Mechatronics MAE 491/591  
2004

Term Project  
This is a group project. Teams should ideally be 3 people. Model a real world mechatronics system of your choosing. Determine the characteristics of the system in terms of the frequency response and identified transfer function. Successfully apply an analog and digital control methodology for the system (regulation or trajectory following) for disturbance rejection. Compare and discuss results. Graduate students must have an academically more rigorous project by selecting either a non-linear single input single output SISO system (magnetic levitation, nonlinear springs, etc, backlash, h), or multi-variable system (2 sensor inputs required for example.

NOTE: Hardware projects are also acceptable for students with sufficient background.

Due Dates  
1. Project proposal 1/15/04  
2. Create model of existing of first design of device including one simulation due 2/12/04. This will not include control. This will  
3. Final completed project paper due 4/20/04  
4. Presentations on 4/20/04, 4/22/04

Your submittals should include  
1. Introduction  
2. Problem Statement/Device/process description  
3. Goal details improvement, specifications  
4. Create model including real values for all devices used using the internet. (inputs, outputs, components, sensors, actuators, etc.)  
Create block diagrams and transfer functions.  
5. Characterize the device including relevant graphics data (time-history simulation, Bode plots, etc.).  
Model all relevant components, controllers, sensors, power limits, etc.  
Use MATLAB or SIMULINK.  
6. Analyze the device and Design appropriate:  
   • analog controller and  
   • discrete controller  
7. Present the controller design and reasoning behind it.  
8. Model and simulate system for open-loop and closed-loop response  
9. Present model, analysis, results of open-loop and closed-loop systems  
   • Show how the controller improved your system response to attain your goals or specifications.
10. Conclusion and Recommendations  
11. References

Limit papers to 20 pages of text (11 point, normal spaced), not including figures or references. Submit hardcopy, Word file, and MATLAB m-files. Late papers will receive -20% per day.
Presentations
• 10 to 15 minutes
• Power point (bring zip, floppy or CD)

April 20, 2004
6:30 Josh, Patrick, Robby
6:45 Pittman and Johnson
7:00 Jason, James, Rachel

April 22, 2004
6:00 Bruce and Doug
6:15 David and Gustavo
6:30 Carl, Kristy, Deidre
6:45 Jeffery and Sean
7:00 Paul and Rachel