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This thesis, entitled **MANUSCRIPT TEMPLATE FOR THE NATIONAL GRADUATE SCHOOL OF ENGINEERING**, prepared and submitted by **STUDENT M. NAME**, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN ELECTRICAL ENGINEERING** is hereby accepted.

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ADVISER M. NAME, PHD
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Accepted as partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN ELECTRICAL ENGINEERING.**

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Dean

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Acknowledgments

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Abstract of Thesis

Make a concise summary that will fit in half a page. Must answer the following:

1. What is the problem that I am solving and why does it matter?

2. What are the state-of-the-art (SOTA) solutions to this problem?

3. What is the gap in the current SOTA?

4. What is your idea to address this gap?

5. Why do you think your idea will work?

6. How will you execute your idea?

7. What is the empirical evidence that your idea works?

8. What can you conclude from the study that you have accomplished?

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List of Figures

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1. Introduction

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- At least 5 pages.

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100

- Summary of the whole thesis. Use previous studies, diagrams, and illustrations to emphasize the motivation behind this thesis.

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- Must answer the following:

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1. What is the problem that I am solving and why does it matter?

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2. What are the state-of-the-art (SOTA) solutions to this problem?

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3. What is the gap in the current SOTA?

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4. What is your idea to address this gap?

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5. Why do you think your idea will work?

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6. How will you execute your idea?

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7. What is the empirical evidence that your idea works?

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8. What can you conclude from the study that you have accomplished?

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9. What are the possible future works that will extend your study?

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- List the roadmap to the rest of the manuscript.

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Start Strong: For every chapter (except possibly the Problem Statement), make an introduction (2 or 3 paragraphs) on what the chapter is all about.

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Stay Strong: Explain ideas in the simplest and most direct way that many people in your field can understand. If a certain topic is a bit specialized or hard to remember, make a concise introduction. Point the reader to a reference for further understanding. Each chapter should be complete or stand-alone and concise.

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Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the points discussed in the chapter.

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1.1. Scope and Limitations

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What is the scope of your work? What are its limitations?

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123	1.2. Structure	123
124	This thesis is organized as follows. In Chapter 2, the discussion on the body of work	124
125	contextualizes our approach. Chapter 3 discusses the problem statement of this thesis. In	125
126	Chapter 4, the methodology is discussed in more detail. Chapter 5 contains the evaluation	126
127	results, while Chapter 6 contains the analysis and discussion. The thesis is concluded in	127
128	Chapter 7.	128

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2. Related Work

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- Expound #2 (*What are the state-of-the-art (SOTA) solutions to this problem?*) and #3

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(*What is the gap in the current SOTA?*) by rigorously enumerating related works and

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analyzing these in the context of the problem that you are solving.

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- Build a taxonomy or survey to narrow down the field of study of the problem and to

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limit the scope of your thesis. If there is a recent survey paper in your problem, use it.

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If none, use Google Scholar to build a tree diagram of related work.

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- Build a table or graph with metrics to show what are available features and what are

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lacking in the current SOTA.

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- Using the table/graph, identify the gap to show what do you intend to solve.

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- Introduce the idea on how to solve this gap.

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2.1. Chapter Summary

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Start Strong: For every chapter (except possibly the Problem Statement), make an introduction (2 or 3 paragraphs) on what the chapter is all about.

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Stay Strong: Explain ideas in the simplest and most direct way that many people in your field can understand. If a certain topic is a bit specialized or hard to remember, make a concise introduction. Point the reader to a reference for further understanding. Each chapter should be complete or stand-alone and concise.

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Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the points discussed in the chapter.

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3. Problem Statement

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- Following up from #3 (*What is the gap in the current SOTA?*), formalize the main problem and subproblems using a list.

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- Use math models and diagrams to clearly show the problem and subproblems being addressed (*e.g.* prior work uses $P(\mathbf{y}|\mathbf{y}_{<t}, \mathbf{x})$ as the model, while we use $P(\mathbf{y}|\mathbf{y}_{\neq t}, \mathbf{x})$).

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Start Strong: For every chapter (except possibly the Problem Statement), make an introduction (2 or 3 paragraphs) on what the chapter is all about.

