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Abstract
This thesis presents the design concepts of the intelligent sensory system for navigation controls of a shopping service robot. In which, a sonar system is used to detect environmental information for map building/modification or obstacle avoidance controls. Besides, an infrared sensory system is used to estimate the distribution of the crowd, which aims to assist the sonar system in navigating in crowded passages by voicing and warning those who in front of the robot against staying in the possible passages. To voice and then to disperse people is an efficient way which could not only reduce unnecessary obstacle avoidance controls but also decrease the computation of the collision-free navigation. Since every intersection could be regarded as a sub-goal point in the local navigation, the robot just executes local obstacle avoidance controls between two intersections for navigation. Meanwhile, the intersection would be detected by two proximity sensors. In this thesis, the intelligent sensory system is integrated by a set of fuzzy controllers, which mainly includes two sub-fuzzy controllers; each of them provides wall following navigation and obstacle avoidance control respectively. The simulation and experimental results show that the robot is indeed capable of performing self-navigation within the shopping environment by the proposed intelligent sensory system.
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