

**Working Title**

**Firstname Lastname** Doctor of Philosophy June 2015

Electrical Engineering Reykjavík University

**Ph.D. Dissertation**

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**Working Title**

Dissertation of 30 ECTS credits submitted to the School of Science and Engineering

at Reykjavík University in partial fulfillment of the requirements for the degree of

**Doctor of Philosophy (Ph.D.) in Electrical Engineering**

June 2015

Thesis Committee:

Superior A. Teacher, Supervisor Professor, Reykjavík University, Iceland

Tough E. Questions, Examiner

Associate Professor, Massachusetts Institute of Technology, USA

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**Working Title**

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**Abstract**

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**Titll verkefnis**

Firstname Lastname júní 2015

**Útdráttur**

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date

Superior A. Teacher, Supervisor Professor, Reykjavík University, Iceland

Tough E. Questions, Examiner

Associate Professor, Massachusetts Institute of Technology, USA

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date

Firstname Lastname Doctor of Philosophy

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*I dedicate this to my spouse/child/pet/power animal.*

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# Acknowledgements

So long, and thanks for all the fish.

Douglas [Adams[1]](#_bookmark37)

This work was funded by 2015 RANNIS grant “Survey of man-eating Minke whales” 1415550. Additional equipment was generously donated by the Icelandic Tourism Board.

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# Preface

This dissertation is original work by the author, Name O. F. Student. Portions of the intro- ductory text are used with permission from Student et [al.[2]](#_bookmark38) of which I am an author.

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# List of Abbreviations

MSc Masters of Science PhD Doctor of Philosophy

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# List of Symbols

|  |  |  |
| --- | --- | --- |
| Symbol | Description | Value/Units |
| *E* | Energy | J |
| *m*  *c* | Mass  Speed of Light | gram  2*.*99 *×* 108 m s*−*1 |

xxx

1

**Chapter 1 Introduction**

State the objectives of the exercise. Ask yourself: Why did I design/create the item? What did I aim to achieve? What is the problem I am trying to solve? How is my solution interesting or novel?

## How to use the template

Before using this template, the author recommends reading the (in progress) guide to suc- cessful projects, including LATEX at [http://afs.rnd.ru.is/project/htgaru/](http://afs.rnd.ru.is/project/htgaru/trunk/how-to-get-around-projects.pdf) [trunk/how-to-get-around-projects.pdf](http://afs.rnd.ru.is/project/htgaru/trunk/how-to-get-around-projects.pdf). Full instructions on setting up LATEX and SubVersion are there. Additionally, as issues are discovered, they are added to the Fre- quently Asked Questions section in that document.

Text will be double spaced when in draft mode so that there is room for reviewers to write comments. Extra blank pages are also removed. If you want to check formatting in a more final form, switch to proofing mode. This text in gray will disappear when you are not in draft mode. It is better to use FiXme’s as a reminder mechanism, though. See Section [1.1.2](#_bookmark12)

**WARNING** It is very very important that you print the generated PDF at 100% scaling. On many computers, printing is set to adjust the size to fit the page. Do not do this, because it will mess up the sizes of the font and the placement of the letters. This becomes very evident when you print it out and the cover window does not line up with your title!

### Document structure

The default document structure is the style called IMRAD: Introduction, Methods, Resarch, And, Discussion. This is also known as the American Psychological Association (APA) format and is commonly used in the [sciences.[3].](#_bookmark39) The template’s current editor believes that this format is a good starting point, but may not be appropriate for some engineering works. In those cases, following a more technical report style may be easier: Introduction, Background, Design, Implementation, Analysis, Conclusion. For some works, this is still too confining. In those cases, the editor recommends the Introduction, Body, Conclusion (IBC) format where the body is a series of IMRAD or other structures. Each section of the body should ask a question and answer it relating to the topic. If you are writing a thesis that is primarily a collection of papers, then the body section would consist of these papers.

2 *CHAPTER 1. INTRODUCTION*



Figure 1.1: The logo of Reykjavík University

### FixMe reminders

If any of these still exist except for note when we are not in draft mode, LATEX will have errors during processing. If the Fatal error is still there, LATEX will refuse to produce the document[1](#_bookmark16). The Fatal error has been commented out in this document so that we can suc- cessfully generate documents but it can be seen in the document’s source.

### Indexes, glossaries, and abbreviations

This section demonstrates indexes and glossaries. Note that you may get errors in this sec- tion if you turn the index and glossary options off. In order to generate the glossary, you will need to run makeglossaries, which requires the Perl language to be installed. See the README.TXT for details.