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Stay Strong: Explain ideas in the simplest and most direct way that many people in your field can understand. If a certain topic is a bit specialized or hard to remember, make a concise introduction. Point the reader to a reference for further understanding. Each chapter should be complete or stand-alone and concise.

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Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the points discussed in the chapter.

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3.1. Objectives

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The specific objectives of this thesis are:

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1. Propose a new method X to solve problem Y.

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2. Compare methods A, B, and C against our method X.

165

166 4. Methodology 166

- 167 • Expound #4 (*What is your idea to address this gap?*), #5 (*Why do you think your idea* 167
168 *will work?*), and #10 (*Introduce the idea on how to solve this gap*). 168
- 169 • Propose a solution. Use math models, diagrams, and algorithms to formalize your 169
170 method. 170
- 171 • Cite related literature of the building blocks used in the proposed method. 171
- 172 • Justify every decision in your proposed method (*e.g.* we used batch normalization to 172
173 stabilize the training) 173

174 4.1. Style and Formatting 174

175 4.1.1. Mathematics 175

176 Please number all of your sections and displayed equations as in these examples: 176

$$E = m \cdot c^2 \quad (4.1)$$

177 and 177

$$v = a \cdot t. \quad (4.2)$$

178 It is important for readers to be able to refer to any particular equation. Just because you did 178
179 not refer to it in the text does not mean some future reader might not need to refer to it. It is 179
180 cumbersome to have to use circumlocutions like “the equation second from the top of page 3 180
181 column 1”. (Note that the ruler will not be present in the final copy, so is not an alternative to 181
182 equation numbers). All authors will benefit from reading Mermin’s description of how to 182
183 write mathematics: <http://www.pamitc.org/documents/mermin.pdf>. 183



Figure 4.1. Example of a long caption title to demonstrate how to use the optional caption parameter. It is set in Roman so that mathematics (always set in Roman: $B \sin A = A \sin B$) may be included without an ugly clash.

4.1.2. Footnotes

Please use footnotes¹ sparingly. Indeed, try to avoid footnotes altogether and include necessary peripheral observations in the text (within parentheses, if you prefer, as in this sentence). If you wish to use a footnote, place it at the bottom of the page on which it is referenced. Use Times 10-point type, single-spaced.

4.1.3. Cross-references

For the benefit of author(s) and readers, please use the

`\cref{...}`

command for cross-referencing to figures, tables, equations, or sections. This will automatically insert the appropriate label alongside the cross-reference as in this example:

To see how our method outperforms previous work, please see Fig. 4.1 and Tab. 4.1. It is also possible to refer to multiple targets as once, *e.g.* to Figs. 4.1 and 4.2a. You may also return to Sec. 4.1 or look at Eq. (4.2).

If you do not wish to abbreviate the label, for example at the beginning of the sentence, you can use the

`\Cref{...}`

command. Here is an example:

Figure 4.1 is also quite important.

¹This is what a footnote looks like. It often distracts the reader from the main flow of the argument.

Table 4.1. Results. Ours is better.

Method	Frobnability
Theirs	Frumpy
Yours	Frobbly
Ours	Makes one's heart Frob

202 4.1.4. References 202

203 List and number all bibliographical references in 12-point Times, single-spaced, at 203
204 the end of your thesis. To make a reference in the text, use the 204

205 `\autocite{...}` 205

206 command instead of plain `\cite{}`, for example [6]. Where appropriate, include 206
207 page numbers and the name(s) of editors of referenced books. When you cite multiple papers 207
208 at once, please make sure that you cite them in numerical order like this [1, 2, 4–6]. If you 208
209 use the template as advised, this will be taken care of automatically. 209

