

Abstract

A long, long time ago...

This section should summarize the content of the dissertation, namely: explain the context of problem, describe the problem itself and address the work done to mitigate/solve the problem. Results and/or contributions should be mentioned.

Resumo

Há muito, muito tempo

See the Abstract.

Agradecimentos

Obrigado a todos, obrigado ...

Dedico a ...

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Acrónimos

| | | | |
|-------------|--|-------------|-------------------------------|
| BS | Base Station | HTTP | Hypertext Transfer Protocol |
| BSN | Body Sensor Network | MRI | Magnetic Resonance Imaging |
| DCC | Departamento de Ciência de Computadores | TCP | Transmission Control Protocol |
| ECG | ElectroCardioGram | UDP | User Datagram Protocol |
| FCUP | Faculdade de Ciências da Universidade do Porto | USF | Unidade de Saúde Familiar |
| HR | Heart Rate | USA | United States of America |

Capítulo 1

Introdução

Este template pretende dar uma base para a escrita de dissertações no Departamento de Ciência de Computadores (**DCC**)/Faculdade de Ciências da Universidade do Porto (**FCUP**).

1.1 Organização

Vejam o capítulo **2** para algum contexto sobre o conteúdo de uma dissertação. O capítulo **4** tem alguns pontos sobre o uso do \LaTeX ao longo do texto são utilizados alguns exemplos para mostrar algumas das funcionalidades.

Capítulo 2

Background

This chapter has the “Instructions for preparing and writing M.Sc. Dissertations” (Research-oriented work), Version 1.0, January, 7th, 2015 from prof. Inês Dutra. It was originally written in English so it was kept as such. It was some additions from Pedro Brandão.

2.1 Before Starting

Before starting your dissertation, you need to **define** what is the subject you are going to work with and perform a **thorough systematic** bibliography review of the theme you chose. What is a systematic review? It is the one where you search the web or books for the subject, and define rules for filtering papers in two sets “included” and “excluded” and explain why some papers go to one set or the other. In order to start the search, you need to prepare keywords related to your subject and prepare queries to be used in Google Scholar, Scopus, MesH etc. These search engines will return a number of papers on the subject you are looking for. **You need to read at least the abstract and conclusions of every paper retrieved after your search.** Now, you filter out only the ones you think are very closely related to your research work, and give a reason for choosing those papers.

2.2 Bibliography

Start organizing your bibliography file. Choose one of the standards available to start organizing your references. Usually your department/faculty has clear rules about the standard to be used. If you are formatting your text using L^AT_EX, most references found during your bibliographic search can be exported in BibTeX format.

2.2.1 Bibliography Section

Your dissertation needs to have a Bibliography Section with a list of the cited works you have in the text. In the process of writing your dissertation, make sure to properly refer the authors you are basing your text on. For example, “Yaacoub et al. [7] discovered that...”. In this sentence, Yaacoub is the first author of one of the publications you list in the Bibliography Section of your dissertation and [7] is the link that connects this citation to the publication in the bibliographic list. If your bibliographic entry has only one author, you cite only the author’s surname. If the bibliographic entry has two authors you cite the two authors’ surnames (e.g., Clausen and Jacquet [2]). If the bibliographic entry has more than two authors, you can use the expression “et al.”, like in the example shown before.

You should avoid as much as possible web site references. Only in some cases, illustration, showing trends, are they acceptable.

References should be used to back up claims made. Specially in the introduction section, sentences that stipulate something should be backed by references that assert that claim (e.g.: Android, in December 2016, was the most widely used mobile operating system [4]¹

2.3 Inserts

Every picture, graph, diagram, algorithm etc needs to have a caption and a number and needs to be cited and explained in the text. The mere existence of a picture, etc. does not exempt it of a description.

2.3.1 Copyrights and image usage

If you want to use any picture, graph, diagram etc available in one of the publications in your dissertation, you need to make sure that you can use it (check the copyright rules). If the copyright rules allow you to reproduce the picture (or others) in your text, you need to insert a reference to the source (where the picture was taken from) in the caption. If you are allowed to use a picture, but want to slightly modify it, you need to say in the caption: Adapted from [1] (where [1] is the number of your reference in the Bibliographic Section).

2.4 Chapters/Organization

Chapter 1: Introduction: This should be a summary of what comes in the next chapters.

