Wildlife Observation System Based on Autonomous Target Recognition and Tracking

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With the continuous expansion of the scope of human activities, the habitat of wild animals in nature is increasingly being invaded and many wild animals are in danger of extinction. The protection of wild animals is imminent. Although nature reserves have been established in more and more regions around the world, the protection of specific animals (such as lions) can still be more professional and meticulous. The premise of meticulous and differentiated protection is that it requires sufficient observation and understanding of the animals' living habits. However, manual observation is very dangerous in reality. Fixed-point observation based on camouflage cameras cannot provide abundant information due to the lack of tracking capabilities. Aerial observation based on unmanned aerial vehicle only has a fixed viewing angle from the top and do not have long time observations ability limited by energy consumption. This project aims at the defects of the above observation methods and designs a system that can automatically identify, track and observe lions. Firstly, the observation system realize the automatic recognition of lion target using a webcam with advanced image recognition technology. Then, the system uses a fully-modified car with differential-controlled rear-wheel drive to achieve automatic tracking. In addition, laser radar is used to control the distance from the target. Meanwhile, the camera is placed on an inertial stabilized platform to isolate the car bumps and image wobbling caused by the rugged terrain. Our system has successfully implemented the above functions. The target recognition rate, tracking accuracy, and inertial stability have reached 95%, ±2°, and ±1°, respectively.