

Abstract

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Dynamic Model of a Holonomic Mobile Robot with Actuated Caster Wheels.

A dynamic model for the holonomic mobile robot C3P is proposed. The C3P has three caster wheels with angular velocities actuation. The model consists of two main dynamic equations which have been derived symbolically using a Lagrange approach. The first equation is the forward dynamics which is used to calculate the wheels angular velocities corresponding to the applied torques on the wheels. The second equation is the steering dynamic estimator for recursive calculation of the steering angles and their derivatives with respect to the wheel angular velocities and acceleration. The velocity control of the C3P using the dynamic model is simulated and compared to the kinematics based controller which have been proposed earlier. The simulation and experimental results clearly show the advantages of the dynamic model in relation to the kinematic one.