You might expect to find the term [light-emitting diodes (LED)](#_bookmark51) in a [glossary.](#_bookmark48) For max- imum safety, the glossary and acronyms should be declared using newglossaryentry before

\begin{document} which is done automatically if you put them into glossary.tex. This is *highly recommended* in case you reorder your text. The author did his [dissertation](#_bookmark47) on [Radio Frequency IDentification (RFID)](#_bookmark52) security. You can even have symbols, such as the one for [ohm](#_bookmark49) which is [Ω](#_bookmark49)

### Citing properly

Any content from external sources must be properly cited. If any part of this document is plagiarized (from another group, the internet, or anywhere else) or your references are not properly cited, you will be in a lot of trouble.

This is in compliance with Reykjavík University’s Code of Ethics[2](#_bookmark17) [3](#_bookmark18) [4](#_bookmark19). For your refer- ence, here is a link to guidelines defining plagiarism and discussing how to avoid it (from the University of Oxford):

<http://www.ox.ac.uk/students/academic/goodpractice/about/>

### Examples

*NOTE: Figures and Tables need to be properly formatted and referenced in the text. Number figures/tables consecutively, include captions, and refer to the figures/tables in the text e.g. Figure* [*1.1.*](#_bookmark11) *Equations need to be numbered consecutively as well. Equations need to have each of their variables defined when they are first used or redefined. If you need to refer to particular places in the document, use numbered references. When you put a label command*

1This is a *feature* so that you don’t submit the document without fixing really important issues.

2<http://en.ru.is/the-university/ru-code-of-ethics/> – see Item 8 and General Rules on Study and Examinations

3<http://en.ru.is/studies/study--and-examination-rules/> – see Article 4.5

4see also the document "Your Work - Your Contribution" <http://www.ru.is/hugverk>, available only in Icelandic

*1.1. HOW TO USE THE TEMPLATE* 3

As an example of an equation, in Equation [1.1](#_bookmark20) is the relationship between angular fre- quency and hertz:

1

*f* = =

*T*

1

2*πω*

(1.1)

where *f* is frequency in Hz, *T* is period in s, and *ω* is angular frequency in rad s*−*1. Resis- tance is in units of Ω

Note that the [1.1.5](#_bookmark20) and the must match when using [1.1.5,](#_bookmark20) it has to be AFTER the item you are trying to point to or inside of it. It is often safest to put inside e.g.:

\caption{This is a caption\label{fig:mycaption}}

As an example of referring to a particular part of the document, the Conclusion is in Chapter [4.2](#_bookmark36) on page [12](#_bookmark36)

### Mutilingual support

In the main file, you have already seen the ML macros used to create multi-lingual docu- ments. You may want to read more about the babel and polyglossia packages to do even more. Quotation marks can be made smart by using “encite”. This will change the quota- tion marks to follow whatever the current language is set to. The Context Sensite Quotes (csquote) package is full of useful macros of this sort. One caveat: don’t use the shorcut "‘ and ’" in the macros nor in the text[5](#_bookmark25). It doesn’t work due to interactions with the multi- language macros. If you need to use those quotes, you can switch languages temporarily,

„Like this’"

### URLs and paths

URLs are easy to use in both the bibliography and text. In your .bib file, make sure that you only put URLs into the url field. Putting it anywhere else is likely to cause it to go off the page. If you are using the hyperref package, then these will be clickable. You can put links in the text with \url like this: [http://www.ru.is](http://www.ru.is/). If you need to specify a location of a file, use the \path similarly: C:\Documents and Settings\ . The only difference is that paths are not clickable.

### Hints

When placing tables and figures, *do not* force LATEX to place them in a given place. Doing so almost always causes problems later. It is better to give hints [htb] than to force it !h].

Add linebreaks at least at the end of every sentence. This is especially important if you are using SVN or collaborating with others. Everything is done by line number, so if an error or issue is on line 5 which happens to be a page of text, good luck finding the problem. Along those same lines, if you are not storing your thesis in version control (SVN, git,

etc) or on a backed up drive, you are asking for trouble.

### Debugging

When things go wrong, it is sometimes hard to figure out what to do. The first step is always to go look at the log file. If you are making changes and they are not showing up, it is likely

5This is the shortcute for German style quotations, which is the same as Icelandic.

4 *CHAPTER 1. INTRODUCTION*

that you are viewing an old file. Delete the .pdf and .aux and try again. On some plat- forms, the package manager can get out of date. Make sure you have updated/synchronized before running pdflatex again.

