

ABSTRAK

Robot berkaki seperti *quadruped* seringkali mengalami hambatan dalam pergerakan dinamis seperti maju, mundur, kanan, dan kiri karena adanya eror sudut pada motor servo, maupun terjadinya selip pergerakan kaki robot dengan lantai. Hal tersebut menyebabkan robot tidak dapat berjalan lurus pada orientasinya dan bergerak miring ke arah yang tidak diinginkan. Oleh karena itu, digunakan metode kontrol orientasi pada sumbu z (*yaw*) untuk membantu robot tetap berjalan lurus di arah orientasi yang diinginkan. Kemudian, digunakan metode Kalman *Filter* untuk mengurangi timbulnya *noise* dan mengurangi *error drifting* pada pendeteksian sensor IMU (MPU6050 dan HMC5883L). Hasil penelitian yang dilakukan memperoleh nilai kestabilan pada sensor IMU hasil Kalman *filter* sebesar 72,2% dengan maksimum *drift* 1° per menit. Nilai akurasi hasil Kalman terhadap sudut aktual yaitu 96,21% dan presisi sebesar 98,77%. Adapun keberhasilan robot dalam melakukan *path following* di arena Labirin 2D yaitu sebesar 55% dengan rata-rata eror kemiringan 2,27°.

Kata Kunci: Robot *Quadruped*, Sensor IMU, Kontrol Orientasi, Kalman Filter, *Path Following*

ABSTRACT

Quadrupedal legged robots often faced challenges in dynamic movements such as forward, backward, right, and left motions due to servo motor angle errors and slippage between the robot's legs and the floor. These issues resulted in the robot deviating from its intended orientation, causing it to move in undesired directions. In response to this, an orientation control method along the z-axis (yaw) was employed to assist the robot in maintaining a straight trajectory in the desired orientation. Additionally, the Kalman Filter method was utilized to mitigate noise and reduce drifting errors in the inertial measurement unit (IMU) sensors (MPU6050 and HMC5883L). The research yielded a stability value of 72.2% for the IMU sensor after Kalman filtering, with a maximum drift of 1° per minute. The accuracy of the Kalman-filtered angles compared to the actual angles was 96.21%, with a precision of 98.77%. Furthermore, the robot demonstrated a 55% success rate in path following within a 2D Maze arena, with an average inclination error of 2.27°.

Kata Kunci: *Quadruped Robot, IMU Sensor, Orientation Control, Kalman Filter, Path Following*