

## **Abstract**

The two-wheeled robot rack is one of the applications of the inverted pendulum system is a two-wheeled control robot that applies an inverted pendulum system where gravity is in an inverted position above the rotating axis which makes the system unbalanced, so it takes a system that functions as a counterweight. Therefore, we need a control system that can make the pendulum balanced. The purpose of this research is to design and analyze a two-wheeled robot control system in order to maintain stabilization at a certain angle by getting input from the MPU 6050 sensor. This system uses Proportional Integral and Derivative (PID) control. The PID control system will later create a program in the Arduino microcontroller whose results are used to control the speed and direction of the DC motor rotation, as well as the predetermined angle data value. If the angle obtained exceeds the set value, the DC motor will rotate back and forth. This study found that the robot performs a balanced movement with parameter values  $K_p = 160$ ,  $K_d = 1.3$ ,  $K_i = 100$ . The navigation system will be controlled via a smartphone via a Bluetooth module embedded in the robot.

**Keywords:** Two Wheel Robot Rack, PID, MPU 6050, Navigation