Study of Dynamic Balancing Control for A Riderless Bicycle

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ABSTRACT

This thesis is focused on designing and realizing the balancing control system of an unmanned bicycle. The control system of the unmanned bicycle is based on the steering control system that is implemented by PID controllers in an industrial personal computer (IPC). A data measurement system for the bicycle is developed, which measures the roll angle of the bicycle body, the steering angle of the front fork, and the bicycle speed. The steering control system driven by a servomotor is designed to simulate the steering control of the rider. These data are provided to the controller implementing the calculation. The bicycle speed and roll angle are controlled independently. The speed control is achieved by one control loop with a PID controller and a PWM, and the roll-angle control by two control loops, where the outer is to generate the reference steering angle by a PID controller, and the inner is to control the steering angle following the reference, also by a PID controller. The data acquisition program and the control program used are written by LabVIEW. The experimental data are used to show the feasibility of the proposed system and controller.

Keywords : Riderless Bicycle   PID   IPC

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