

Navigation and Perception Technologies and Applications for Intelligent Unmanned Systems in Complex Scenarios

Professor Jun Luo 罗均

Chongqing University

Abstract

Perception capability is fundamental for intelligent unmanned systems to understand and interact with their surrounding environment. The advancement of autonomous operation in complex scenarios relies on the continuous enhancement of perception capabilities. Our team has been conducting in-depth research on perception technologies for intelligent unmanned systems in complex scenarios. We have made breakthroughs in key technologies such as structured industrial scene feature perception, dynamic environment perception in the wild, non-cooperative target perception, and low-altitude, slow-moving target perception. We have developed a multi-sensor fusion perception technology system incorporating cameras, LiDAR, infrared sensors, and radar. This has resulted in a series of innovative technological achievements, enabling intelligent unmanned systems to perceive environments and targets in complex scenarios. Examples include precise recognition of welding features by robot welders on the Changtai Yangtze River Bridge, autonomous cross-domain perception and motion planning in unstructured environments by amphibious unmanned vehicles, and detection, identification, and tracking of non-cooperative targets and low-altitude, slow-moving aerial targets such as drones. These technologies serve major national engineering projects and the development of key defense equipment models, and have received multiple awards, including the second prize of the National Science and Technology Progress Award.



Jun Luo is the Dean of the College of Mechanical and Vehicle Engineering at Chongqing University, a Second-Level Professor, and a Ph.D. advisor. He also serves as the Director of the State Key Laboratory of Mechanical Transmission and is the leader of the first national Huang Danian-style faculty team. His primary research areas include robotics technology, trajectory tracking and disturbance rejection control for intelligent unmanned systems, small target perception and recognition, acoustic stealth, and swarm game theory algorithms. Prof. Luo has led over 30 major projects, including key projects funded by the Central Military Commission Science and Technology Committee, the National Key R&D Program, the National 863 Program, major instrument projects and key projects from the National Natural Science Foundation of China, and the National Science Fund for Distinguished Young Scholars. He has published over 280 SCI-indexed papers, received the IEEE Best Paper Award, holds 310 authorized invention patents, and has authored and translated five monographs. His accolades include one Second Prize of the National Technological Invention Award, one Second

Prize of the National Science and Technology Progress Award, and five First Prizes in industry and provincial/ministerial science and technology awards.