

ANALISIS KINERJA ROBOT LINE FOLLOWER BERBASIS OS INTERNAL MELALUI PENGUKURAN TEGANGAN DAN KECEPATAN MOTOR

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ABSTRAK

Robot line follower merupakan salah satu media pembelajaran yang banyak digunakan dalam pendidikan teknik karena mampu Menunjukkan integrasi antara sensor, aktuator, dan sistem kendali secara aplikatif. Pada generasi terbaru, *robot line follower* umumnya telah dilengkapi sistem operasi internal (*OS Internal*) yang mengatur seluruh proses navigasi secara otomatis tanpa pemrograman tambahan dari pengguna. Namun, keterbatasan akses terhadap algoritma internal membuat evaluasi performa hanya dapat dilakukan melalui pengukuran parameter fisik seperti tegangan dan kecepatan motor. Penelitian ini bertujuan untuk menganalisis kinerja *robot line follower* berbasis *OS Internal* melalui pengukuran tegangan suplai dan kecepatan motor (*RPM*) sebagai indikator utama kestabilan gerak. Metode penelitian menggunakan pendekatan kuantitatif eksperimental dengan pengujian langsung pada *robot* menggunakan multimeter digital dan tachometer. Hasil penelitian Menunjukkan bahwa terjadi penurunan tegangan ketika *robot* bergerak dibandingkan kondisi *idle*, yang berdampak langsung pada penurunan *RPM* motor kiri dan kanan. Selain itu, perbedaan *RPM* antar motor berpengaruh terhadap kestabilan *robot* dalam mengikuti jalur. Hubungan tegangan–kecepatan motor Menunjukkan kecenderungan linier sesuai teori motor *DC*. Dengan demikian, evaluasi parameter fisik terbukti efektif dalam menilai performa *robot* ber-*OS Internal* dan relevan untuk penggunaan *robot* edukasi di lingkungan perguruan tinggi.

Kata Kunci: *robot line follower*, *OS Internal*, tegangan, *RPM*, motor *DC*, sistem kendali.

PERFORMANCE ANALYSIS OF INTERNAL OS BASED LINE FOLLOWER ROBOT THROUGH MOTOR VOLTAGE AND SPEED MEASUREMENTS

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ABSTRACT

Line follower robots are widely used as educational tools in engineering programs because they demonstrate the integration of sensors, actuators, and control systems in a practical and observable manner. The latest models commonly include an internal operating system (internal OS) that autonomously manages navigation processes without requiring user programming. However, limited access to the embedded control algorithms restricts performance evaluation to physical measurements such as supply voltage and motor speed (RPM). This study aims to analyze the performance of a line follower robot equipped with an internal OS by measuring its operating voltage and motor speed as primary indicators of motion stability. A quantitative experimental method was applied using direct testing with a digital multimeter and tachometer. The results show that the robot experiences voltage drops during movement compared to idle conditions, which directly affects the RPM of both motors. Differences in motor speed also influence the robot's ability to maintain stable path-following behavior. The relationship between voltage and motor speed exhibits a linear trend consistent with DC motor theory. Therefore, evaluating physical parameters is proven effective for assessing the performance of internally controlled robots and is highly relevant for educational use in university laboratory environments.

Keywords: line follower robot, internal OS, voltage, RPM, DC motor, control system.