ABSTRACT

Balancing is an ability to maintain the state of an entity in an equilibrium or a stable state without external help.

Balance is essential for a two-wheeled vehicle such as bicycles and motorcycles. It takes tremendous effort for the rider/user to balance the vehicle on either stationary or moving condition. In this final project, the author implements and designs a balancing tool on a bicycle that can maintain balance on the bike using the concept of inertia wheel pendulum and PD as the control method of this tool. The balance can be achieved by utilizing both the rotation and acceleration of a reaction wheel producing angular momentum as a balancing momentum for the bike. The input on this system is from the gyroscope sensor value that has been filtered and then calculated as a PWM output by the microcontroller to DC motor connected to the reaction wheel.

Several tests had been carried out for the final project. The maximum deviation for maintaining balance was proven from the range of 0 to 4 degrees both left and right direction. It was achieved using a gradual PWM change after the input from MPU6050 sensor had been filtered using Kalman filter. The assembled bike had a dimension of $60cm \times 10cm \times 25cm$ $(W \times L \times H)$.

Keywords*: Balance, Momentum Angle, Filter, MPU6050 Sensor, Reaction Wheel.*