## Background

Provide background about the subject matter (e.g. How was morse code developed? How is it used today?). This is a place where there are usually many citations. It is suspicious when there is not. Include the purpose of the different equipment and your design intent. Include references to relevant scientific/technical work and books. What other examples of similar designs exist? How is your approach distinctive?

If you have specifications or related standards, these must be described and cited also. As an example, you might cite the specific RoboSub competition website (and documents) if working on an AUV[6](#_bookmark28).

## Section

The test text “Lorem Ipsum” is from an ancient text from 45 B.C. [[4],](#_bookmark40) [[5]](#_bookmark41)

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, plac- erat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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6Autonomous Undersea Vehicle

Table 1.1: A very simple table

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*1.3. SECTION* 5

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### 1.3.1 Subsection

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Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

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6 *CHAPTER 1. INTRODUCTION*

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Suspendisse vitae elit. Aliquam arcu neque, ornare in, ullamcorper quis, commodo eu, libero. Fusce sagittis erat at erat tristique mollis. Maecenas sapien libero, molestie et, lobor- tis in, sodales eget, dui. Morbi ultrices rutrum lorem. Nam elementum ullamcorper leo. Morbi dui. Aliquam sagittis. Nunc placerat. Pellentesque tristique sodales est. Maecenas imperdiet lacinia velit. Cras non urna. Morbi eros pede, suscipit ac, varius vel, egestas non, eros. Praesent malesuada, diam id pretium elementum, eros sem dictum tortor, vel consectetuer odio sem sed wisi.

#### 1.3.1.1 SubSubsection

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Aliquam lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elemen- tum, magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, vestibulum ut, massa. Fusce ultrices nulla et nisl.

Etiam ac leo a risus tristique nonummy. Donec dignissim tincidunt nulla. Vestibulum rhoncus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimen- tum augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet sed, pellentesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec pede. Proin mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam lobortis, metus quis elementum commodo, nunc lectus elementum mauris, eget vulputate ligula tellus eu neque. Vivamus eu dolor.

Nulla in ipsum. Praesent eros nulla, congue vitae, euismod ut, commodo a, wisi. Pel- lentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Aenean nonummy magna non leo. Sed felis erat, ullamcorper in, dictum non, ultricies ut, lectus. Proin vel arcu a odio lobortis euismod. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Proin ut est. Aliquam odio. Pellentesque massa turpis, cursus eu, euismod nec, tempor congue, nulla. Duis viverra gravida mauris. Cras tincidunt. Curabitur eros ligula, varius ut, pulvinar in, cursus faucibus, augue.

7

**Chapter 2 Methods**

Etiam ac leo a risus tristique nonummy. Donec dignissim tincidunt nulla. Vestibulum rhon- cus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimentum augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet sed, pellen- tesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec pede. Proin mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam lobortis, metus quis ele- mentum commodo, nunc lectus elementum mauris, eget vulputate ligula tellus eu neque. Vivamus eu dolor.

Nulla in ipsum. Praesent eros nulla, congue vitae, euismod ut, commodo a, wisi. Pel- lentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Aenean nonummy magna non leo. Sed felis erat, ullamcorper in, dictum non, ultricies ut, lectus. Proin vel arcu a odio lobortis euismod. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Proin ut est. Aliquam odio. Pellentesque massa turpis, cursus eu, euismod nec, tempor congue, nulla. Duis viverra gravida mauris. Cras tincidunt. Curabitur eros ligula, varius ut, pulvinar in, cursus faucibus, augue.

Nulla mattis luctus nulla. Duis commodo velit at leo. Aliquam vulputate magna et leo. Nam vestibulum ullamcorper leo. Vestibulum condimentum rutrum mauris. Donec id mauris. Morbi molestie justo et pede. Vivamus eget turpis sed nisl cursus tempor. Curabitur mollis sapien condimentum nunc. In wisi nisl, malesuada at, dignissim sit amet, lobortis in, odio. Aenean consequat arcu a ante. Pellentesque porta elit sit amet orci. Etiam at turpis nec elit ultricies imperdiet. Nulla facilisi. In hac habitasse platea dictumst. Suspendisse viverra aliquam risus. Nullam pede justo, molestie nonummy, scelerisque eu, facilisis vel, arcu.

Curabitur tellus magna, porttitor a, commodo a, commodo in, tortor. Donec interdum. Praesent scelerisque. Maecenas posuere sodales odio. Vivamus metus lacus, varius quis, imperdiet quis, rhoncus a, turpis. Etiam ligula arcu, elementum a, venenatis quis, sollicitudin sed, metus. Donec nunc pede, tincidunt in, venenatis vitae, faucibus vel, nibh. Pellentesque wisi. Nullam malesuada. Morbi ut tellus ut pede tincidunt porta. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam congue neque id dolor.

