Simulation and Analysis of Inverted Pendulum Controllers

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Abstract : The inverted pendulum is a highly nonlinear and open-loop unstable system. An inverted pendulum (IP) is a pendulum which has its mass above its pivot point. It is often implemented with the pivot point mounted on a cart that can move horizontally and may be called a cart and pole. The characteristics of the inverted pendulum make identification and control more challenging. This paper presents the simulation study of several control strategies for an inverted pendulum system. The goal is to determine which control strategy delivers better performance with respect to pendulum's angle. The inverted pendulum represents a challenging control problem, which continually moves toward an uncontrolled state. For controlling the inverted pendulum. The simulation study that sliding mode control (SMC) control produced better response compared to Genetic Algorithm Control (GAs) and proportional-integral-derivative(PID) control.

Keywords : Inverted Pendulum (IP) Proportional-Integral-Derivative (PID), Genetic Algorithm Control (GAs), Sliding Mode Control (SMC)

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