

Project

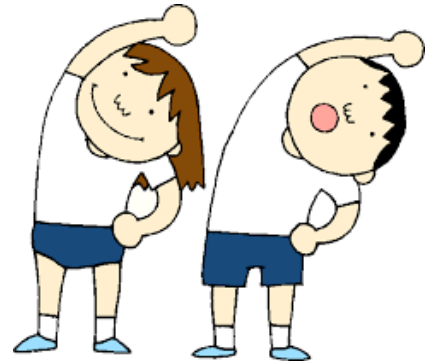
A Student Survival Guide

K Ramaprasada Raju



SRKR Engg. College, Bhimavaram-534204, India.

Prolusion



Capstone Project in the final semester is a need and students are keen to do this. It is a testbed to tune up their skills and a launchpad to learn the required job skills. The students will get enormous confidence as they do this. They apply their learned skills in theoretical subjects. But at the onset, the student is in a dilemma in choosing the project and delays doing the actual project. Here is an attempt to help the student come out of this dilemma and start work at the earliest. This saves about one month and one can spend this on doing a good project.

The project harnesses curiosity, and it involves a systematic gathering of information. This booklet brings out the roles of a student and a supervisor. It will address the difficulties in reading and writing a technical paper. It will aid the student in writing a good project proposal. One can plan the timeline on the lines of the tentative schedule to do the project. The evaluation procedure is to prepare the student to get good grades. It highlights the importance of being an expert in their respective chosen domain. Finally, this effort is to motivate the student to become a good professional.

*Dr. K. Ramaprasada Raju,
Professor,
Computer Science and Engg.*

Schedule

	Week	What to do?	Your progress	Date
Nov	1	•Find an area to work in	Research and Data Collection	
	2	•Read papers	Initial Project Specification	
Dec	3	•Extract / formulate <i>high impact</i> problems	Discussed the initial specifications with the supervisor	
	4		Research of literature narrowed to these specifications	
	5	•Submit project proposal	Final Project Specification	
	6		Submission of 1st progress report with required assumptions	
Jan	7	•Search for Related Work	Final option and work towards implementation	
	8		Research each mechanism involved	
	9	•Read papers in depth	Submission of 2nd progress report	
	10		Finalizing the option to be pursued	
Feb	11	•Algorithm Design	Implementation	
	12	•Coding	Discuss with the supervisor regarding the progress and results	
	13		Submission of 3rd progress report	
	14		Documentation and final results	
Mar	15	•Writing Report	Present draft report to the supervisor and finalize the report	
	16	•Final ppt. preparation	Finalize the presentation viewgraphs	
	17		Submission of the final report	
	18	•Final Presentation	Oral Project Presentation	

Contents

<u>A Bird's Eye View</u>	6
<u>Team</u>	7
<u>Student</u>	8
<u>Supervisor</u>	9
<u>Reading</u>	10
<u>Proposal</u>	11
<u>Writing</u>	12
<u>Format</u>	13
<u>Report</u>	14
<u>Presentation</u>	15
<u>Evaluation</u>	16
<u>Ethics</u>	17
<u>Conclusion</u>	18
<u>In a Nutshell</u>	19

A Bird's Eye View

Industry requires people who can design and innovate. It expects the display of exemplary professional conduct in many contexts. It is no longer enough to be competent in analysing problems. The professionals have to propose, design and install solutions. In addition, they have to respond to opportunities created by the marketplace. Project is the capstone course of the entire programme and responds to the needs of industry by:

- Providing students with a forum for engineering and management practices
- Cultivating the values and ethics necessary for professional conduct at the workplace

It is a student-driven project and does not involve regular classroom delivery. It presents the opportunity to build upon a core of learning gained in the earlier years. It broadens that knowledge. It requires the exercise of knowledge and skills. Students must take complete ownership of their project. This needs a considerable shift in attitude. They must be self-regulating and self-directed in their time management and research. Projects are of two categories. The students should find out the category before they begin.

1. **Research:** Theoretical analysis leading to new knowledge. Requires an extensive background preparation and comprehension of the subject. Requires clear thinking and sound logic. The major goal is to understand how to research.
2. **System Design and Implementation:** Application of expertise and knowledge gained. Requires little knowledge outside of that got in the programme. The working prototype or simulation results should support the design.

This document intends to ease figuring out what to work on. Please come up with your own ideas or change the supervisor's suggestions in any way you want.

Team



As far as possible, work in teams of three unless you are doing a tiny project. Working with others is a lot more fun. It is often a lot more productive, and the resulting work is substantial than if you were working in isolation.