Donec et nisl at wisi luctus bibendum. Nam interdum tellus ac libero. Sed sem justo, laoreet vitae, fringilla at, adipiscing ut, nibh. Maecenas non sem quis tortor eleifend fermen- tum. Etiam id tortor ac mauris porta vulputate. Integer porta neque vitae massa. Maecenas tempus libero a libero posuere dictum. Vestibulum ante ipsum primis in faucibus orci luc- tus et ultrices posuere cubilia Curae; Aenean quis mauris sed elit commodo placerat. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Viva-

8 *CHAPTER 2. METHODS*

mus rhoncus tincidunt libero. Etiam elementum pretium justo. Vivamus est. Morbi a tellus eget pede tristique commodo. Nulla nisl. Vestibulum sed nisl eu sapien cursus rutrum.

Nulla non mauris vitae wisi posuere convallis. Sed eu nulla nec eros scelerisque pharetra. Nullam varius. Etiam dignissim elementum metus. Vestibulum faucibus, metus sit amet mattis rhoncus, sapien dui laoreet odio, nec ultricies nibh augue a enim. Fusce in ligula. Quisque at magna et nulla commodo consequat. Proin accumsan imperdiet sem. Nunc porta. Donec feugiat mi at justo. Phasellus facilisis ipsum quis ante. In ac elit eget ipsum pharetra faucibus. Maecenas viverra nulla in massa.

Nulla ac nisl. Nullam urna nulla, ullamcorper in, interdum sit amet, gravida ut, risus. Aenean ac enim. In luctus. Phasellus eu quam vitae turpis viverra pellentesque. Duis feugiat felis ut enim. Phasellus pharetra, sem id porttitor sodales, magna nunc aliquet nibh, nec blandit nisl mauris at pede. Suspendisse risus risus, lobortis eget, semper at, imperdiet sit amet, quam. Quisque scelerisque dapibus nibh. Nam enim. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Nunc ut metus. Ut metus justo, auctor at, ultrices eu, sagittis ut, purus. Aliquam aliquam.

9

**Chapter 3 Results**

In this section you discuss any issues that came up while developing the system. If you found something particularly interesting, difficult, or an important learning experience, put it here. This is also a good place to put additional figures and data.

Donec molestie, magna ut luctus ultrices, tellus arcu nonummy velit, sit amet pulvinar elit justo et mauris. In pede. Maecenas euismod elit eu erat. Aliquam augue wisi, facilisis congue, suscipit in, adipiscing et, ante. In justo. Cras lobortis neque ac ipsum. Nunc fermentum massa at ante. Donec orci tortor, egestas sit amet, ultrices eget, venenatis eget, mi. Maecenas vehicula leo semper est. Mauris vel metus. Aliquam erat volutpat. In rhoncus sapien ac tellus. Pellentesque ligula.

Cras dapibus, augue quis scelerisque ultricies, felis dolor placerat sem, id porta velit odio eu elit. Aenean interdum nibh sed wisi. Praesent sollicitudin vulputate dui. Praesent iaculis viverra augue. Quisque in libero. Aenean gravida lorem vitae sem ullamcorper cursus. Nunc adipiscing rutrum ante. Nunc ipsum massa, faucibus sit amet, viverra vel, elementum semper, orci. Cras eros sem, vulputate et, tincidunt id, ultrices eget, magna. Nulla varius ornare odio. Donec accumsan mauris sit amet augue. Sed ligula lacus, laoreet non, aliquam sit amet, iaculis tempor, lorem. Suspendisse eros. Nam porta, leo sed congue tempor, felis est ultrices eros, id mattis velit felis non metus. Curabitur vitae elit non mauris varius pretium. Aenean lacus sem, tincidunt ut, consequat quis, porta vitae, turpis. Nullam laoreet fermentum urna. Proin iaculis lectus.

Sed mattis, erat sit amet gravida malesuada, elit augue egestas diam, tempus scelerisque nunc nisl vitae libero. Sed consequat feugiat massa. Nunc porta, eros in eleifend varius, erat leo rutrum dui, non convallis lectus orci ut nibh. Sed lorem massa, nonummy quis, egestas id, condimentum at, nisl. Maecenas at nibh. Aliquam et augue at nunc pellentesque ullamcorper. Duis nisl nibh, laoreet suscipit, convallis ut, rutrum id, enim. Phasellus odio. Nulla nulla elit, molestie non, scelerisque at, vestibulum eu, nulla. Ut odio nisl, facilisis id, mollis et, scelerisque nec, enim. Aenean sem leo, pellentesque sit amet, scelerisque sit amet, vehicula pellentesque, sapien.

