ISSN: 2472-3703 DOI: 10.6911/WSRJ.202412_10(12).0008

Concept of Intelligent Cluster Operations for Urban Counterterrorism

Jufeng Yin[1,*], Qiwu Wu[2], Kaimin Guo[3], Weicong Tan[4]

[1]Postgraduate Brigade, Engineering University of PAP, Xi'an, 710086, China

[2]School of Equipment Management and Support, Engineering University of PAP, Xi'an, 710086, China

[3]Postgraduate Brigade, Engineering University of PAP, Xi'an, 710086, China

[4]Postgraduate Brigade, Engineering University of PAP, Xi'an, 710086, China

[*] Corresponding author: yjf931119@qq.com

Abstract

In recent years, with the development of unmanned equipment and unmanned combat platforms, coupled with the addition of artificial intelligence, the existing mode of combat has evolved from mechanization and informatization to the direction of intelligence. The rapid development of global robotics and clustering technology has been gradually applied to the forces of various countries, and has played an important role in non-war military operations such as border and sea defense patrol and control, land and sea rights protection struggle, anti-terrorism and stability maintenance operations, and rescue and relief. The article takes urban counter-terrorism under the background of intelligent war as the research background, analyzes the development status quo of intelligent unmanned clusters, their functions and application fields, and boldly carries out the winning mechanism of urban counter-terrorism intelligent unmanned clusters and the conception of battle method, so as to provide ideas and references for the future urban counter-terrorism intelligent clusters.

Keywords

Urban Counterterrorism; Intelligent; Unmanned Cluster; Operational Concepts.

1. INTRODUCTION

On July 23, 2020, when inspecting the Air Force University of Aviation, President Xi emphasized that various types of unmanned aircraft systems have emerged in large numbers, and unmanned combat is profoundly changing the face of war. We need to strengthen unmanned combat research, enhance unmanned aircraft professional construction, strengthen combat-oriented education and training, and accelerate the training of unmanned aircraft application and command personnel[1]. The important instructions of President Xi are profoundly important. President Xi's important instructions profoundly pointed out that the current war pattern is changing, and put forward specific requirements for the development of unmanned and intelligent combat. The task of strengthening the research of unmanned clusters and the cultivation of related talents so that they can form combat capability as early as possible is imminent.

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202412_10(12).0008

2. INTELLIGENT COMBAT HAS CREPT IN

Since entering the 21st century, the intelligent technology represented by artificial intelligence has made a breakthrough development, and has given birth to unmanned combat platforms represented by unmanned combat vehicles, unmanned aerial vehicles, unmanned ships, etc. in the military field, which makes intelligent war become the sixth new war form following cold war, hot war, mechanized war, nuclear war, and information war[2]. The war of intelligence has become the sixth new form of war after cold war, hot war, mechanized war, nuclear war and information war. With the development of science and technology, the gradual separation of people and equipment, unmanned equipment from the beginning of assisting human combat evolution for human combat. It is expected that by 2025, 30% of the equipment of the Russian army will realize intelligent unmanned. It is expected that by 2030, 60% of the U.S. Army's ground equipment will be intelligent and unmanned[3] . A large number of unmanned vehicles, unmanned aircraft and unmanned boats are expected to become the main combat equipment in future intelligent warfare. This predicts that the future battlefield will become "unmanned, silent, invisible", the traditional array of barricades, short-force fighting, human tactics will have no place, the unmanned system instead of humans, the independent implementation of the "perception and detection, mission planning, confrontation and combat, linkage and coordination, destruction and assessment of injuries The combat mode of "perception and detection, mission planning, confrontation and strike, linkage and coordination, and damage assessment" will become the trend of future war.

3. GROWING URBAN TERRORISM

TTerrorism is the organized use of violence or the threat of violence by its perpetrators against unarmed persons in order to achieve certain political objectives by terrorizing certain targets[4]. Terrorism. Throughout history, urban terrorism has been an important issue in the global security situation.

With the acceleration of urbanization, it has become easier for terrorist organizations to carry out their extremist activities in urban environments. This type of terrorism usually targets public places with large flows of people in cities, such as stations, theaters, gathering places, landmarks, etc., with the aim of causing widespread panic and social unrest among the population and creating a momentum to expand their influence in order to achieve their goals. The harm and suffering caused by outbreaks of urban terrorism to people all over the world is immense (table 1 below).

