

Abstract

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Kinematic modeling of omnidirectional mecanum wheeled mobile robot

One of the main concerns about wheeled mobile robots is the presence of singular points within their workspaces. In singular positions the robot loses one or several degrees of freedom. This means that the robot cannot move along (or around) some directions. It is difficult to control the robot mechanism in singular position. The avoidance of these singular positions has to be taken into consideration when selecting the design parameters. A prerequisite to this is through knowledge about the effect of design parameters and constraints on singularity. In this paper, quality condition index was introduced as a criterion for evaluating singularities of different configurations of a mecanum wheeled mobile robot obtainable by different design parameters. It was illustrated that this method can effectively be employed to obtain the optimum configuration of mecanum wheeled mobile robot with the aim of avoiding singularity within the workspace. Simulation results of this method are provided to demonstrate the performance of the proposed modeling approach. This method maybe employed to design the wheeled mobile robot with different arrangements of mecanum wheels.