

Design and Motion Control of a Two-Wheel Inverted Pendulum Robot

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Abstract : Two-wheel inverted pendulum robot (TWIPR) is designed with two-hub DC motors for human riding and motion control evaluation. In order to measure the tilt angle and angular velocity of the inverted pendulum robot, accelerometer and gyroscope sensors are chosen. The mobile robot's moving position and velocity were estimated based on DC motor built in hall sensors. The control kernel of this electric mobile robot is designed with embedded Arduino Nano microprocessor. A handle bar was designed to work as steering mechanism. The intelligent model-free fuzzy sliding mode control (FSMC) was employed as the main control algorithm for this mobile robot motion monitoring with different control purpose adjustment. The intelligent controllers were designed for balance control, and moving speed control purposes of this robot under different operation conditions and the control performance were evaluated based on experimental results.

Keywords : balance control, speed control, intelligent controller, two wheel inverted pendulum

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