

基于机器视觉的农业车辆路径跟踪 Path Tracking of Agricultural Vehicle Based on Machine Vision

刘兆祥 陈艳 籍颖 刘刚 张漫 周建军

中国农业大学

关键词: 机器视觉 自动导航 随机霍夫变换 模糊逻辑 PID控制

摘要: 简述了一种基于机器视觉的农业车辆自动导航系统。提出了直线检测算法,显著降低了内存需求和时间消耗;以横向偏差和航向偏差作为输入量,构建了二维模糊决策器,对期望前轮转角进行决策;构建了基于PID的转向控制器,实现前轮转向控制,并采用简化的两轮车运动学模型进行了仿真。仿真和实验结果表明,该导航系统可以有效地实现直线路径跟踪。当车速为0.3m/s时,最大跟踪横向偏差不超过5cm,平均偏差不超过2cm;当车速为0.6m/s时,最大跟踪横向偏差不超过8cm,平均偏差不超过4cm。An autonomous navigation system based on machine vision for agricultural vehicle was studied. A novel line detection algorithm was proposed for navigation directrix detection, which could decrease the cost of memory and time considerably. A 2-D fuzzy controller with the inputs of lateral error and heading error was built to determine the expected angle of turning wheel, and a turning controller based on PID was constructed to control the turning of front wheel. The simplified kinematics model of two-wheel vehicle was adopted for simulation. The results of simulation and experiments indicated that the navigation system could track the desired beeline path effectively. The maximum tracking lateral error was less than 5cm and 8cm at the speed of 0.3m/s and 0.6m/s respectively, and the average lateral error was less than 2cm and 4cm respectively.

[查看全文](#) (请使用Adobe Acrobat 6.0版本浏览) [返回首页](#)

[引用本文](#)