

Abstract

Ahmed Khamies El-Shenawy

Controlling a Holonomic Mobile Robot With Kinematics Singularities

In this paper a method is presented to control a holonomic mobile robot with singularities. The robot has 3 castor wheels, each wheel actuated by its angular velocity only. Using the proposed approach, singular wheel configurations are escaped without adding steering actuation to any wheel. The wheel coupling equation (WCE) virtually actuates the steering angular velocity of one wheel through controlling the actuated angular velocities of the other two wheels. Basing on the WCE and a cascaded control structure a standard wheel velocity controller is used to control the velocity of the robot. Simulations and practical experiments are carried out to illustrate the performance of the proposed approach and controller.