SPEED CONTROL SYSTEM DESIGN OF ELECTRIC WHEELCHAIR BASED DISTURBANCE OBSERVER

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ABSTRACT

Electric wheelchair provides meaningful functionality for users who have physical limitations. One type of wheelchair used is a differential steering with two main drive wheels. Two wheels are connected to a dc motor and generally controlled using PID controllers. PID performance is inconsistent in the face of change (uncertainty) the characteristics of a dc motor so that it always should be re-tuning to adjust the characteristics of a new dc motor. Disturbance observer controller-based (DOB) has advantages in overcoming the shortcomings of the other controllers such as PID.

DOB design process requires a mathematical model of dc motors that are identified in order to determine the compensators, filters and mathematical models of dc motor inverse form. Compensator set the left and right wheels to represent the speed and direction of the wheelchair, while the DOB compensate disturbances or changes in the characteristics of dc motors.

Test the entire system with the disturbance, makes the occurrence of overshoot with amplitude increased by only about 0.01 rad / s for each increase in disturbances at the motor input of 1 volt and the system will be stable for 3 s after a given disturbance.

Key Words: Disturbance Observer, Uncertainty, Wheelchair