

# Special Session Proposal: Intelligent Agricultural Unmanned Systems

## 邀请组专题建议：智能农业无人系统

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Intelligent agriculture has been the hotspot of global agricultural research, especially in China. In July 2017, in order to seize the major strategic opportunities for the development of artificial intelligence, build the first-mover advantage of China's artificial intelligence development, and accelerate the construction of innovative countries and world science and technology powers, the China State Council issued the "New Generation Artificial Intelligence Development Plan". The key layout includes five major areas and six major tasks, including intelligent agriculture. The "Plan" clearly pointed out that by 2025, the basic theory of artificial intelligence has achieved a major breakthrough, and some technologies and applications have reached the world's leading level. Artificial intelligence has become the main driving force for China's industrial upgrading and economic transformation, and the construction of intelligent society has made positive progress. A new generation of artificial intelligence has been widely used in the fields of intelligent manufacturing, smart medical care, smart city, intelligent agriculture, and national defense construction. The scale of artificial

intelligence core industry exceeds 400 billion Chinese Yuan and drives related industries to exceed 5 trillion Chinese Yuan: Promoting artificial intelligence and various industry integration and innovation; Piloting demonstration of artificial intelligence application in key industries and fields such as manufacturing, agriculture, logistics, finance, commerce, home, etc.; Promoting the scale application of artificial intelligence and comprehensively improving the intelligent level of industry development; Developing agricultural intelligent sensing and control system, intelligent agricultural equipment, autonomous systems for agricultural machinery field operations, etc.; Establishing and improving the intelligent agricultural information remote sensing and monitoring network, which integrates the sky and the ground; Establishing a typical agricultural big data intelligent decision analysis system, and carrying out integration application demonstrations such as intelligent farms, intelligent plant factories, intelligent pastures, intelligent fish farms, intelligent orchards, agricultural products processing intelligent workshops, and agricultural products green intelligent supply chains.

At present, intelligent agricultural unmanned systems have covered space (navigation, remote sensing, meteorological, and communication satellites), air (agricultural-aviation plant-protection UAVs, agricultural-aviation remote sensing and mapping UAVs, long-endurance solar-powered UAVs, long-endurance airships, and bionic flying robots), ground (unmanned farming/harvesting machinery, biomass energy system, soil improved bionic robot, and unmanned animal-husbandry robot), and water (unmanned underwater vehicle, underwater operation robot, and unmanned aquaculture system) four spatial dimensions, with broad development prospects. Establishing an agricultural integrated space-air-ground-water cooperation and precision operation system based on the closed-loop control of large systems, studying the intelligent sensing and control technology of intelligent agricultural unmanned systems, and establishing the application demonstration bases all over the world, play an important role at supporting leaping developments of automotive operations, intelligent operations, unmanned operations, and cluster operations of intelligent agricultural machinery and equipment. It is also of great significance to realize the short-term goal “unmanned farming” and the long-term goal “unmanned agriculture”

of world agricultural modernization.

Articles covering but not limited to recent research on the following topics are invited to this organized session:

- Agricultural information integrated space-air-ground-water remote sensing and monitoring network (satellites, UAVs, UGVs, USVs and UUVs) and multi-source data fusion for agricultural applications;
- Unmanned agricultural intelligent sensing and control system, intelligent agricultural equipment, and autonomous systems for agricultural machinery field operations;
- Unmanned simultaneous localization and mapping, and sensing of unmanned robots in agriculture;
- Unmanned agricultural robots guidance (path planning), navigation and control;
- Bio-inspired swarm intelligence and multi-agent system cooperative control;
- Unmanned agricultural water management, flow measurement and control;
- Unmanned crop yield mapping, remote sensing and monitoring;
- Unmanned crop phenotype detection, hyper-spectral sensing, and quantitative inversion;
- Unmanned farms, unmanned plant factories, unmanned pastures, unmanned fish farms, and unmanned orchards;
- Agricultural big data intelligent decision analysis system, agricultural products processing intelligent workshops, and agricultural products green intelligent supply chains;
- Bionic systems, bionic flying robots, soil improved bionic robot, bionic animal-husbandry robots, bionic aquaculture robots, and biomass energy system.

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Suggested Special Session Chairs

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