

# **2026 Funding Scheme for Scientific Research and Innovation – Key R&D Projects (in Response to National Needs) Application Guidelines for the Smart City Field**

## **I. Background**

Coordinated low-altitude and ground monitoring for smart cities represents a key direction in holistic urban governance. It is closely related not only to public safety and emergency response capabilities, but also to the development of the digital economy and smart society. China's 15<sup>th</sup> Five-Year Plan proposes fostering the low-altitude economy as a pillar industry, emphasizing the need to “accelerate the development of spatiotemporal big data platforms for smart cities, promote the application of city information modeling and digital twin technologies, and establish integrated urban information infrastructure connecting space, air and ground.” The rapid increase in unmanned aerial vehicle (UAV) traffic density and the continued opening of low-altitude airspace have created bottlenecks in data fusion, real-time perception, and cross-domain coordination for coordinated low-altitude and ground monitoring in urban environments. Breakthroughs in key technologies, including information and communication, intelligent sensing, and collaborative control and management, are urgently needed to establish a full-domain, multi-dimensional monitoring system that integrates dynamic and static monitoring capabilities, thereby providing strong support for the safe and orderly development of the low-altitude economy and digital, smart urban governance.

## **II. Overall Objectives**

In response to the needs of public safety, emergency response, and other aspects of smart city governance, this scheme aims to modernize urban governance capabilities through the research, development, and demonstration application of coordinated low-altitude and ground monitoring technologies, thereby supporting the development of the digital economy and smart society in Macao and the Guangdong-Hong Kong-Macao Greater Bay Area.

## **III. Research Direction**

**Research Direction:** Key Technologies and Demonstration Applications for Coordinated Low-Altitude and Ground Monitoring in Smart Cities

Addressing the major need for real-time, dynamic monitoring and governance in smart cities, the project shall study an integrated “sensing–transmission–computing–control–application” framework for air–ground multi-agent systems; investigate cross-modal collaborative perception technologies for dynamic and static urban features based on multiple intelligent agents; develop multi-scale, real-world, 3D modeling and updating technologies for high-density urban environments; study trustworthy target identification, inference, and decision-making technologies based on air–ground multi-agent collaboration; and carry out demonstration applications for urban infrastructure inspection, emergency rescue, and traffic flow monitoring.

### **Assessment Indicators:**

(1) The peak signal-to-noise ratio of scenarios shall exceed 25 dB; the VRAM overhead shall be less than 24 GB; the target detection and recognition rates shall exceed 95%; the target distance and velocity resolution accuracies shall be better than 5 m and 2 m/s, respectively; and the target trajectory update frequency shall exceed 5 Hz.

(2) The scene reconstruction accuracy shall reach the sub-centimeter level; the average rendering frame rate shall exceed 60 FPS; and the reconstructed scene scale shall exceed 1 km<sup>2</sup>.

(3) Multi-modal data fusion shall integrate at least three categories of data; the average semantic understanding accuracy shall exceed 95%; the response latency for collaborative decision-making instructions shall be less than 200 ms; the task decomposition and resource scheduling success rates shall exceed 90%; and the re-planning latency following decision-making failure shall be less than 8 s.

(4) The relative error for loop-closure localization in autonomous intelligent navigation shall be approximately 1‰ at 1 km; the maximum number of subtasks that can be executed continuously shall exceed ten; the overall mission execution success rate shall exceed 90%; and the obstacle avoidance success rate for unmanned systems shall exceed 90%.

(5) Demonstration applications shall be conducted in at least three typical scenarios.

(6) At least ten high-quality papers shall be published; at least ten invention patent applications shall be filed or approved; and at least eight doctoral students and twelve master's students shall be supervised.

(7) A Technology Readiness Level (TRL) of at least 6 shall be achieved, and the project outcomes shall be made available to the relevant Macao authorities for demonstration applications.

#### **IV. Application Requirements**

(1) The lead applicant must be a Macao institution, and collaboration with a state-level research institution in the Chinese mainland is required. If an enterprise participates, it must contribute at least 10% of the grant amount.

(2) The project duration is four years. The maximum funding amount per project is MOP 15 million.

#### **V. Contributing Experts**

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