Research on Climbing Stairs for An Autonomous Vision-Guided Robot Wheelchair

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ABSTRACT

In this thesis an autonomous vision-guided technology is applied to our developed novel robot wheelchair for stair-climbing. In order to climb a flight of stairs automatically for the robot wheelchair, a CCD camera mounted on this robot wheelchair will be used to detect stairs. Since there exist large differences on stair environment, the boundaries of all stairs are confined to a straight lines, and all of them are perpendicular each other. After carrying out the detection of stair boundaries and imagine processing, the captured image coordinates will be transformed into the real-world coordinates. The corresponding rotational angles for each arm, or the motor commands can be calculated using kinematics and one-step-ahead motion planning algorithm, so that the autonomous vision-guided stair climbing can be implemented. Finally, from the implemented experiments, it is shown that the robot wheelchair can climb stairs autonomously using the vision-guided technology.

Keywords : robot wheelchair ; autonomous vision guidance ; machine vision ; stairs

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