

Focused Independent Study Project (FISP)

(Final Exam)

ECE 6330 “*Nonlinear and Adaptive Control*”

Spring 2004 Offering

Due: April 26, and 28, respectively

Task(s):

1. Carry out an independent investigation on an advanced topic in *nonlinear control design* (*nonlinear analysis* is also OK).
2. Choose an appropriate example for controller design and simulation.
3. Prepare an electronic handout of at least 6 pages (two-column IEEE Conference format - refer to <http://www.paperplaza.net>)
4. Prepare and deliver a 25-35 minutes presentation describing your topic and example to the class and the Instructor. There will be a Q/A session after your presentation.
5. Note: you are not asked to write a publishable paper - you can repeat the published results in this FISP.

Details:

1. Choose one of the following topics if you do not have an idea on what your FISP topic should be:
 - (a) Backstepping Nonlinear Control Design
 - (b) Forwarding Nonlinear Control Design
 - (c) Adaptive feedforward control
 - (d) Nonlinear learning control
 - (e) Sliding Mode Control
 - (f) Robust Nonlinear Control
 - (g) Parameter Estimation
 - (h) Feedback Linearization
 - (i) Modern Gain Scheduling
 - (j) Networked Control System
 - (k) Lyapunov-Based Design
 - (l) Chaos Control
 - (m) Neural Adaptive Control
 - (n) Center Manifold Theory
 - (o) Topic of Your Own Choice (Approval of the Instructor is required!)
2. Study the appropriate section of the text or other books.

3. Find at least one article in the literature related to your topic (preferably from journals such as *IEEE Transactions on Automatic Control*, *ASME Journal of Dynamics, Measurement, and Control*, *Automatica*, etc. Please refer to Appendix-2 for a list of SCI journals related to systems control.). You can also find more information from the WWW links provided in Appendix-1, in addition to YAHOO.
4. Find a suitable example system, conduct a system analysis and/or controller design. Include simulations to illustrate your results. Note that your example may come from the paper in item 3), or it may come from a textbook or another paper.
5. Prepare a 25 minutes lecture on the chosen topic. Include examples and illustrations of the topic to aid understanding as appropriate.
6. Turn in the notes/handouts you use for your presentation, including the worked out example. Your notes can be detailed or in outline form, depending on your preferred style of presentation.
7. You can feel free to consult the Instructor.

APPENDIX - 1: Essential Systems Control Related Web Sites

1. <http://www.theorem.net/control.html> (a lot of links)
2. <http://www.ieeecss.org/> (E-letter, and other IEEE Control System Society publications)
3. <http://www.ifac-control.org/> (IFAC, Newsletter and Professional Briefs etc.)
4. <http://www.autsubmit.com/> (AUTOMATICA Editor-in-Chief's home)
5. <http://citeseer.nj.nec.com/> (Researchindex site where you can find a lot of online papers)
6. <http://xxx.lanl.gov/> (arXiv.org e-Print archive)
7. <http://ejournals.ebsco.com/Journal.asp?JournalID=100662> (International Journal of Control on line)
8. ...

APPENDIX - 2: Systems Control Related SCI (Science Citation Index) Journals Top journals in control are marked with (*)

1. AUTOMATICA(*) Bimonthly ISSN: 0005-1098 PERGAMON-ELSEVIER SCIENCE LTD, THE BOULEVARD, LANGFORD LANE, KIDLINGTON, OXFORD, ENGLAND, OX5 1GB
2. IEEE TRANSACTIONS ON AUTOMATIC CONTROL(*) Monthly ISSN: 0018-9286 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
3. IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY(*) Bimonthly ISSN: 1063-6536 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
4. SIAM JOURNAL ON CONTROL AND OPTIMIZATION(*) Bimonthly ISSN: 0363-0129 SIAM PUBLICATIONS, 3600 UNIV CITY SCIENCE CENTER, PHILADELPHIA, PA, 19104-2688
5. AUTOMATION AND REMOTE CONTROL Semimonthly ISSN: 0005-1179 MAIK NAUKA/INTERPERIODICA, C/O KLUWER ACADEMIC-PLENUM, PUBLISHERS., 233 SPRING ST NEW YORK, NY, 10013-1578
6. BIOLOGICAL CONTROL Quarterly ISSN: 1049-9644 ACADEMIC PRESS INC, 525 B ST, STE 1900, SAN DIEGO, CA, 92101-4495
7. IEE PROCEEDINGS-CONTROL THEORY AND APPLICATIONS Bimonthly ISSN: 1350-2379 IEE-INST ELEC ENG, MICHAEL FARADAY HOUSE, SIX HILLS WAY STEVENAGE, HERTFORD, ENGLAND, SG1 2AY
8. IEEE CONTROL SYSTEMS MAGAZINE Bimonthly ISSN: 0272-1708 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
9. IEEE TRANSACTIONS ON ULTRASONICS FERROELECTRICS AND FREQUENCY CONTROL Bimonthly ISSN: 0885-3010 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
10. INTERNATIONAL JOURNAL OF CONTROL Semimonthly ISSN: 0020-7179 TAYLOR & FRANCIS LTD, 11 NEW FETTER LANE, LONDON, ENGLAND, EC4P 4EE
11. JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME Quarterly ISSN: 0022-0434 ASME-AMER SOC MECHANICAL ENG, THREE PARK AVE, NEW YORK, NY, 10016-5990
12. JOURNAL OF GUIDANCE CONTROL AND DYNAMICS Bimonthly ISSN: 0731-5090 AMER INST AERONAUT ASTRONAUT, 1801 ALEXANDER BELL DRIVE, STE 500, RESTON, VA, 22091
13. JOURNAL OF PROCESS CONTROL Bimonthly ISSN: 0959-1524 ELSEVIER SCI LTD, THE BOULEVARD, LANGFORD LANE, KIDLINGTON, OXFORD, ENGLAND, OX5 1GB
14. MATHEMATICS OF CONTROL SIGNALS AND SYSTEMS Quarterly ISSN: 0932-4194 SPRINGER-VERLAG LONDON LTD, SWEEP-TAPPLE HOUSE, CATTESHALL ROAD, GODALMING, ENGLAND, GU7 3DJ
15. MODELING IDENTIFICATION AND CONTROL Quarterly ISSN: 0332-7353 MIC, DIV ENG CYBERNETICS, TRONDHEIM, NORWAY, 7034

