

10 Steps to Identify a Research Problem for your MS Thesis

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1. **Identify the general subject domain** in which you would like to pursue your MS thesis. This would typically be a subject in which you have excelled or enjoyed during your MS studies, or an area in which you already have some knowledge and experience (e.g., based on the subject of your undergraduate project).
2. **Obtain the list of the top 15 conferences and 5 journals** in your domain of interest. You can obtain this list by consulting faculty members that are actively working in that domain or that have research interests in that domain. If you do not know which faculty member to ask, you can find out who they are by asking almost any PhD faculty member at SEECS.
3. **Go through the list of papers** presented in each of the conferences and papers published in the journals within the last three years. You do not need to study the papers yet; just go through the titles and make a note of the papers which you think might interest you. To find the list of papers, you can make use of Google to find the website of the conferences/journals. The conferences usually list the papers presented and published on a page describing the conference “proceedings”.
4. You should now **create an empty document called “List of Research Papers”** and copy and paste the following information for each paper you found that you think might be interesting:
 - The names of the authors
 - The title of the paper
 - The name of the conference or journal in which it appeared
 - The venue of the conference or the volume number and issue number of the journal
 - The page numbers in the conference proceedings or journal (if known)
 - The publisher of the conference or journal
 - The month and year of publication or just the year of publication

This information for each paper should be noted in the format of a citation, which looks like the following examples:

- [1] Hassan Khan, Fauzan Mirza, and Syed Ali Khayam, “Determining Malicious Executable Distinguishing Attributes and Low-Complexity Detection”, Journal in Computer Virology, volume 7, number 2, pages 95-105, Springer, May 2011.
- [2] Muhammad Zubair Shafiq, Syeda Momina Tabish, Fauzan Mirza, and Mudassar Farooq, “PE-Miner: Mining Structural Information to Detect Malicious Executables in Realtime”, in proceedings of the 12th International Symposium on Recent Advances in Intrusion Detection (RAID 2009), Saint-Malo, France, Lecture Notes in Computer Science, volume 5758, pages 121-141, Springer, September 2009.

5. **Download the PDF file for each of the papers** in your list.
6. **Read the abstract for each of the papers** in your list, and make a note of how interesting the paper seems. This should be on the basis of your understanding of the abstract and your motivation to work on a problem similar to the one addressed in the paper.
7. **Sort the list of papers** in your “List of Research Papers” document according to how interesting you found each paper’s abstract. The list should be ordered so that the paper you found to be the most interesting is at the top of the list, and the least interesting at the end. Add notes alongside or below each citation to describe what you thought of the paper based on this initial impression (just from the abstract).
8. **Read the top five papers** in the list, in order. You should have read and understood one paper fairly thoroughly before moving onto the next one. As you read it, write your observations and opinions about the paper in the “List of Research Papers” document. If you do not understand something in the paper, skip over it but try to understand the significance of the piece which you are skipping. Your goal is to have a clear understanding of the idea, approach to the problem, the methodology of the investigation and solution, and any open problems which might not be addressed. Your notes should, at the very least, cover these points for each paper.
9. For each of the top five papers that you have read, try to **identify some aspect that you think could have improved the work**. This can mean any way to extend the work, but it can also mean any way to apply the ideas and approach to a different, perhaps related, problem. Write a half-page summary for each idea that you think can be used to improve the work. This work can be called “Possible Avenues for Further Research”.
10. **Meet one or more faculty members in your area of interest**, and take the “List of Research Papers” and “Possible Avenues for Further Research” documents with you. Persuade them that you have done a reasonably good background study by following the steps in this document and see whether they are interested in supervising your research on any of the problems you have identified. If not, go back to step 8 but with the next 5 papers in your list.

Good luck! ☺