The nature of the computer science field is one that fosters collaboration. It is often essential for high impact work. You should develop the ability to collaborate on projects. Unless there is a very good and compelling reason for you to work alone, the supervisor won't agree to it. For large enough projects, the supervisor will be happy to allow teams of four or more. The proposal should make it clear why it is a large enough project.

- Be honest and realistic with your teammates when setting goals. If you do not meet a promised deadline, it affects the whole team, not you.
- Communication is crucial! Don't make major decisions by yourself and let people know when you are behind or ahead of the schedule.
- Try to exploit each other's strengths.

Student



The student is the driving force in the project. He/she has the responsibility of finding a suitable problem. The problem should apply to computer science and is worthwhile to solve. It should be possible to solve given the time-frame and resources available.

The student should present the current status of the project to the supervisor. Bring any problems that arise during the project to the supervisor's attention. This helps in providing feedback and advice. The student should make a detailed schedule for the project. Submit a hard copy of the proposal to the supervisor.

The supervisor will read the proposal and get back to you. Sometimes, it may not have enough focus or you are trying to do too much. He/she may want to meet with the team to better understand exactly what you are doing.

Don't wait for the supervisor to get back to you; get started as soon as possible! You have about two months to carry out the project, which is ample if your proposal is focused and you start early, but not otherwise.

The student should put in place all parts of the project by keeping all the deadlines for the project report.

Supervisor



The supervisor will provide feedback and advice to the student. It is important to realise that the student is the driving force in the project. The amount of help and guidance received from the supervisor depends on how well the student informs the current status of the project.

The best teachers are those who show you
where to look, but don't tell you what to see -
Alexandra K. Trenfor

The supervisor meets each student once/ twice per week at a fixed time. The student has to send an updated version of the project report one or two days before each meeting. The supervisor notifies the examiner if exceptional problems turn up in a project. They discuss and take action. The following are the different stages of the project and the corresponding deliverables.

<i>Stage</i>	<i>Deliverables</i>
Define the problem	Problem statement, Area background, Aim and objectives
Choose methods	Motivation of choice, Method application and alternatives
Develop conclusions	Result analysis, Conclusions and future work
Defend the work	Oral presentation, Defending the work

Reading



To get the most from your reading, find a quiet place to work. Ensure no disturbances and distractions, have a pencil and notepad at hand. If you don't know what you hope to gain from the paper, you can not tell whether reading it will be beneficial or a waste of time. Your needs control how you read.

Before beginning to read a paper, consider why you are doing it. What do you want to get out of it? **(Decide what to read.)**

- Read title, abstract
- Read it, file it, or skip it?

If you only need an overview, a brief scan may be enough **(Read for breadth)**.

- What did they do?
- Skim introduction, headings, graphics, definitions, conclusions and references
- Consider the credibility.
- How useful is it?
- Decide whether to go on

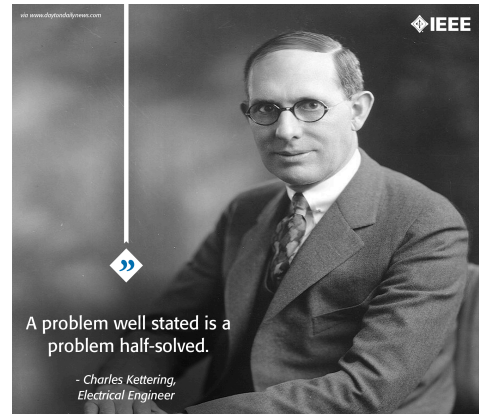
If you present the paper to others, you need a deep study. Challenge the paper's argument until you understand it **(Read in-depth)**.

- How did they do it?
- Challenge their arguments
- Examine
 - Assumptions
 - Methods
 - Statistics
 - Reasoning and Conclusions
- How can I apply their approach to my work?

If you need the information later, taking notes will help you **(Take notes)**.

- Make notes as you read
- Highlight major points
- Note new terms and definitions.
- Write a summary

Proposal



You are free to come up with your own, and the supervisor will be happy to discuss your proposal ideas. Or, you may pursue one of the supervisor's suggestions (change them in your proposal if you like).

The proposal should describe the problem you plan to solve, an outline of how you plan to solve and describe what you will *deliver* for the final project. Meet the supervisor with this 1-2 page draft proposal to get feedback before it is due. The project proposal should contain the following items.

