

# Research on The Construction of Air Ground Integrated Unmanned Reconnaissance Equipment System

Qiwu Wu<sup>1, \*</sup>, Xiaoping Xie<sup>1</sup>, Lingzhi Jiang<sup>2</sup>

<sup>1</sup>College of Equipment Management and Support, Engineering University of PAP, Xi'an, 710086, China

<sup>2</sup>College of Information Engineering, Engineering University of PAP, Xi'an, 710086, China

\*wuqiwu700@163.com

**Abstract:** It is urgent to construct an urban anti-terrorism oriented air ground integrated unmanned reconnaissance equipment system. Base on the background of urban anti-terrorism application, this paper focuses on the main challenges faced by the construction of air ground integrated unmanned reconnaissance equipment system, and puts forward relevant countermeasures and suggestions.

**Keywords:** Air ground integration, Unmanned reconnaissance equipment, System construction.

## 1. Introduction

The urban anti-terrorism oriented air ground integrated unmanned reconnaissance equipment system takes unmanned intelligent equipment in the air and on the ground as the main body, urban anti-terrorism tasks as the driving force, and forms air ground integration anti-terrorism reconnaissance intelligence information through intelligent reconnaissance payload and automatic intelligence information processing platform.

## 2. The Main Challenges Facing the Construction of Air Ground Integrated Unmanned Reconnaissance Equipment System

### 2.1. Complex Environment Has Great Impact on Reconnaissance Operations

The urban area is characterized by dense buildings, complex and changeable electromagnetic environment, narrow space, and mixed people. This requires high coordination capability, communication support capability and fast situation awareness capability. Terrorist activities usually take place in densely populated places, and the personnel involved are usually divided into our personnel, the terrorists and ordinary people. The number, status, and location of personnel change dynamically and are in disorder. It is difficult for unmanned reconnaissance equipment to understand the overall situation.

### 2.2. Multidimensional Information Increases the Complexity of System Construction

The air ground integrated unmanned reconnaissance equipment system is a systematic project. The forms of urban anti-terrorism tasks under complex conditions are complex and diverse, involving command and control, information communication, situation awareness, armed attack, explosion search and risk elimination, survival protection, comprehensive support and other capabilities. It covers the functional requirements of multiple scenarios at the metropolitan level, regional level, block level, underground level, building level, etc. These are key elements that affect

the construction of the air ground integrated unmanned reconnaissance equipment system.

## 3. Countermeasures and Suggestions for Building the Air Ground Integrated Unmanned Reconnaissance Equipment System

### 3.1. The Goal Principle of Designing the Air Ground Integrated Unmanned Reconnaissance Equipment System Scientifically

The air ground integrated unmanned reconnaissance equipment system should be guided by improving urban anti-terrorism efficiency, According to specific tasks and opponents' conditions, build an air ground integrated unmanned reconnaissance equipment system based on existing equipment and supplemented by new intelligent unmanned equipment. Considering the particularity and complexity of urban anti-terrorism tasks, it is suggested to follow the "1+x" model, adhere to the design principle of "high, middle and low", "far, middle and near", "small, medium and micro", and highlight the modularity, flexibility, complementarily and integrity of the system. Among them, "1" refers to the universal unmanned air ground reconnaissance equipment system, and "x" refers to the modular and flexible combination and collocation based on "1" and according to different urban anti-terrorism tasks, environments, methods, processes and collaboration to adapt to the rapidly changing needs of the scene.

### 3.2. Pay Attention to The Comprehensive Effectiveness of The Air Ground Integrated Unmanned Reconnaissance Equipment System

From the perspective of operation effect, the main function of the air ground integrated unmanned reconnaissance equipment is to improve the detective target, strike target, destroy and evaluate target strike effect, etc. Therefore, technology integration and system integration are required to achieve efficiency multiplication. At the same time, through

advanced network technology, various decentralized unmanned reconnaissance equipment will be connected into a whole to form an overall capability. The unmanned reconnaissance equipment system should have the ability of interconnection, intercommunication and interoperability, so that different types of unmanned equipment from different manufacturers can be integrated in technology to achieve structural optimization and strength complementarily.

### **3.3. Innovative Research the Air Ground Integrated Unmanned Reconnaissance Equipment System and Corresponding Reconnaissance Tactics**

Base on the task and environment, we should distinguish rescue, strike and anti-attack and other types of tasks, design operational mission scenario, adopt modular grouping, miniaturized fast reflexive grouping, unmanned cluster grouping and other new grouping modes, and strengthen assumed digital twin training. According to the urban anti-terrorism tasks, we should distinguish different levels, cooperate with assault force. Scientific use of air interdiction, cruise reconnaissance, integrated detection and attack, remote control explosion disposal, accompanied flight alert and man-machine coordinated assault and other combat methods to implement multi-dimensional and three-dimensional strike against targets.

## **Acknowledgment**

This work is supported by the Natural Science Basic Research Plan in Shanxi Province of China (No.2020JM-361), the Young and middle-aged scientific research backbone projects of Engineering University of PAP (No.KYGG201905) and the basic research foundation project of Engineering University of PAP (No.WJY202019 , No.WJY202144 , No.WJY202233), the PAP's Military Scientific Research Mandatory Project (No.WJ2020A020048, No.WJ2021A030100), the PAP's Military Theory Research Project (WJJY22JL0236), the PAP's national defense science and technology innovation project (No.ZZKY20223103).

## **References**

- [1] JinsongHu, Wentao Huang. New Changes in Reconnaissance Intelligence Caused by Unmanned Equipment[J]. Military Digest, 2020(19):27-30
- [2] Ziyang Cheng, Guoquan Ren, Yin zhang, etc. Current situation and trend of combined application of air ground unmanned equipment [J]. Tactical missile technology.2018,(6):7-12
- [3] Huangqin Zhu, Haixiao Huang. Development of UAV System Operational Comprehensive Support Construction (the first edition [M]. Beijing: Bule Sky Press.2014.