Table 1. Urban Terrorist Attacks (List of Typical Cases)[5]

Date of occurrence	Name of case	place of occurrence	number of people killed
On September 11,2001	The "9 11" event	U.S. World Trade Center, Pentagon	More than 3,000 people
September 1, 2004	Beslan hostage situation	Beslan City School	More than 350 people
July 7, 2005	London July 7th bombings	London Underground, UK	52 people
July 5, 2009	"7-05" incident	Urumqi Market, Xinjiang	197 people
October 28, 2013	The "10-28" attacks	Tiananmen Square in Beijing	10 people
March 1, 2014	The "3-01" incident in Kunming	Yunnan Kunming Railway Station	31 people
November 13, 2015	Paris serial terrorist attacks	Multiple outbreaks in Paris, France	132 people
July 30, 2023	Bombings in Pakistan	Venue in Bajaur district, Pakistan	56 people
March 22, 2024	"3-22" Moscow attack	Moscow Concert Hall, Russia	145 people

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202412_10(12).0008

4. INTELLIGENT CLUSTER PROJECT DAY BY DAY

In recent years, military powers around the world have made intelligent unmanned clusters an important direction for strategic development. Take the U.S. Army as an example, since the third "offset strategy" was put forward in 2014, unmanned clusters have been taken as a new quality combat force to win future intelligent wars, and under the unified leadership of the Ministry of National Defense, a large amount of research and demonstration work has been carried out, and the CODE project, Perdix project, Perdix project, and the "Gray Quail" project have been launched one after another. "(CODE) program, "Gray Partridge" (Perdix) program, "Gremlins" program, "Fast Lightweight Autonomous "(FLA), Air Combat Evolution (ACE), and Autonomous Multi-Domain Adaptive Swarm System (AMASS). Among them, the "Cooperative Operations in Denied Environments" project focuses on the cooperative operations of clusters in denied environments; the "Gray Partridge" project focuses on the study of distributed control and decision-making of large-scale small UAV clusters; the "Fast Lightweight Autonomy" project aims to study the distribution of small aircrafts and their capabilities in the field. The "Fast Lightweight Autonomy" project aims to study the navigation and control technology of small vehicles; the "Air Combat Evolution" project tries to make UAVs evolve the ability of rapid air combat decision-making through learning; and the "Autonomous Multi-Domain Adaptive Swarming System" project is to utilize a large number of autonomous UAVs, unmanned ground vehicles, and unmanned ground vehicles in a coordinated combat environment. The "Autonomous Multi-Domain Adaptive Swarm System" project utilizes a large number of autonomous unmanned aerial vehicles, unmanned ground vehicles and unmanned surface ship platforms to establish an effective, low-cost mission set of counter-integrated defense and control systems through a theater-scale distributed command and control system, which can be combined with unmanned clusters according to the mission requirements to make intelligent joint multi-domain operations possible.

5. CONCEPT OF INTELLIGENT CLUSTER OPERATIONS FOR COUNTER-TERRORISM IN CITIES

Counter-terrorism operations are characterized by the uncertainty of the combat object, the large span of the combat environment, the difficulty of organizing command and coordination, the high danger of tracking and pursuing, and the strong timeliness of intelligence investigation[6]. The urban counter-terrorism combat involves more factors, higher social concern, and more complex combat environment. Urban counter-terrorism combat involves more factors, higher social concern, and a more complex combat environment, that is, different from the conventional urban offensive and defensive wars, but also different from the mountains, borders, sea and other counter-terrorism battlefields (see Table 2).

Table 2. Comparison of urban and other terrain[7]

Battlefield factors	city	hilly area	border area	at sea
non-combatant	large	small	small	small
High-value infrastructure	large	small	small	small
Observation/strike limitations	yes	a few	a few	no
mode of engagement	many kinds of	lesser	lesser	lesser
scope of the attack	shortness	center	center	center
Force mobility	low	high	low	high
communications capability	go down	go down	normalcy	normalcy
social concern	high	low	low	low

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202412_10(12).0008

With the continuous development of science and technology and the network, the way of rioters to carry out attacks in the city has become more covert, more diversified, more arrogant and worse. Traditional reliance on commanders to carry out "OODA" (observation-judgment-decision-action) ring of operational efficiency is obviously not enough to deal with the new situation of urban[8]. A more intelligent and efficient urban counter-terrorism operation mode and corresponding tactical methods need to be proposed urgently.

