

**ANALISIS PENGARUH ENKRIPSI RIVEST-SHAMIR-
ADLEMAN TERHADAP PENGENDALI PID NIRKABEL
PADA KENDALI POSISI SUDUT MOTOR DC**

TUGAS AKHIR

Karya Ilmiah sebagai salah satu syarat untuk menyelesaikan jenjang Strata Satu (S-1) di Jurusan Teknik Elektro, Fakultas Teknik, Universitas Andalas.

Oleh:

M. Sean Mahogra Radi
NIM. 2010952044

Pembimbing:

Dr. Darmawan, M. Sc
NIP. 197708162005011002



**Program Studi Sarjana
Teknik Elektro
Fakultas Teknik
Universitas Andalas
2025**

Judul	Analisis Pengaruh Enkripsi Rivest-Shamir-Adleman Terhadap Pengendali PID Nirkabel Pada Kendali Posisi Sudut Motor DC	M. Sean Mahogra Radi
Program Studi	Teknik Elektro	2010952044
Fakultas Teknik Universitas Andalas		
ABSTRAK Penggunaan sistem kendali nirkabel semakin meluas karena fleksibilitasnya, namun juga meningkatkan risiko keamanan data. Untuk mengatasi hal ini, enkripsi RSA dapat digunakan dalam komunikasi data kendali, meskipun berpotensi memengaruhi kinerja sistem <i>real-time</i> seperti pengendali PID. Penelitian ini menganalisis pengaruh enkripsi RSA terhadap performa kendali posisi sudut motor DC menggunakan sistem PID berbasis <i>webserver</i> dan komunikasi nirkabel. Enkripsi diterapkan pada komunikasi data antara <i>webserver</i> dan <i>driver</i> melalui protokol TCP dan UDP. Hasil pengujian menunjukkan bahwa enkripsi RSA menyebabkan keterlambatan respon sistem. Pada komunikasi TCP, <i>delaytime</i> naik 0.177 detik, <i>steady state error</i> naik 1.387°, <i>risetime</i> naik 0.115 detik, <i>settlingtime</i> naik sebesar 0.672 detik. Pada komunikasi UDP, <i>delaytime</i> naik 1.341 detik, <i>overshoot</i> naik 1.61%, <i>risetime</i> naik sebesar 0.038 detik, <i>peaktime</i> naik 1.495 detik, <i>settlingtime</i> naik sebesar 1.327 detik, <i>steady state error</i> naik 0.871°, dan persen <i>overshoot</i> lebih besar 1.61%. Kata kunci: Pengendali PID, Motor DC, Enkripsi RSA, Kendali Nirkabel, <i>Transmission Control Protocol</i>, <i>User Datagram Protocol</i>		

<i>Title</i>	<i>Analysis of the Effect of Rivest-Shamir-Adleman Encryption on Wireless PID Controller on DC Motor Angular Position Control</i>	M. Sean Mahogra Radi
<i>Mayor</i>	<i>Electrical Engineering</i>	2010952044
<i>Engineering Faculty Andalas University</i>		
ABSTRACT <i>The use of wireless control systems is becoming increasingly widespread due to their flexibility; however, it also raises concerns about data security. To address this issue, RSA encryption can be applied to control data communication, although it may affect the performance of real-time systems such as PID controllers. This study analyzes the impact of RSA encryption on the performance of angular position control of a DC motor using a PID system based on a webserver and wireless communication. Encryption is applied to data transmission between the webserver and the driver using TCP and UDP protocols. Test results show that RSA encryption causes delays in system response. In TCP communication, delay time increased by 0.177 seconds, steady-state error increased by 1.387°, rise time increased by 0.115 seconds, and settling time increased by 0.672 seconds. In UDP communication, delay time increased by 1.341 seconds, overshoot increased by 1.61%, rise time increased by 0.038 seconds, peak time increased by 1.495 seconds, settling time increased by 1.327 seconds, steady-state error increased by 0.871°, and percent overshoot was 1.61% higher.</i> <i>Keywords: PID Controller, DC motor, RSA encryption, Wireless controller, Transmission Control Protocol, User Datagram Protocol</i>		