
- Active Response, Strengthen Technical Measures





4、Effect

(4)、 Technical Measures

- Detection
- Interference
- Capture
- Destruction



4、 Effect

(4) 、 Technical Measures

- Detection

- optical characteristics (such as visible light imaging)
- thermal characteristics(such as infrared imaging)
- radio frequency characteristics(such as electromagnetic radiation signal)
- acoustic characteristics(such as acoustic characteristics and acoustic characteristics of rotating wing engine etc.)
- electromagnetic characteristics(such as magnetic field)



The UAV detection system with thermal infrared and high definition visible light imaging capability



4、Effect

(4) 、 Technical Measures

- Detection
- Interference to disrupt the UAV's electronic system, cut off its control link, image transmission and GPS positioning signal



The anti UAV electromagnetic interference gun



4、Effect

(4) 、 Technical Measures

- Detection
- Interference
- Capture

In order to capture the invading UAVs, we can use an UAV to carry the capturing network and expand it to capture the target UAV when approaching the target UAV.



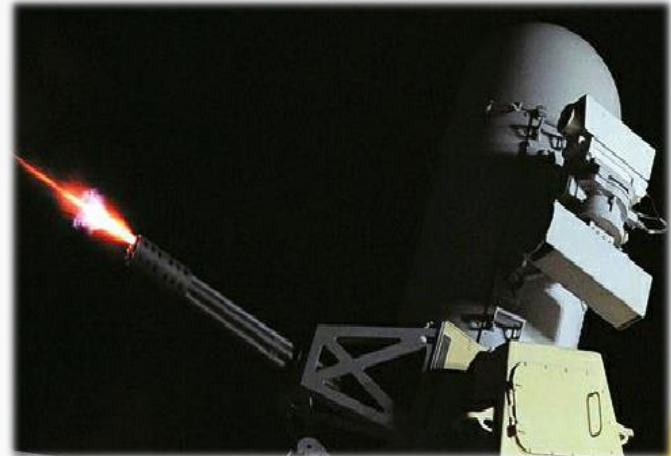
The anti UAV network capturing UAV



4、Effect

(4) 、 Technical Measures

- Detection
- Interference
- Capture
- Destruction



To use high-energy laser or high power electromagnetic weapons and other technologies to perform irreversible, destructive strikes.



5、 Summary

Nuclear security work has a long way to go, not only to guide the use, but also to strengthen prevention





5、 Summary

On the basis of good record, China's nuclear security work continues to innovate and develop, actively respond to the impact of the application and the development of the "low, small, slow" UAV technology, strengthen guidance, improve the level of nuclear security work in management, technical measures and other aspects.



State Nuclear Security Technology Center

国家核安保技术中心
STATE NUCLEAR SECURITY TECHNOLOGY CENTER



Thanks!

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