ABSTRACT

With a low average number of steps per day and supported by rapid growth in the logistics services sector. Automated mobile robots are an efficient transportation or logistics solution. The mobile robot can operate automatically outdoors with the Outdoor Localization method (localization outside the room). Localization is done by utilizing sensor fusion in the form of IMU, GPS, and encoder. Differences in the characteristics of the sensors used cause differences in sampling time and noise characteristics. In addition, in controlling the speed of the mobile robot, a separate system is needed between the motor and turning direction regulator. Thus, in this study the mobile robot will implement the Kalman Filter to overcome differences in sensor characteristics and Ackerman Steering in order to reduce slip and adjust the speed when turning which is commonly used in 4-wheeled vehicles. navigation. Ziegler-Nichols PID control is also applied to automatic mobile robots as Position Control and Speed Control so that it can run according to the given purpose. The speed PID control implemented with Kp: 7, Ki: 10, and Kd: 0.1 resulted in a Settling Time of 4.3s while the position PID control (Steering) with Kp: 0.5, Ki: 0.05, and Kd: 0.01 results in a Settling Time of 40s. By implementing the Kalman Filter, it can overcome GPS readings that jump so that the mobile robot can stop at the target point with a tolerance value of 1 meter.

Keywords: *Mobile Robot, Outdoor Localization, Kalman Filter, Position Control, Speed Control.*