16. CIRCUITS SYSTEMS AND SIGNAL PROCESSING Quarterly ISSN: 0278-081X BIRKHAUSER BOSTON INC, 675 MASSACHUSETTS AVE, CAMBRIDGE, MA, 02139
17. DISCRETE AND CONTINUOUS DYNAMICAL SYSTEMS Quarterly ISSN: 1078-0947 SOUTHWEST MISSOURI STATE UNIV, DEPT MATHEMATICS, SPRINGFIELD, MO, 65804
18. CYBERNETICS AND SYSTEMS ANALYSIS Bimonthly ISSN: 1060-0396 CONSULTANTS BUREAU, 233 SPRING ST, NEW YORK, NY, 10013
19. FUZZY SETS AND SYSTEMS Semimonthly ISSN: 0165-0114 ELSEVIER SCIENCE BV, PO BOX 211, AMSTERDAM, NETHERLANDS, 1000 AE
20. IBM SYSTEMS JOURNAL Quarterly ISSN: 0018-8670 IBM CORP, OLD ORCHARD RD, ARMONK, NY, 10504
21. IEEE INTELLIGENT SYSTEMS & THEIR APPLICATIONS Bimonthly ISSN: 1094-7167 IEEE COMPUTER SOC, 10662 LOS VAQUE-ROS CIRCLE, PO BOX 3014, LOS ALAMITOS, CA, 90720-1314
22. IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS Quarterly ISSN: 0018-9251 IEEE-INST ELECTRICAL ELEC-TRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
23. IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS I-FUNDAMENTAL THEORY AND APPLICATIONS Monthly ISSN: 1057-7122 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
24. IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS II-ANALOG AND DIGITAL SIGNAL PROCESSING Monthly ISSN: 1057-7130 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
25. IEEE TRANSACTIONS ON SYSTEMS MAN AND CYBERNETICS PART A-SYSTEMS AND HUMANS Bimonthly ISSN: 1083-4427 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
26. IEEE TRANSACTIONS ON SYSTEMS MAN AND CYBERNETICS PART B-CYBERNETICS Bimonthly ISSN: 1083-4419 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
27. IEEE TRANSACTIONS ON SYSTEMS MAN AND CYBERNETICS PART C-APPLICATIONS AND REVIEWS Quarterly ISSN: 1094-6977 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
28. IEEE TRANSACTIONS ON FUZZY SYSTEMS Quarterly ISSN: 1063-6706 IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST, NEW YORK, NY, 10017-2394
29. INTERNATIONAL JOURNAL OF GENERAL SYSTEMS Quarterly ISSN: 0308-1079 GORDON BREACH SCI PUBL LTD, C/O STBS LTD, PO BOX 90, READING, ENGLAND, RG1 8JL
30. MULTIDIMENSIONAL SYSTEMS AND SIGNAL PROCESSING Quarterly ISSN: 0923-6082 KLUWER ACADEMIC PUBL, SPUI-BOULEVARD 50, PO BOX 17, DORDRECHT, NETHERLANDS, 3300 AA
31. JOURNAL OF AIRCRAFT Bimonthly ISSN: 0021-8669 AMER INST AERONAUT ASTRONAUT, 1801 ALEXANDER BELL DRIVE, STE 500, RESTON, VA, 22091