Semester Project
Focused Literature Report
ECE 541a Automatic Control Systems

As documented in the course syllabus, the ECE 541a students need to complete a semester project worth five percent of their grade. Obviously, this project must be original and not a resubmission or a reworked version of another project. The project must also represent your own work. The details of the project are outlined below.

This project is designed to enhance your skills in the process of reading, studying, and learning from the control systems literature. You aren't expected to become an expert in the topical area you pursue, but you should become comfortable with the process and learn something about the topic you select.

The project consists of two parts.

Part One (Quantitative Data Collection about Papers): Part one consists of (i) completing an Introductory Tutorial on "How do I create a search strategy," (ii) identifying two or three papers to study, and (iii) reporting on the quantifiable aspects of each paper.

Part Two (Analysis of the papers): Part two consists of studying, comparing, and contrasting the selected papers and culminates with a report.

The following sections provide information and guidelines on the process of completing the project. At the end of this document, you will find words and sources that might be helpful in getting you started.

Part One Process:

(i) Complete the Introductory Tutorial provided by the University of Arizona Library on "How Do I Create a Search Strategy" (https://new.library.arizona.edu/tutorials/create-search-strategy/)
Follow the Tutorial Instructions and take a screen shot of your Quiz Results. You will submit a pdf of your "Quiz Results" screen shot to complete this step in Part One of the project. (Don't worry about your score on the tutorial. The main point of the Tutorial is to become more familiar with the library resources and the process of using the library facilities.)

(ii) Identify two or three journal papers you will study in this project. Use the words at the end of this document, the sources (journals/conferences), or the indexes, the table of contents, or the chapter references of the textbooks associated with this class to help target your search for papers. Or, select the papers based on something (controls-related) that you want to learn more about. Ideally, you want to select papers that you will be motivated to study! There are no right or wrong papers, as long as the papers are controls-related and scholarly. A scholarly paper is one that has been written by experts, is written for experts, and has been peer-reviewed. Some examples of non-scholarly papers, would be blog posts, newspaper articles, magazine articles, or social media posts. Also, the total number of pages in the papers you select should be less than 50. In this step, you will submit (a) a

bibliographic entry for each paper, (b) a brief description of the strategy you used to select the papers, and (c) a pdf copy of each paper.
For information on bibliographic format, refer to *The Chicago Manual of Style* or refer to Section 17.3 in the 2014 IEEE-SA Standards Style Manual.

Example: [1] Boggs, S. A., and N. Fujimoto, "Techniques and instrumentation for measurement of transients in gas-insulated switchgear," *IEEE Transactions on Electrical Installation*, vol. ET-19, no. 2, pp. 87-92, Apr. 1984.

(iii) Complete the spreadsheet based on your papers. In this step, you are simply reporting the quantifiable aspects of each paper. The data from each paper will be recorded in a single row of the spreadsheet. If you have two papers, then you will only need to complete two rows of the spreadsheet. The completed spreadsheet will constitute the completion of this step of Part One.

Part Two Process:

The end product from Part Two will be your report. This report is a "Focused Literature Report" and not a classical Literature Review, which would consist of many more papers and a slightly different objective. In your report, you are trying to concisely document the papers you selected by comparing and contrasting them.

You could start your report with a section that describes the theme or research question of each paper.

The final section of your report should contain an annotated bibliography of each paper. You may refer to Section 17.4.2 of the 2014 IEEE-SA Standards Style Manual for an example of an annotated bibliographic entry.

In between the beginning section of your report, which describes the theme of each paper, and the final section, which is an annotated bibliography of each paper, you might organize your report by answering approximately ten of the following questions.

1. Is there a gap between the contents in your papers and the material in ECE 541a?
2. Was there any similarity with how the papers were organized?
3. Did the papers share any common references? Authors?
4. What research questions were addressed in the papers?
5. Which paper did you like? Why?
6. What questions arise from comparing and contrasting the papers?
7. Are you able to generate a new hypothesis or any new theories that need to be investigated?
8. Have these questions already been asked and answered by others, since the publication of your selected papers?
9. Did this project identify other papers that you would read and study to further your research or inspire a new research direction?
10. What did you like about any or all of your papers?
11. What did you not like about any of the papers you selected?
12. Did you feel some of the material in any of your papers was unclear or confusing?
13. Do you think the authors missed anything?
14. Have there been any corrections to any of the papers?
15. Did their analysis and methodology seem justified?