Sed consequat tellus et tortor. Ut tempor laoreet quam. Nullam id wisi a libero tristique semper. Nullam nisl massa, rutrum ut, egestas semper, mollis id, leo. Nulla ac massa eu risus blandit mattis. Mauris ut nunc. In hac habitasse platea dictumst. Aliquam eget tortor. Quisque dapibus pede in erat. Nunc enim. In dui nulla, commodo at, consectetuer nec, malesuada nec, elit. Aliquam ornare tellus eu urna. Sed nec metus. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas.

Phasellus id magna. Duis malesuada interdum arcu. Integer metus. Morbi pulvinar pellentesque mi. Suspendisse sed est eu magna molestie egestas. Quisque mi lorem, pulvinar

10 *CHAPTER 3. RESULTS*

eget, egestas quis, luctus at, ante. Proin auctor vehicula purus. Fusce ac nisl aliquam ante hendrerit pellentesque. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Morbi wisi. Etiam arcu mauris, facilisis sed, eleifend non, nonummy ut, pede. Cras ut lacus tempor metus mollis placerat. Vivamus eu tortor vel metus interdum malesuada.

Sed eleifend, eros sit amet faucibus elementum, urna sapien consectetuer mauris, quis egestas leo justo non risus. Morbi non felis ac libero vulputate fringilla. Mauris libero eros, lacinia non, sodales quis, dapibus porttitor, pede. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Morbi dapibus mauris condimentum nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Etiam sit amet erat. Nulla varius. Etiam tincidunt dui vitae turpis. Donec leo. Morbi vulputate convallis est. Integer aliquet. Pellentesque aliquet sodales urna.

Nullam eleifend justo in nisl. In hac habitasse platea dictumst. Morbi nonummy. Ali- quam ut felis. In velit leo, dictum vitae, posuere id, vulputate nec, ante. Maecenas vitae pede nec dui dignissim suscipit. Morbi magna. Vestibulum id purus eget velit laoreet laoreet. Praesent sed leo vel nibh convallis blandit. Ut rutrum. Donec nibh. Donec interdum. Fusce sed pede sit amet elit rhoncus ultrices. Nullam at enim vitae pede vehicula iaculis.

11

**Chapter 4 Discussion**

Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Aenean nonummy turpis id odio. Integer euismod imperdiet turpis. Ut nec leo nec diam imperdiet lacinia. Etiam eget lacus eget mi ultricies posuere. In placerat tristique tortor. Sed porta vestibulum metus. Nulla iaculis sollicitudin pede. Fusce luctus tellus in dolor. Curabitur auctor velit a sem. Morbi sapien. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Donec adipiscing urna vehicula nunc. Sed ornare leo in leo. In rhoncus leo ut dui. Aenean dolor quam, volutpat nec, fringilla id, consectetuer vel, pede.

Nulla malesuada risus ut urna. Aenean pretium velit sit amet metus. Duis iaculis. In hac habitasse platea dictumst. Nullam molestie turpis eget nisl. Duis a massa id pede dapibus ultricies. Sed eu leo. In at mauris sit amet tortor bibendum varius. Phasellus justo risus, posuere in, sagittis ac, varius vel, tortor. Quisque id enim. Phasellus consequat, libero pretium nonummy fringilla, tortor lacus vestibulum nunc, ut rhoncus ligula neque id justo. Nullam accumsan euismod nunc. Proin vitae ipsum ac metus dictum tempus. Nam ut wisi. Quisque tortor felis, interdum ac, sodales a, semper a, sem. Curabitur in velit sit amet dui tristique sodales. Vivamus mauris pede, lacinia eget, pellentesque quis, scelerisque eu, est. Aliquam risus. Quisque bibendum pede eu dolor.

Donec tempus neque vitae est. Aenean egestas odio sed risus ullamcorper ullamcorper. Sed in nulla a tortor tincidunt egestas. Nam sapien tortor, elementum sit amet, aliquam in, porttitor faucibus, enim. Nullam congue suscipit nibh. Quisque convallis. Praesent arcu nibh, vehicula eget, accumsan eu, tincidunt a, nibh. Suspendisse vulputate, tortor quis adipiscing viverra, lacus nibh dignissim tellus, eu suscipit risus ante fringilla diam. Quisque a libero vel pede imperdiet aliquet. Pellentesque nunc nibh, eleifend a, consequat consequat, hendrerit nec, diam. Sed urna. Maecenas laoreet eleifend neque. Vivamus purus odio, eleifend non, iaculis a, ultrices sit amet, urna. Mauris faucibus odio vitae risus. In nisl. Praesent purus. Integer iaculis, sem eu egestas lacinia, lacus pede scelerisque augue, in ullamcorper dolor eros ac lacus. Nunc in libero.

