

水果收获机器人避障路径规划

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摘要: 在综合分析路径规划研究的基础上, 采用基于概率地图的路径规划方法, 运用启发式搜索算法对水果收获机器人机械臂运动路径进行实时规划。在搜索过程中, 以位姿点密度作为权重使路径向自由空间扩散, 避免过度采样。为提高路径规划速度, 采用延迟碰撞检测策略, 可有效降低计算量。采用有向包围盒进行碰撞检测。最后利用虚拟现实技术, 对水果收获时要绕过的支架和狭窄区域进行三维计算机模拟。结果显示, 路径规划时间均小于0.15 s, 达到实时要求。In research of path planning of fruit picking robot the probabilistic roadmap method is adopted to achieve on-line planning with heuristic search arithmetic. At the sampling and searching stage, the density of samples in neighborhood was used as weight to control expansion of roadmap and avoiding over sampling in free space. After finding out best path, we used hierarchical decomposition methods to detect collision, which based on oriented bounding boxes. When picking the fruit, a robot usually needs to round over shelf and pass through narrow region. We simulated these two typical situations with virtual reality technique. The results show that a path planning cycle is less than 0.15 s and meets the request of real-time.

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