- Project title (a detailed title is better than a vague one; You can always change it later if you don't like it!) and the names and details of investigators.
- A one-sentence summary of the research problem followed by a one-paragraph explanation. It should not be over 10-12 lines long. This should identify the research question you are addressing.
- A statement of the research method. This should elaborate on how you will solve the problems you have raised and motivated in the previous paragraph?
- A statement of the plan and schedule, to convince the supervisor (and yourself!) that you can complete this by the end of the semester.
- A list of resources (be as clear as you can) you need to do your work.

Read background material before turning in the proposal

Writing



Evaluation of the work depends on what you write in your papers, reports, etc. Choose a good title. Maintain clarity, elegance, and flow. Cut redundancy. A popular misconception is that the paper should have a lot of math, should be hard to read and should fill all 20 pages. In reality, math usage should accord with the need. It is to make things more precise/unambiguous where English is too verbose.

Reviewers don't enjoy reading hard-to-read papers. Academic readers know that hard-to-read doesn't mean weighty matter. They will detect when a writer is showing off. Quality is more important than quantity. It is usually hard to fit your content in 20 pages. So be concise and use figures and examples to fill the space.

Tips

- ★ Review lots of good/bad papers; avoid their mistakes
- ★ Be ambiguous in your initial abstract.
 - Mention what you achieve without revealing techniques
- ★ Be picky about how your sentences sound and feel
 - Can you write the same thing in a simpler way?
 - Can you write the same thing concisely?
 - Are you moving back and forth between two concepts?
 - A different word may be a better fit to explain this?
- ★ Finish a draft of the paper at least a week before the final deadline
 - Otherwise, your chance of acceptance reduces to 20-30%

Format

You can write a paper to publish in a conference or a journal. The paper includes the following:

- Title: Less than 11 words
- Abstract: 200–250 words (Write this at the end)
 - Mention what you have achieved; mention key experimental results
- Introduction
 - Background, motivation, contributions, and organisation (one paragraph each)
- Formal Problem Statement (some other name)
 - Mention assumptions of setting under which your solution applies
- Background (some other name)
 - Describe background necessary to understand the rest of the document
 - Optional–point to other documents (Used to fill space if required)
- Your Solution (in one or more sections)
- Related Work (cite and briefly discuss)
 - How does it differ from your work?
 - Their limitations but be polite.
- Performance Model
 - Describe your experimental setup and metrics you used to test your solution against previous work.
- Experiments
 - Use graphs and tables to show results.
 - Refer to the graphs/tables in the text: We see in Figure 1 that ...
 - Discuss intuition behind why the graphs are the way they are.
 - Should sound like: Because of these reasons, the results are as expected.
- Conclusions
 - Like the abstract, but more technical points – assume the reader has already read through the document.
 - Can mention future work
- Acknowledgements
- References

Report



You should prepare a report on your project. It is almost like a paper, sections become chapters, subsections become sections. Besides, it has a table of contents, a list of figures, and a list of tables.

Your report should introduce and motivate the problem your project addresses. Describe related work in the area, discuss the elements of your solution. Present the results that measure the behaviour, performance, or functionality of your system. Compare to other related systems as appropriate.

Because this report is for grading, **do not treat it as an afterthought**. Plan to leave at least a week to do the writing and make sure you proofread and edit carefully!

Checklist

- ☐ Do a spell-check
- ☐ Ensure figure/table/section numbers match those in text
- ☐ Look at the start and end of each page.
- ☐ Use / no indent after figures/tables.
- ☐ Place figures/tables where you want them.
- ☐ Give good names for your algorithms/solutions (some nice expansions)
- ☐ Use those names to make your title.
- ☐ Take a print out and read it.

Submit a paper copy of your report before the final project demonstration. Give a presentation on your project in the class. This provides an opportunity to present a short demo of your work to other students.

Presentation



Students must present a project report as per the department's announced schedule. The student has to present a dissertation and a power-point presentation. A team will examine the dissertation and various aspects of the project. External and internal examiners are part of the team, and the Head of Department will be a moderator.

Making a good presentation:

- Aim for 20-25 slides for a 30-40 minute talk.
- Number your slides.
- The Least font size should be 20 pts.
- Always use sentence case. Don't use all capital letters.
- Limit the amount of text on each slide (max. 6 lines) and put the details in your narration.
- Use only one message per slide. If you have over one message, add a slide.
- Don't show code on your slides.
- Use quality graphics that support your message.
- Maintain a consistent design regarding colours, font styles, and graphics.
- Have a beginning, a middle, and an end. Tell your audience what you will tell them, tell it, and then summarise it.
- Plan your conclusion first; Know what you want to convey. Make the rest of your slides lead to and support the result.
- Make copies of your slides as handouts

Evaluation

The final project evaluation is across categories and category weights to determine marks.