Fusce suscipit cursus sem. Vivamus risus mi, egestas ac, imperdiet varius, faucibus quis, leo. Aenean tincidunt. Donec suscipit. Cras id justo quis nibh scelerisque dignissim. Ali- quam sagittis elementum dolor. Aenean consectetuer justo in pede. Curabitur ullamcorper ligula nec orci. Aliquam purus turpis, aliquam id, ornare vitae, porttitor non, wisi. Maecenas luctus porta lorem. Donec vitae ligula eu ante pretium varius. Proin tortor metus, convallis et, hendrerit non, scelerisque in, urna. Cras quis libero eu ligula bibendum tempor. Vivamus tellus quam, malesuada eu, tempus sed, tempor sed, velit. Donec lacinia auctor libero.

Praesent sed neque id pede mollis rutrum. Vestibulum iaculis risus. Pellentesque lacus. Ut quis nunc sed odio malesuada egestas. Duis a magna sit amet ligula tristique pretium.

12 *CHAPTER 4. DISCUSSION*

Ut pharetra. Vestibulum imperdiet magna nec wisi. Mauris convallis. Sed accumsan sollic- itudin massa. Sed id enim. Nunc pede enim, lacinia ut, pulvinar quis, suscipit semper, elit. Cras accumsan erat vitae enim. Cras sollicitudin. Vestibulum rutrum blandit massa.

Sed gravida lectus ut purus. Morbi laoreet magna. Pellentesque eu wisi. Proin turpis. Integer sollicitudin augue nec dui. Fusce lectus. Vivamus faucibus nulla nec lacus. Integer diam. Pellentesque sodales, enim feugiat cursus volutpat, sem mauris dignissim mauris, quis consequat sem est fermentum ligula. Nullam justo lectus, condimentum sit amet, posuere a, fringilla mollis, felis. Morbi nulla nibh, pellentesque at, nonummy eu, sollicitudin nec, ipsum. Cras neque. Nunc augue. Nullam vitae quam id quam pulvinar blandit. Nunc sit amet orci. Aliquam erat elit, pharetra nec, aliquet a, gravida in, mi. Quisque urna enim, viverra quis, suscipit quis, tincidunt ut, sapien. Cras placerat consequat sem. Curabitur ac diam. Curabitur diam tortor, mollis et, viverra ac, tempus vel, metus.

Curabitur ac lorem. Vivamus non justo in dui mattis posuere. Etiam accumsan ligula id pede. Maecenas tincidunt diam nec velit. Praesent convallis sapien ac est. Aliquam ullamcorper euismod nulla. Integer mollis enim vel tortor. Nulla sodales placerat nunc. Sed tempus rutrum wisi. Duis accumsan gravida purus. Nunc nunc. Etiam facilisis dui eu sem. Vestibulum semper. Praesent eu eros. Vestibulum tellus nisl, dapibus id, vestibulum sit amet, placerat ac, mauris. Maecenas et elit ut erat placerat dictum. Nam feugiat, turpis et sodales volutpat, wisi quam rhoncus neque, vitae aliquam ipsum sapien vel enim. Maecenas suscipit cursus mi.

## Summary

Quisque consectetuer. In suscipit mauris a dolor pellentesque consectetuer. Mauris convallis neque non erat. In lacinia. Pellentesque leo eros, sagittis quis, fermentum quis, tincidunt ut, sapien. Maecenas sem. Curabitur eros odio, interdum eu, feugiat eu, porta ac, nisl. Curabitur nunc. Etiam fermentum convallis velit. Pellentesque laoreet lacus. Quisque sed elit. Nam quis tellus. Aliquam tellus arcu, adipiscing non, tincidunt eleifend, adipiscing quis, augue. Vivamus elementum placerat enim. Suspendisse ut tortor. Integer faucibus adipiscing felis. Aenean consectetuer mattis lectus. Morbi malesuada faucibus dolor. Nam lacus. Etiam arcu libero, malesuada vitae, aliquam vitae, blandit tristique, nisl.