16. Was the literature review in each paper sufficient?
17. Did any paper leave something out?
18. Would it be possible for the authors of your papers to have a debate?
    a. Imagine the authors of your papers sitting around a table.
    b. What conversation would that group have?
    c. Would there be complementary arguments?
    d. Would there be strong opinions and disagreement?
    e. What would be the theme of the discussion?
    f. How many viewpoints would exist?
    g. Would the authors of one paper win the debate?
19. Was the process followed in each paper systematic?
20. Could the research be duplicated? Was the research transparent?
21. Did the paper contain words that were unfamiliar?
22. Did the paper contain words that are used in ECE 541a?
23. Did the papers do a good job defining new words or terms?
24. Did you have to locate definitions or meanings of new words or phrases on your own?
25. Is the work generalizable? Are the results in the paper very specific to a particular set or group of systems or can the concepts and ideas be extended to many different systems? Is the research in a paper a special case, does it work for extreme cases, or does it work for typical cases? Did the paper clearly state the limitations or constraints on their work? For example, was it clear when their approach could be applied to a given system?
26. Is this research novel (new) or does this research extend previous research, i.e., is the research a completely new development or is the research cumulative?
27. Were some paper abstracts "better" than others? What makes the abstract better?
28. Did the papers have a "hook" in the introduction that made you want to read the paper? How did they create the hook? Was the hook a particular problem? Was the hook the need for a better solution?
29. Did the introduction let the reader know what to expect in the rest of the paper?
30. What did you think of their literature review? Was it thorough? Did they do a good job of finding themes or topics in the papers they reviewed? Did they group or organize their referenced papers that shared common themes or topics?
31. Did the author's provide some background on how their paper fits in with the existing literature?
32. Was is clear what the authors wanted the readers to take away from their paper?
33. Were the claims in the paper clear? Did they do a good job supporting their claims?
34. Were the results clearly stated and explained? How could the results section be improved in the papers?
35. Did their discussion follow logically from their results?
36. Was the conclusion effective at summarizing the paper?
37. Did the paper include opinion statements? If so, did the authors support their opinions with strong arguments?
38. What did you find interesting?
39. Was future research identified by each paper?
40. Did the paper provide descriptions or insights into what the next research steps should be? What are the next questions? What are the next steps?
41. Do you think any of your papers contained errors or misleading information?
42. Was the paper clearly written?
43. Do the introduction and conclusion sections of each paper provide the reader with a strong understanding of what was done in the paper?
44. Was the paper painful to read? Or, was the paper interesting? Was the paper full of good ideas?

45. Would you recommend the paper to someone else, if they were wanting to learn more about the paper's topic? If not, did this project make you aware of a better paper for learning about the topic?
46. What questions do you now have after studying these papers?
47. Given more time, would you pursue this topic further? If so, what would be your next steps? Are there other papers you would like to read? Would you like to formulate your own questions and pursue them with your own research?
48. If you would not pursue this topic, given more time, what topic or direction would you like to pursue?

As you are studying/reading the papers in an attempt to answer some of the above questions, you might practice writing 'memos' to yourself as you read. View these memos as a type of 'quiz'. For example, after reading a paragraph or a section of the paper, you might want to write your own paraphrased version of what you read. Try to recall what was said, what equations were used or developed, what was trying to be accomplished? Could the material be related to material you already know or was the material completely new? How could the material be applied? The memos you write could be used to collect your thoughts and provide you with ideas.

After writing your memos, you could then collect, organize, and compare your memos and their contents. This comparison should provide a way to identify, compare, and contrast the different papers and help you answer some of the above questions.

While you are reading your journal articles, in addition to thinking about the above questions, you might consider the following questions as suggested by Nilson[1]: Why did the authors conduct this research? What issues or unknowns in the literature motivated them? How did they develop their hypothesis or research questions? What constitute their data, and how did they collect them? Why did they choose the data analysis techniques they did? What conclusions did they draw from their data? To what extent were these conclusions warranted? What limitations of the study did they note? What limitations, if any, did they miss? What is the significance of their findings? What does their study contribute to the field?

List of Possible Control System Words to Use When Searching for Your Papers (non-exhaustive):

Adaptive, Application Areas (Agriculture, Astronomy, Computing, Energy, Industrial, Medical/Biomedical, Power, Robotics, Space, Transportation), Artificial Intelligence, Augmented Reality, Autonomous, Classical, Decentralized, Descriptor Variable Systems, Disturbance, Environmental, Frequency Domain, Guidance, H-Infinity, Kalman Filter, Model-Predictive Control, Modern, Multi-variable, Nonlinear, Optimal Control, PID, Quantum, Robust, Servomechanism, Stochastic, Two-Degree of Freedom, etc.

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[1] Nilson, Linda. "Creating Self-Regulated Learners: Strategies to Strengthen Students' Self-Awareness and Learning Skills," Stylus Publishing, LLC, 2013. (Available through the UA Library, new.library.arizona.edu: https://ebookcentral.proquest.com/lib/uaz/reader.action?docID=3037610.) Nilson cites the work by Rose, et. al. that is available at the following URL: https://serc.carleton.edu/NAGTWorkshops/metacognition/group_tactics/28890.html.

Possible Scholarly Sources for Your Papers:

IEEE Transactions on Automatic Control, IEEE Control Systems Magazine, IEEE Transactions on Control Systems Technology, American Control Conference, Conference on Decision and Control, Automatica, International Journal of Control, etc.