ABSTRAK

Peralihan sistem kontrol manual ke sistem kontrol otomatis berbasis jaringan data yang lebih efektif dan efisien. Sistem kontrol berbasis jaringan data, atau lebih dikenal sebagai *Networked Control System* (NCS). NCS biasa digunakan sebagai kontrolernya dimana memungkinkan lebih banyak aktuator dan sensor terhubung dengan jaringan. Performa kontrol sering mengalami gangguan pada *plant*. Maka dari itu diperlukan metode untuk meminimalkan gangguan tersebut berupa *noise.*

Plant yang digunakan berupa motor DC karena mempunyai karakteristik kecepatan yang variatif. NCS akan dianalisis menggunakan metode *Linear Quadratic Gaussian* (LQG). LQG adalah sistem kontrol optimal yang digunakan untuk mendesain dinamik optimal regulator dan estimator optimal (filter kalman) yang berfungsi mengestimasi variabel keadaan dan menyaring *noise*.

Dari penelitian yang telah dilakukan, didapat hasil pengujian motor DC tanpa regulator LQG pada NCS sudah sesuai spesifikasi yang telah ditentukan seperti, nilai *settling time* ≤ 1,78 detik, *rise time* ≤ 0,7 detik, persentase overshoot ≤ 2%, *steady state error* ≤ 0,5 % dan respon sistem stabil. Sedangkan, hasil pengujian motor DC dengan regulator LQG pada NCS sudah sesuai dengan spesifikasi yang ditentukan dan sistem stabil namun, belum bekerja sempurna. Hal tersebut dikarenakan hasil respon sistem lebih besar dari *set point*.

Kata kunci : Filter Kalman, *Linear Quadratic Gaussian (*LQG), *Linear Quadratic Regulator* (LQR), Motor DC, *Networked Control System*(NCS), Performa Sistem

ABSTRACT

Manual control system transition into automatic control system based on data network which is more effective and efficience. Data network based control system can be called as Networked Control System (NCS). NCS is used as a controller which allows more actuators and sensors that connected to the network. The control performanceis frequently impaired in the plant. Therefore, a method to minimize the diturbancein form of noice is needed.

The plant that will be used is DC motor. It is because the DC motor has varies speed characteristic that can be chosen. NCS will be analyze usng Linear Quadratic Gaussian (LQG) method. LQG is an optimal control system that can be used to design optimal dinamic regulator and optimal estimator (kalman filter) which is has function to estimate state variable and to filter the noise.

By this research, can be seen that implementation of NCS without LQG regulator works well. The system response has meets the needs needs with settling time ≤ 1.78 seconds, rise time ≤ 0.7 seconds, the percentage of overshoot ≤ 2%, steady state error ≤ 0.5%. and also the system was stable. However the implementation of NCS with LQG regulator works not perfect yet. It is because the system response results is bigger than the set point. Yet some of results has meet the needs and also the system was stable.

Keywords: Kalman Filter, Linear Quadratic Gaussian (LQG), Linear Quadratic Regulator (LQR), DC Motor, Networked Control System (NCS), System Performance