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Title of thesis resource: Design and manufacturing of Two Wheel Balancing Robot.

Abstract:

Inverted Pendulum is a classical problem in dynamic and control. The Fundamental Case is when pendulum is mounted on a cart and can be balanced with moving cart to back and forth. The goal of this thesis is designing and manufacturing an inverted pendulum on coaxial wheels instead of cart. Moving and turning of robot should be controlled using remote control. First mathematical model of robot is extracted then a PID and LQR controllers is simulated on it. In implementation phase, a PID controller is used for balancing the robot. A gyro sensor and an accelerometer sensor are used to measure pendulum angle. To obtain a smooth angle with minimum noise and drift, data of sensors are combined with KALMAN filter. The Robot can keep its balancing well, but simulation results show that to have control on position of robot it is better to use LQR controller instead of PID controller in implementation phase.