Maecenas accumsan dapibus sapien. Duis pretium iaculis arcu. Curabitur ut lacus. Ali- quam vulputate. Suspendisse ut purus sed sem tempor rhoncus. Ut quam dui, fringilla at, dictum eget, ultricies quis, quam. Etiam sem est, pharetra non, vulputate in, pretium at, ipsum. Nunc semper sagittis orci. Sed scelerisque suscipit diam. Ut volutpat, dolor at ullamcorper tristique, eros purus mollis quam, sit amet ornare ante nunc et enim.

## Conclusion

Phasellus fringilla, metus id feugiat consectetuer, lacus wisi ultrices tellus, quis lobortis nibh lorem quis tortor. Donec egestas ornare nulla. Mauris mi tellus, porta faucibus, dictum vel, nonummy in, est. Aliquam erat volutpat. In tellus magna, porttitor lacinia, molestie vitae, pellentesque eu, justo. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Sed orci nibh, scelerisque sit amet, suscipit sed, placerat vel, diam. Vestibulum nonummy vulputate orci. Donec et velit ac arcu interdum semper. Morbi pede orci, cursus ac, elementum non, vehicula ut, lacus. Cras volutpat. Nam vel wisi quis libero venenatis placerat. Aenean sed odio. Quisque posuere purus ac orci. Vivamus odio. Viva-

*4.2. CONCLUSION* 13

mus varius, nulla sit amet semper viverra, odio mauris consequat lacus, at vestibulum neque arcu eu tortor. Donec iaculis tincidunt tellus. Aliquam erat volutpat. Curabitur magna lorem, dignissim volutpat, viverra et, adipiscing nec, dolor. Praesent lacus mauris, dapibus vitae, sollicitudin sit amet, nonummy eget, ligula.

Cras egestas ipsum a nisl. Vivamus varius dolor ut dolor. Fusce vel enim. Pellentesque accumsan ligula et eros. Cras id lacus non tortor facilisis facilisis. Etiam nisl elit, cursus sed, fringilla in, congue nec, urna. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Integer at turpis. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Duis fringilla, ligula sed porta fringilla, ligula wisi commodo felis, ut adipiscing felis dui in enim. Suspendisse malesuada ultrices ante. Pellentesque scelerisque augue sit amet urna. Nulla volutpat aliquet tortor. Cras aliquam, tellus at aliquet pellentesque, justo sapien commodo leo, id rhoncus sapien quam at erat. Nulla commodo, wisi eget sollicitudin pretium, orci orci aliquam orci, ut cursus turpis justo et lacus. Nulla vel tortor. Quisque erat elit, viverra sit amet, sagittis eget, porta sit amet, lacus.

In hac habitasse platea dictumst. Proin at est. Curabitur tempus vulputate elit. Pellen- tesque sem. Praesent eu sapien. Duis elit magna, aliquet at, tempus sed, vehicula non, enim. Morbi viverra arcu nec purus. Vivamus fringilla, enim et commodo malesuada, tortor metus elementum ligula, nec aliquet est sapien ut lectus. Aliquam mi. Ut nec elit. Fusce euismod luctus tellus. Curabitur scelerisque. Nullam purus. Nam ultricies accumsan magna. Morbi pulvinar lorem sit amet ipsum. Donec ut justo vitae nibh mollis congue. Fusce quis diam. Praesent tempus eros ut quam.

Donec in nisl. Fusce vitae est. Vivamus ante ante, mattis laoreet, posuere eget, congue vel, nunc. Fusce sem. Nam vel orci eu eros viverra luctus. Pellentesque sit amet augue. Nunc sit amet ipsum et lacus varius nonummy. Integer rutrum sem eget wisi. Aenean eu sapien. Quisque ornare dignissim mi. Duis a urna vel risus pharetra imperdiet. Suspendisse potenti.

Morbi justo. Aenean nec dolor. In hac habitasse platea dictumst. Proin nonummy porttitor velit. Sed sit amet leo nec metus rhoncus varius. Cras ante. Vestibulum commodo sem tincidunt massa. Nam justo. Aenean luctus, felis et condimentum lacinia, lectus enim pulvinar purus, non porta velit nisl sed eros. Suspendisse consequat. Mauris a dui et tortor mattis pretium. Sed nulla metus, volutpat id, aliquam eget, ullamcorper ut, ipsum. Morbi eu nunc. Praesent pretium. Duis aliquam pulvinar ligula. Ut blandit egestas justo. Quisque posuere metus viverra pede.

Vivamus sodales elementum neque. Vivamus dignissim accumsan neque. Sed at enim. Vestibulum nonummy interdum purus. Mauris ornare velit id nibh pretium ultricies. Fusce tempor pellentesque odio. Vivamus augue purus, laoreet in, scelerisque vel, commodo id, wisi. Duis enim. Nulla interdum, nunc eu semper eleifend, enim dolor pretium elit, ut commodo ligula nisl a est. Vivamus ante. Nulla leo massa, posuere nec, volutpat vitae, rhoncus eu, magna.