The author believes that although the current countries focus on the research and development of intelligent cluster warfare, but there is still a long way to go before the real intelligent cluster warfare. Based on the characteristics of urban counter-terrorism operations and the maturity of the current development of intelligent systems, in order to realize the intelligent cluster operations need to be based on man-machine cooperation and steady, gradual and iterative advancement.

First, the primary stage of "manned and unmanned". The human-machine mixed combat team as a combat carrier, the use of unmanned aircraft, unmanned assault vehicles, unmanned sniper weapons platforms, detonation robots and other equipment, with manned assault forces, the realization of reconnaissance and perception, command and control, infiltration to pick up the enemy, into the four key links based on the four key aspects of the strike, the whole element of human-machine cooperative mode of operation. The whole process is controlled and led by the commander, and the combatants guide the strikes, giving full play to the role of unmanned equipment.

The second is the intermediate stage of "manned and unmanned". On the basis of the primary stage, the realization of unmanned autonomous cooperation, fully intelligent reconnaissance and perception, autonomous identification of attacks, the commander only needs to input the combat effect that he wants to achieve to the system, and the system applies artificial intelligence and advanced algorithms to generate feasible combat solutions for the commander to make decisions and make choices. At this stage, the combatants retire to the "second line", realizing unmanned combat under the control of personnel, and basically relying on the weapons platform to carry out counter-terrorism operations autonomously.

Thirdly, it is the high and extreme stage of "rule by someone, action by no one". On the basis of the intermediate stage, the complete realization of intelligent cluster combat, manifested as a human design, unmanned control, commanders to achieve "menu a la carte" type of combat, the action process without the participation of combatants, completely by the unmanned combat platforms and robots autonomy implementation. Ultimately, it will realize a high degree of trust between human beings and intelligent cluster systems, and intelligent clusters will replace human beings on the battlefield of urban counter-terrorism.

6. CONCLUDING REMARKS

The extensive use of intelligent clusters in modern warfare will profoundly change the traditional battlefield spatial and temporal understanding and winning mechanism. With the progress of science and technology and the development of military science, the constraints to win the war are becoming more and more complex, intelligent clusters as a new quality of combat power, will continue to influence and change the combat mode style. A deep understanding of intelligent clusters on the future battlefield changes, early and in-depth research, in order to win the strategic initiative of the future war.

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202412_10(12).0008

REFERENCES

[1] Xi Jinping Visits Air Force Aviation University on August 1 Eve and Delivers Important Speech [EB/OL]. (2020-07-24) [2020-07-30]. http://www.xinhuanet.com/mil/2020-07/24/c_121071623.htm

[2] Zhao Yanjie, Yuan Guanmai, Liang Yueqian Intelligent unmanned clusters: the disruptive force that will change the future of warfare-Beijing: Electronic Industry Press, 2024.01 ISBN-978-7-121-45186-7

[3] LIN Juanjuan, ZHANG Yuantao, WANG Wei. Military Intelligence is profoundly affecting future operations [EB/OL]. (2019-09-10)[2020-12-24]. http://www.mod.cn/jmsd/2019-09/10/content_485o148.htm

[4] Wang Zhiliang, Wang Shuhua Research on Terrorism Materials (First Series-December 31, 2009) China Politics and Law Press ISBN-978-7-562-079453

[5] MENG Chengcai, LIU Jie, LI Wei. Research on the application of police unmanned aerial vehicles in counter-terrorism operations under the background of national security strategy[J]. Journal of Yunnan Police Academy, 2023, (06):34-40.

[6] WANG Chao, YANG Jian, LUO Jinliang et al. Research on the Military Utilization Mode of UAV Cluster [A]. Proceedings of the 11th China Command and Control Conference [C]. Proceedings of the 11th China Command and Control Conference [C]. Chinese Institute of Command and Control (CICC): China Command and Control Society, 2023: 193-196.

[7] Shi Junyan, Hou Dianning. Research on the synergy of urban anti-terrorism operations between micro-small UAVs and ground-based unmanned systems[J]. Ship Electronic Engineering, 2022, 42(09): 36-40.

[8] Boyd, J. A discourse on winning and losing. Maxwell Air Force Base [R] . AL , USA : Air University Library Document No. M-U43947(Briefing slides),1987. M-U43947 (Briefing slides), 1987.