CALIFORNIA INSTITUTE OF TECHNOLOGY
Control and Dynamical Systems

CDS 111
Project Proposal

R. Murray
Spring 1996

Issued: 6 May 96
Due: 13 May 96

Briefly describe your proposed course project. You should make sure to address the following issues in your proposal:

1. What hardware are you going to use for your project? All course projects must involve some physical experiment. Describe the interface hardware for the experiment (sensors, actuators, computation) in sufficient detail to insure that reasonable controllers can be implemented and tested.
2. What software are you going to use for your project? If you are doing anything more complicated than single linear controllers on the ducted fan, you will probably need to write or otherwise obtain some software. You should make sure that this exists or is easy to write.
3. What control design techniques are you going to try? How will you evaluate their effectiveness? What will you use as a baseline controller for comparison? What aspects of the system are you trying to capture using the design technique you have chosen? Is the design technique appropriate for observed behavior of the system and the available models?

All project proposals should be 1–4 pages long (handwritten is fine). Project proposals will be returned with comments. Students who are auditing the course will not be allowed to use course resources (the ducted fan, TA time, instructor time) unless they turn in a proposal and the proposal is approved.

Here are some suggested projects based on the ducted fan. If you choose one of these projects, you will still need to fill in the details and address the issues listed above.

- Gain scheduled control for aggressive trajectory tracking.
- Comparison of H_∞ and LQG controllers on the ducted fan. This can either be around hover or around a forward flight condition.
- Following the Honeywell MIMO control design guidelines, implement one of the following design techniques on the ducted fan:
  - Dynamic inversion
  - Eigenstructure assignment
  - μ synthesis
- Use system identification techniques to build up a sequence of more accurate models for the ducted fan and compare the differences in performance as a function of model fidelity.