210 4.1.5. Illustrations, graphs, and photographs 210

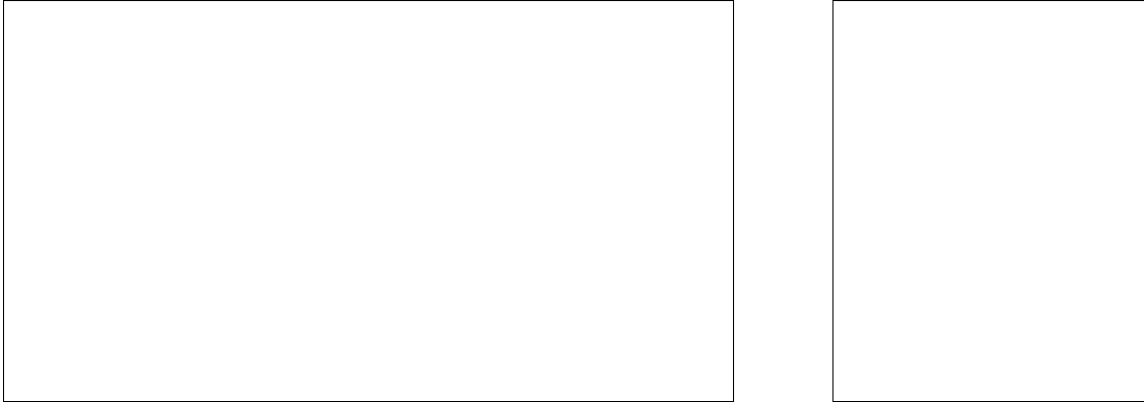
211 All graphics should be centered. In \LaTeX , avoid using the `center` environment for 211
212 this purpose, as this adds potentially unwanted whitespace. Instead use 212

213 `\centering` 213

214 at the beginning of your figure. Please ensure that any point you wish to make is 214
215 resolvable in a printed copy of the paper. Resize fonts in figures to match the font in the body 215
216 text, and choose line widths that render effectively in print. Readers (and reviewers), even of 216
217 an electronic copy, may choose to print your paper in order to read it. You cannot insist that 217
218 they do otherwise, and therefore must not assume that they can zoom in to see tiny details on 218
219 a graphic. 219

220 When placing figures in \LaTeX , it's almost always best to use `\includegraphics`, 220
221 and to specify the figure width as a multiple of the line width as in the example below 221

222 `\usepackage{graphicx} ...` 222
223 `\includegraphics[width=0.8\linewidth]` 223
224 `{myfile.pdf}` 224



(a) An example of a subfigure.

(b) Another subfigure.

Figure 4.2. Example of a short caption title. It should be centered.

4.1.6. Color

If you use color in your plots, please keep in mind that a significant subset of reviewers and readers may have a color vision deficiency; red-green blindness is the most frequent kind. Hence avoid relying only on color as the discriminative feature in plots (such as red vs. green lines), but add a second discriminative feature to ease disambiguation.

4.1.7. Miscellaneous

Compare the following:

`$conf_a$` *conf_a*

`conf_a` *conf_a*

See The T_EXbook, p165.

The space after *e.g.*, meaning “for example”, should not be a sentence-ending space. So *e.g.* is correct, *e.g.* is not. The provided `\eg` macro takes care of this.

When citing a multi-author paper, you may save space by using “et alia”, shortened to “*et al.*” (not “*et. al.*” as “*et*” is a complete word). If you use the `\etal` macro provided, then you need not worry about double periods when used at the end of a sentence as in Alpher *et al.* However, use it only when there are three or more authors. Thus, the following is correct: “Frobnication has been trendy lately. It was introduced by Alpher [1], and subsequently developed by Alpher and Fotheringham-Smythe [2], and Alpher *et al.* [3].”

This is incorrect: “... subsequently developed by Alpher *et al.* [2] ...” because reference [2] has just two authors.

244	4.2. Chapter Summary	244
245	Start Strong: For every chapter (except possibly the Problem Statement), make an	245
246	introduction (2 or 3 paragraphs) on what the chapter is all about.	246
247	Stay Strong: Explain ideas in the simplest and most direct way that many people in	247
248	your field can understand. If a certain topic is a bit specialized or hard to remember, make a	248
249	concise introduction. Point the reader to a reference for further understanding. Each chapter	249
250	should be complete or stand-alone and concise.	250
251	Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the	251
252	points discussed in the chapter.	252

