Performance comparison between Sliding Mode Controller SMC and Proportional-Integral-Derivative PID controller for a highly nonlinear two-wheeled balancing robot

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ABSTRACT
The research on two-wheels balancing robot has gained momentum due to their functionality and reliability when completing certain tasks. This paper presents investigations into the performance comparison of Sliding Mode Controller (SMC) and Proportional-Integral-Derivative (PID) controller for a highly nonlinear 2-wheels balancing robot. The mathematical model of 2-wheels balancing robot that is highly nonlinear is derived. The final model is then represented in state-space form and the system suffers from mismatched condition. Two system responses namely the robot position and robot angular position are obtained. The performances of the SMC and PID controllers are examined in terms of input tracking and disturbances rejection capability. Simulation results of the responses of the nonlinear 2-wheels balancing robot are presented in time domain. A comparative assessment of both control schemes to the system performance is analyzed and discussed.

KEYWORDS:
SMC; PID; balancing robot

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