ABSTRACT

Balancing a two-wheeled robot is a mobile robot that has two wheels on the right and left sides that are not balanced when without a controller. This robot balancing is a development of a dynamic model of an inverted pendulum placed on a wheeled train. To make this two-wheeled robot balanced requires a good control method to maintain the position of the robot in a state perpendicular to the surface of the earth.

In this Final Project the Mega Arduino microcontroller, accelerometer sensor, and dc encoder motor and LQ Servo are used as control methods. LQ Servo is a control method that determines the gain of the controller so that the input to the system is optimal so that the balancing of this robot can maintain its position perpendicular to the surface of the earth in a flat plane. The test results show that this LQ Servo can be applied to robot balancing.

In this Final Project several tests have been carried out. First, DC Motor is tested to determine unknown parameters. Secondly, testing the slope of the robot's angle to determine the maximum slope of the angle that can be compensated by the robot. The third is a comparison test between simulations and test results which aims to find the accuracy of the models that have been made. Finally, test for the step response to robot.

Keywords**:** LQ Servo, Balancing Robot, Kalman Filter