

番茄收获机械手避障运动规划

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摘要: 基于伪距离避障法,以机械手可操作度作为优化指标,采用性能优化与正运动学迭代相结合的方法,进行了番茄收获机械手连杆避障运动规划与仿真。试验结果表明,机械手臂能够沿预定路径成功避开障碍物到达目标位置,并能保证良好的可操作性性能,各关节位置变化连续、平滑,无关节越限现象,末端执行器位置绝对误差为0.87mm,运动速度为0.18m/s,机械手能够满足番茄收获的精度和生产率要求。Free-obstacle motion planning of a tomato harvesting manipulator was studied based on a pseudo-distance approach. An optimization technique and alternative approach using a forward kinematics was applied to solve the path planning, which was modeled with consideration of manipulability measure maximization and obstacle avoidance for links of the manipulator. The simulation results show that the tomato harvesting manipulator can avoid obstacles successfully and reach the objective position along a specified geometric trajectory with optimal manipulability. The joints displacement varies smoothly within their limits. The position absolute error and moving rate of the end-effector are 0.87 mm and 0.18 m/s respectively. the harvesting manipulators can fulfill the accuracy of tomato picking with well working efficiency.

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