ABSTRAK

Autonomous Ground Vehicles (AGVs) face stability challenges when operating on uneven outdoor terrains. This study aims to evaluate the effectiveness of a Proportional-Integral-Derivative (PID) controller in maintaining the speed stability of four DC motors. The scope of the research focuses on the use of PG45 motors and rotary encoder sensors within the Telkom University park area.

The research methodology includes architectural design, system modeling for PID parameter tuning, and the implementation of the control algorithm on an Arduino microcontroller. A series of field tests were then conducted to directly assess the performance of the AGV in relevant outdoor environments.

The results indicate that the PID control system successfully maintained motor speed according to the setpoint while effectively minimizing error. The AGV demonstrated stable movement when traversing uneven surfaces, confirming that PID is a reliable solution for ensuring AGV motion stability in outdoor conditions.

Key Word: *Autonomous Ground Vehicle* (AGV), Control PID, Motor DC, *Rotary Encoder*.