## Low-Altitude Drone Defense Solutions

#### 01 Research Main Content & Problem-Solving Techniques

#### Main Content:

This project focuses on drone defense technology requirements for major events, important venues, and key public safety targets. It aims to research drone detection and identification, pinpoint deception, and interference technology,making key breakthroughs in four core areas: <u>detecting based on drone location, identity recognition through drone signal characteristics, precise navigation deception, and drone</u> interference. The goal is to accurately identify and control the "low, slow, small" drone identity for unauthorized flights, as well as <u>construct a</u> comprehensive drone detection and countermeasure system., This system, combined with other drone target detection and tracking, highpower interference, and other means, is to be adapted and optimized for urban complex environments. This ensures comprehensive technological and equipment support for three-dimensional social security, large-scale event security, and violent terror prevention and handling.

1. Drone Location Detection Technology

2. Drone Identity Recognition Technology

3. Precise Navigation Deception Technology

4. Drone Interference Technology

5. Individual Soldier Drone Countermeasure Technology

### 02) Technical Route



The detection and recognition subsystem include: radar detection module, spectrum detection module, and protocol cracking module;

Navigation deception subsystem includes: navigation satellite signal simulation module, time synchronization module, and real-time deception trajectory generation module;

Interference subsystem includes: fixed interference module and portable interference module.

#### ) (1) Detection and Recognition Subsystem



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As shown in the schematic, the radar and spectrum equipment detect the actual position of the drone and input the data into the control system. The system then accurately records the drone location information after wirelessly breaking the signal protocol and transmitting the information, distinguishing between authorized and unauthorized drones, ensuring the success rate of navigation deception and interference.



#### (2) Navigation Deception Subsystem



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The structure of the navigation deception subsystem is shown in the diagram. After detecting the real position of the drone, the data is entered into the control model, which calculates and outputs the satellite signals to be simulated. These are then converted into multicarrier simulation signals by the deception equipment. The time synchronization module resolves the temporal differences, ensuring the success rate of the deception signal.

Target drone

reception

model

#### 02) (3) Interference Subsystem



The structure of the interference system includes fixed and portable interference modules. The fixed interference module achieves widerange drone interference by receiving system commands. The portable interference module is highly mobile and can carry out targeted interference at any time.







#### (1) Fixed Detection, Attack, and Deception System



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Performance	Parameter Index
Detection Range	3-8km (depending on the surrounding environment)
Detection Frequency	20MHz6000MHz
Range	
Attack Range	≥2km (single-band 100W power)
Attack Frequency Range	900MHz、1.2GHz、1.5GHz、2.4GHz、5.2GHz、5.8GHz
Deception Distance	≥5km
Deception Frequency Range	GPS、GLONASS、Galileo
Operating Temperature	-40+70°C
Protection Level	IP67

This fixed system utilizes radio detection to discover drones and employs radio suppression technology and navigation deception to counter them. It can be used against both manually operated and autopiloted drones, and multiple devices networked together can provide large-scale protection, especially against drone clusters.

#### 03) (2) Portable Operator Positioning System



Detection Range	1.5-3KM (depending on antenna installation)
Detection Time	$\leq$ 15 seconds under normal conditions (may vary with distance)
Power Consumption	50W
Temperature Resistance	- 30°C∼ 50°C
Waterproof Level	3
Weight	10KG
Detectable Drone Models	DJI Phantom 4, DJI Mavic 2, DJI Mavic 3, DJI FPV, DJI 2S, DJI M300, etc.
Standby Time	6h
Dimensions	450*320*150mm

The Portable Operator Positioning System is capable of outdoor drone detection and locating the takeoff and landing points as well as the operator's position. Its single-soldier design is convenient to carry and versatile for various scenarios.

#### 03 **)** Portable Radio Detection System

Detection Range	1.5-3KM (depending on antenna installation)
Detection Time	≤3 seconds
Detection Frequency	2.4GHz、5.8GHz
Direction Finding Accuracy	≤20°
Temperature Resistance	- 30°C ~ 50°C
Waterproof	IP65
Weight	500g
Weight	DJI Phantom 4, DJI Mavic 2, DJI Mavic 3, DJI FPV, DJI 2S, DJI M300, etc.
Battery Life	24h

The Portable Radio Detection System is suitable for individual combat. This compact and highly sensitive device can accurately detect unauthorized drones in complex environments, allowing for early preparations.

#### 03 ) (4) Portable Detection and Attack System



A portable detection and attack system, integrating detection and countermeasure systems into one, achieves the function of individual soldier discovery and immediate striking. In emergency situations, a single person can complete the countermeasure against unmanned aerial vehicles.

Detection Range	1.5-3KM
Detection Time	≤3seconds
Detection Frequency	2.4GHz、5.8GHz
Direction Finding Accuracy	≤20°
Attack Distance	1.5KM
Attack Frequency	433MHz、830MHz、915MHz、1.2GHz、1.5GHz、2.4GHz、5.2GHz、5.8GHz
Temperature Resistance	- 30℃~ 50℃
Waterproof	IP65
Weight	3kg
Detectable Drone Models	DJI Phantom 4, DJI Mavic 2, DJI Mavic 3, DJI FPV, DJI 2S, DJI M300, etc
Battery Life	12h

#### (5) Portable Detection & Attack Deception System



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The Portable Detection and Attack Deception System is a derivative product of the fixed Detection and Attack Deception System, allowing a single person to discover and counteract a full range of drones, achieving low-altitude security defense.

Detection Distance	1.5-3KM
Detection Time	≤3 seconds
Detection Frequency	2.4GHz、5.8GHz
Direction Finding Accuracy	≤20°
Direction Finding Accuracy	1.5KM
Attack Frequency	433MHz、830MHz、915MHz、1.2GHz、1.5GHz、2.4GHz、5.2GHz、5.8GHz
Deception Distance	3KM (10W transmission power, distance can be increased by increasing power)
Deception Frequency Bands	GPS、GLONASS、Galileo、BD B1
Deception Frequency	- 30°C∼ 50°C
Bands	
Waterproof	IP65
Weight	4kg
Detectable Drone Models	DJI Phantom 4, DJI Mavic 2, DJI Mavic 3, DJI FPV, DJI 2S, DJI M300, etc
Battery Life	12h

#### **Drone Comprehensive Management Platform**

The Drone Comprehensive Management System is specialized equipment developed to deal with drone security threats. It uses radio detection, optoelectronics, low-altitude surveillance radar, interference, etc., to detect, locate, and track invading drones. It can also guide counter-interference equipment automatically, drive away or force down illegal drones, ensuring low-altitude airspace safety.

 Multi-dimensional Stereoscopic Surveillance

04

24/7
Comprehensive
Monitoring

- 24/7 Comprehensive Monitoring
- Flexible and Scalable Deployment



#### 05 **Vehicle-mounted Drone Countermeasure System**





The Vehicle-mounted Drone Countermeasure System is convenient for defending against drone invasions while on the move, thereby achieving low-altitude safety protection for moving convoys.

# Thank you for listening!

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