Cat1: Research;

Cat2: System Design and Implementation.

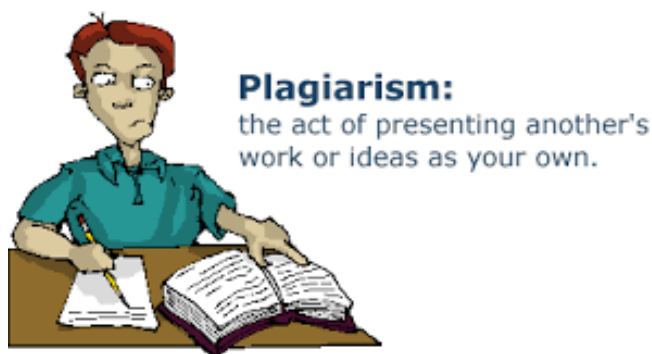
Assessment Categories and Weightings

	Cat1	Cat2	
Conduct	10	10	Regularity and Punctuality. Rigour and diligence at research material.
Understanding & Comprehension	30	15	Background theory, its application and limitations.
Approach & Method	20	25	Use of methods and approaches expected of a professional engineer, justification for select methods and evaluation of alternatives.
Results	15	30	Conclusions, completeness, design quality, demonstration of results.
Report	15	10	Quality, consistency, grammar and spelling, organisation of sections.
Presentation	10	10	Coverage of work done, effectiveness, answers to questions

Quality Parameters

Perfect	A+	100%	There is absolutely no room for improvement
Excellent	A	85%	Deficiency in one or two relatively insignificant components and is overall a much higher standard than that expected of a good student.
Very Good	B+	75%	Deficiency in one or two relatively insignificant components but is of a much higher standard than that expected of an average student.
Good	B	65%	Deficiency in one or two significant components but is of a higher standard than that expected of an average student.
Satisfactory	C	50%	You could have done better work, but is of an average standard. The engineering input is correct, but the treatment lacks depth.
Pass	D	40%	The work is below average but still acceptable. There may be some analytical and design flaws, but the work is retrievable.
Poor	F	< 30%	Its standard is too low to deserve a passing grade.

Ethics



Doing project work is an opportunity for professional development and achievement. Don't regard it as a need for the award of a degree. One should ensure the integrity of the work. The original authors did not get credit for their contribution if you use their work as yours. If you neglect to cite the work you borrow, either by choice or by accident, you are committing plagiarism.

The student is bound by the following research obligations to :

- provide both in-text and bibliographic citations. Failure to do so is an attempt to plagiarize. Plagiarism is unacceptable and is a serious breach of professional and ethical conduct. It is a grave offence under the regulations and can attract severe penalties.
- present authentic research data. Falsifying results or distorting them to fit expectations is a serious offence.

If you use text, charts, photographs, or other graphics from other's original material:

- Clearly indicate the reused material by using quotation marks or indentations and provide a full reference to the original material (publication title, author name, article title, etc.).
- Get written permission from the publisher/original author.

Conclusion

In a four year course, one can only cover a fraction of topics. There are sure to be instances where the background material covered is not in too much detail. And even for covered topics, there will be other relevant related work that you should be familiar with. Part of doing something new is figuring out what's already been done or is known, so you should search the related literature as much as you can. Keep an eye out for useful software or research tools that you can leverage; this will save you tremendous amounts of time later. Finally, the project will develop your skills in the following areas:

- ☛ Design to specification
- ☛ Formulation of creative solutions to the problems
- ☛ System analysis and inquiry
- ☛ Validation and testing against benchmarks
- ☛ *Project management:*
 - ◆ Concept development, planning, implementation and testing
- ☛ *Time management:*
 - ◆ Planning for unforeseen events and setting realistic goals
- ☛ *Communication:*
 - ◆ Writing technical reports and delivering professional presentations

Aim high in a focused way, and do the best you can! The best projects are sure to be published in top ACM, IEEE or CSI conferences. You will far surpass all expectations with wonderful work that will further the state-of-the-art research.

*Teachers open the door,
but you must enter by yourself.*

In a Nutshell



- Find an area to work in
- Read papers
- Extract/formulate *high impact* problems
- Search for related work (Usually related work is not good enough)
- Invent your own solutions (Algorithm design/analysis and coding)
- Write the report

