

Balancing and Synchronization Control of a Two Wheel Inverted Pendulum Vehicle

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Abstract : A two wheel inverted pendulum (TWIP) vehicle is built with two hub DC motors for motion control evaluation. Arduino Nano micro-processor is chosen as the control kernel for this electric test plant. Accelerometer and gyroscope sensors are built in to measure the tilt angle and angular velocity of the inverted pendulum vehicle. Since the TWIP has significantly hub motor dead zone and nonlinear system dynamics characteristics, the vehicle system is difficult to control by traditional model based controller. The intelligent model-free fuzzy sliding mode controller (FSMC) was employed as the main control algorithm. Then, intelligent controllers are designed for TWIP balance control, and two wheels synchronization control purposes.

Keywords : balance control, synchronization control, two-wheel inverted pendulum, TWIP

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