基于 Faster R-CNN 和模糊 PID 的巡检机器人云台控制研究

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摘　要：云台系统作为智能巡检机器人的视觉载体，承载着巡检机器人的核心功能，基于预置位的传统云台运作模式电厂复杂环境下显得乏力.针对复杂环境下云台预置位少、反应慢等问题，提出了一种基于 Faster R-CNN 和模糊 PID 的云台控制策略，利用 Faster R-CNN 检测并识别云台输送图像中的目标，根据目标与图片的位置关系判断云台运动方向，计算中心坐标的误差并送入模糊 PID 控制器进行参数调节来达到控制云台的目的.实验结果表明，利用 Faster R-CNN 进行目标检测识别可达到 90.8％的准确率并且运行在毫秒级，模糊控制使云台能够快速反应并平稳运行，应用效果良好.

关键词：巡检机器人；云台控制；Faster R-CNN；模糊 PID

Research on inspection robot PTZ control based on

faster R-CNN and fuzzy PID

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Abstract：As the carrier of vision for intelligent inspection robots, the pan/tilt system carries the core functions of the inspection robot. The traditional PTZ operation mode based on preset positions appears to be weak in substations, power plants and other complex environments. Aiming at the problem of less pre-position and slow response of the PTZ in complex environments, a PTZ control strategy based on Faster R-CNN and fuzzy PID is proposed.To detect and identify targets in the PTZ transmission image using Faster R-CNN. According to the position relationship between the target and the picture, the motion direction of the PTZ is judged, and the error of the center coordinate is calculated and sent to the fuzzy PID controller for parameter adjustment to achieve the purpose of controlling the PTZ. Experimental results show that the use of Faster R-CNN for target detection and identification can achieve an accuracy of 90.8% and run in milliseconds. The fuzzy control enables PTZ to respond quickly and run smoothly,and the application results is good.

Key words： inspection robot；PTZ control；Faster R-CNN；fuzzy PID

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