EE621 Nonlinear Control (Spring 2008)

Guidelines for Final Projects

Project Formulation

Students can choose his/her own project as long as he/she talks to me and gets permission before carrying out the project. Students can also choose from one of the three projects that I posted:

Project 1: (based on Paper 1 and 2 posted)

Title: Designing flocking control for nonlinear cooperative systems.
Description: Qu *et. al.* presented cooperative control methods for a class of nonlinear systems using Lyapunov-theory based approach in Paper 1. The project is to apply the result of Paper 1 to solve flocking of nonlinear systems with switching topology. Flocking in fixed and switching networks for linear systems is discussed in paper 2.

Project 2: (based on Paper 3 posted)

Title: Stabilization of planar collective motion
Description: Sepulchre *et. al.* studied the problem of stabilization of planar collective motion in the all-to-all communication in Paper 3. The relevance and limitations of the proposed model and control design is discussed in Section VIII C. You can try to extend the result based on this discuss.

Project 3: (based on Project 3 posted)

Title: Control of Frictional Dynamics Through Surface Vibration
Description: See Project 3 posted.

Requirements

- Choose one of the topics suggested or any other with consent of the instructor
- Review the basics of the subject (background, definition, etc.)
- Demonstrate how Lyapunov direct method based approach can be applied to solve the stability analysis and/or control design
- Provide an illustrative example and simulate your results using Matlab
- Discuss the potential applications of the basic argument
- Write a technical report that provides the above details

Grading

The project will be graded by the quality of the submitted Final Report. It will be judged based on the completeness, technical correctness, innovation, organization, and presentation of the report. You could use either WORD or Latex to write your final report. Note that maybe you cannot solve the whole problem (which may be very difficult), but tell a good story of the sub-problem (a less-difficult problem) that you can solve, and spell out what's your contribution clearly.