ECE552
Control Systems Design II
Project Report

Overview: This term we have introduced the Non-Minimal State Space (NMSS) system description of discrete time systems as well as an effective means to design and simulate an LQR control design. This design enables full state feedback without the need to incorporate an observer despite the fact that only output and input variables are measured. The design approach was applied to both minimum and non-minimum phase systems. (Recall that use of the LQG/LTR design methodology requires that the system features a minimum phase response. LQG design involves optimal pole placement via an LQR formulation together with optimal observer design using a Kalman filter. Loop Transfer Recovery (LTR) is subsequently used to recover the desired properties of an LQR design). The weighting matrices used in our LQR NMSS design, namely, $\boldsymbol{Q}$ and $\boldsymbol{r}$, were optimized using a Differential Evolution algorithm which minimized the disturbance response using a step input.

Report: You are now asked to document to work as described above. This should use the format of an IEEE paper, which typically is broken down into the following sections:

1) Abstract
2) Introduction
3) General overview
4) Design procedure and results
5) Conclusion
6) References
7) Appendices

Other sections may be added and each section may be further subdivided when appropriate. Recall the wider discussion in class concerning the presentation format.

If possible it is desirable to use Latex to format the report, as this is the de facto standard for academic papers.

Grading: Your report will be assessed based on, but not limited to, the following:

1) Completeness of the report
2) Accuracy and effectiveness of results presented
3) Effectiveness of the presentation and format

The report is an opportunity to present a compelling case for the use of the NMSS design methodology.

Email your completed report to tymerski@ee.pdx.edu.