Quisque facilisis auctor sapien. Pellentesque gravida hendrerit lectus. Mauris rutrum so- dales sapien. Fusce hendrerit sem vel lorem. Integer pellentesque massa vel augue. Integer elit tortor, feugiat quis, sagittis et, ornare non, lacus. Vestibulum posuere pellentesque eros. Quisque venenatis ipsum dictum nulla. Aliquam quis quam non metus eleifend interdum. Nam eget sapien ac mauris malesuada adipiscing. Etiam eleifend neque sed quam. Nulla facilisi. Proin a ligula. Sed id dui eu nibh egestas tincidunt. Suspendisse arcu.

14

15

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[3] *The IMRAD research paper format*, Jan. 2013. [Online]. Available: [http://www15.](http://www15.uta.fi/FAST/FIN/RESEARCH/imrad.html) [uta.fi/FAST/FIN/RESEARCH/imrad.html](http://www15.uta.fi/FAST/FIN/RESEARCH/imrad.html).

[4] Cicero, “De finibus bonorum et malorum (the extremes of good and evil)”, 45 B.C. Section 1.10.32.

[5] Unknown, “Lorem ipsum website”, [Online]. Available: [www.lipsum.com](http://www.lipsum.com/).

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17

# Appendix A Code

You can put code in your document using the listings package, which is loaded by default. Be aware that the listings package does not put code in your document if you are in draft mode. The "forcegraphics" option will put them in even in draft mode.

There is an example java (Listing [A.1)](#_bookmark43) and XML file (Listing [A.2).](#_bookmark45) Defaults are set in ruthesis.cls and customizations are in custom.tex. Thanks to the url package, you can typeset OSX and unix paths like this: /afs/rnd.ru.is/project/thesis- template. Windows paths: C:\windows\temp\ . You can also typeset them using the menukey package, but it tends to delete the last separator.[1](#_bookmark44)

Listing A.1: Data\_Bus.java: Setting up the class.

1 **package** com.example.mycoolapp;

3 **import** android.app.Activity;

**import** android.content.Intent;

5 **import** android.os.Bundle;

**import** android.view.View;

7 **import** android.widget.Button;

**import** android.widget.TextView;

9

*// I am creating a comment that is very very long to demonstrate how the line wrapping ←' '→system works. You should see a symbol to annotate that it has been wrapped to ←' '→the next line.*

11 **public class** Data\_Bus **extends** Activity { Button Next;

13 TextView textdisplay1, textdisplay2;

15 @Override

**protected void** onCreate(Bundle savedInstanceState) {

17 *// TODO Auto−generated method stub*

**super**.onCreate(savedInstanceState);

19 setContentView(R.layout.adc\_databustest);

Next = (Button) findViewById (R.id.checkButton);

21 textdisplay1 = (TextView) findViewById (R.id.tvTop); textdisplay2 = (TextView) findViewById (R.id.tvBottom);

23

1The menukey package has issues with biblatex, read custom.tex for more information.

18 *APPENDIX A. CODE*

}

25 }

Listing A.2: AndroidManifest.xml: Configuration for the Android UI.

1 <?xml version="1.0" encoding="utf*−*8"?>

<**manifest** [xmlns:android="http://schemas.android.com/apk/res/android"](http://schemas.android.com/apk/res/android)

3 package="com.example.mycoolapp" android:versionCode="1"

5 android:versionName="1.0" >

7 <uses*−*sdk android:minSdkVersion="13"

9 android:targetSdkVersion="13" />

11 <application android:allowBackup="true"

13 android:icon="@drawable/ic\_launcher" android:label="@string/app\_name"

15 android:theme="@style/AppTheme" >

17 <activity android:name=".MainActivity"

19 android:label="@string/app\_name" >

<intent*−*filter>

19

**Glossary**

**dissertation** A large pile of paper that professors use to prop up shelves.. [2](#_bookmark10)

**glossary** a place to put all the terms that confuse people. [2](#_bookmark10)

**ohm** unit of electrical resistance. [2](#_bookmark10)

20

21

**Acronyms**

**LED** light-emitting diodes. [2](#_bookmark10)

**RFID** Radio Frequency IDentification. [2](#_bookmark10)

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School of Science and Engineering Reykjavík University



Menntavegur 1

101 Reykjavík, Iceland

Tel. +354 599 6200

Fax +354 599 6201

[www.ru.is](http://www.ru.is/)