253	5. Results	253
254	• Expound #6 (<i>How will you execute your idea?</i>) and #7 (<i>What is the empirical evidence</i>	254
255	<i>that your idea works?</i>).	255
256	• Make a complete description of your experimental setup (<i>e.g.</i> dataset, train and	256
257	test/validation configurations, hardware configurations, software framework).	257
258	• Describe the metrics (performance measures) that are used to benchmark the task.	258
259	These are the same metrics in the review of lit. Sometimes, you may need to introduce	259
260	new metrics. However, you have to have a strong justification on why there is a need	260
261	for a new metric and it is a good measure of performance in a task.	261
262	• Make sure the metrics are comprehensive (<i>e.g.</i> include model parameter count, FLOPS,	262
263	inference time, memory use, energy consumption, <i>etc.</i>).	263
264	• Use graphs and tables to summarize the quantitative results from your proposed	264
265	method vs SOTA.	265
266	• Illustrate sample outputs to qualitative describe the results of your experiments.	266
267	5.1. Chapter Summary	267
268	Start Strong: For every chapter (except possibly the Problem Statement), make an	268
269	introduction (2 or 3 paragraphs) on what the chapter is all about.	269
270	Stay Strong: Explain ideas in the simplest and most direct way that many people in	270
271	your field can understand. If a certain topic is a bit specialized or hard to remember, make a	271
272	concise introduction. Point the reader to a reference for further understanding. Each chapter	272
273	should be complete or stand-alone and concise.	273
274	Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the	274
275	points discussed in the chapter.	275

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6. Analysis and Discussion

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- As a follow up of #7 (*What is the empirical evidence that your idea works?*), given the experimental results, make an in-depth analysis and discussion to argue and justify that your proposed method works.

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- Use further evidences (*e.g.* attention maps) to emphasize the strong points of your method.

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- Make an ablation study (*e.g.* what if we vary the depth of the network, what if we introduce data corruption, *etc.*) to further show strong/weak points of your proposed method.

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- No method is perfect. What are the failure cases of your method (*e.g.* method does not work on rotated text). Explain why your method fails in these cases.

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6.1. Chapter Summary

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Start Strong: For every chapter (except possibly the Problem Statement), make an introduction (2 or 3 paragraphs) on what the chapter is all about.

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Stay Strong: Explain ideas in the simplest and most direct way that many people in your field can understand. If a certain topic is a bit specialized or hard to remember, make a concise introduction. Point the reader to a reference for further understanding. Each chapter should be complete or stand-alone and concise.

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Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the points discussed in the chapter.

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296	7. Conclusion	296
297	• Expound #8 (<i>What can you conclude from the study that you have accomplished?</i>)	297
298	and #9 (<i>What are the possible future works that will extend your study?</i>).	298
299	• Please summarize all important points of your thesis (<i>i.e.</i> from the beginning to end).	299
300	• What are the future unsolved issues in your thesis?	300
301	• How other researchers can take off from your outputs?	301
302	7.1. Limitations and Future Work	302
303	What are the limitations of your work? Given these, what are possible future research	303
304	directions?	304

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Bibliography

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[1] F. Alpher, “Frobnication,” *IEEE TPAMI*, vol. 12, no. 1, pp. 234–778, 2002 (cit. on pp. 7, 8).

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[2] F. Alpher and F. Fotheringham-Smythe, “Frobnication revisited,” *Journal of Foo*, vol. 13, no. 1, pp. 234–778, 2003 (cit. on pp. 7, 8).

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[3] F. Alpher, F. Fotheringham-Smythe, and F. Gamow, “Can a machine frobnicate?” *Journal of Foo*, vol. 14, no. 1, pp. 234–778, 2004 (cit. on p. 8).

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[4] F. Alpher and F. Gamow, “Can a computer frobnicate?” In *CVPR*, 2005, pp. 234–778 (cit. on p. 7).

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[5] F. LastName, *Frobnication tutorial*, Supplied as supplemental material tr.pdf, 2014 (cit. on p. 7).

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[6] F. LastName, *The frobnicatable foo filter*, Face and Gesture submission ID 324. Supplied as supplemental material fg324.pdf, 2014 (cit. on p. 7).

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A. Additional Results and Discussion

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In this appendix, we present and discuss additional results.

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B. Background Material

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In this appendix, we discuss some background material and show the proof to our method X.

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