Here you explain in two to five pages: (1) the context of your work highlighting and defining

¹An example where a web link to a recognized market analysis company would be valid. Note that the time which the report was seen is very relevant.

the problem you need to solve, (2) what you want to do (objectives) and (2) why you want to do it (motivation), (3) how you want to achieve your objectives (methodology), always supporting your text on the available literature, (4) contributions (Results that confirm that you achieved your objectives) and (5) organization of the chapters that come next.

Chapter 2: Basic Concepts: In this chapter you need to present the foundations of your work: theoretical aspects, background material etc, all that is needed to understand the terminology and expressions used in the remaining chapters.

Chapter 3: Related Work: Here you need to discuss about other works in the literature that do something similar to what you want to do. You need to cite and discuss the relevant papers you chose to include in your study during your survey. Explain what others do, why it is not sufficient, and why you need to do what you want to do. It is helpful to define some criteria to compare your work against others, and build a table with main characteristics of other works contrasting to what you want to do. In other words, in which aspects is your work different from others?

Chapter 4: Your Work: this chapter describes the contributions of the work done. If it is based on prior work (continuation of the project or using prior developed work), the should only describe what is the new work done. If references are needed, it should be clear what is the prior work and what is the new contribution.

Chapter 5: Materials and Methods: should have:

- Definition of Experiments (if any)
- Definition of Evaluation Metrics

Chapter 6: Results and Analysis

Chapter 7: Conclusions and Future work: this should restate the problem and iterate through the solution(s) analyzing the advantages and contributions. The limitations and unsolved problems should also be described. It should also describe the potentiality of new research/development that the work enables, the future work.

- Research Summary
- Main Findings
- Limitations
- Future Work
- Conclusion

During writing, some of these chapters may collapse into just one. **Your work (chapters 4-7) should account for at least 50% of your whole dissertation.**

2.4.1 Contents of each chapter

You should start each chapter with a summary of its objective and contents, preferably relating to previous ones. At the end of the chapter provide a conclusion/summary of it, preferably connecting it to the next one.

Capítulo 3

Estado da Arte

Sem conteúdo relevante, apenas com texto para ocupar o espaço.

3.1 Section example

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3.2 Second Section example

3.2.1 SubSection example

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Capítulo 4

Desenho e Desenvolvimento

O referente ao “Your work” do capítulo 2.

No contexto deste template, este capítulo serve de exemplos de uso do L^AT_EX de algumas regras de tipografia. Note-se que as regras sobre a formatação estão disponíveis [Estrutura e Layout de teses](#). Pode-se ver exemplos de tese (para a formatação e conteúdo) no repositório da UP <https://repositorio-aberto.up.pt/handle/10216/9535>.

4.1 Exemplo de código

```
public interface CallbackCmdMeasurements { // comment
    public abstract void newMeasure(MeasurementBasic measure, int reqId);
    public abstract void newMeasuresAggSimp(MeasurementBasic[] measuresAggSimp,
        'A string');
}
```

Bloco de Código 4.1: CommandDaemon callback interfaces

É possível como referir o código, por exemplo o bloco de código 4.1.

4.2 Acrónimos

Deve-se acrescentar os acrónimos no ficheiro `acros.tex` e ordená-los alfabeticamente nesse ficheiro. Vamos usar o acrónimo Transmission Control Protocol (**TCP**) que deve estar expandido, assim como no capítulo 5. Os acrónimos devem aparecer expandidos em cada capítulo (o que está já configurado para esta dissertação).

Ao usar `\acp` o acronym tentará colocar o plural (acrescentando um `s`). É possível no ficheiro `acros.tex` colocar qual o plural pretendido por exemplo Unidades de Saúde Familiar (**USFs**).

Deve-se usar `\newacroplural{USF}{Unidades de Saúde Familiar}`, definindo o novo plural. Pode-se opcionalmente definir um novo “plural” para a versão do acrónimo com `\newacroplural`

USFes

`{USF}{Unidades de Saúde Familiar}` (acrónimo no plural incorreto; apenas para exemplo).

Podem usar `\acs` para apenas mostrar o acrónimo, `\acl` para mostrar a expansão. Ver mais na documentação do pacote `acronym`.

4.3 Figuras

Podem ver a figura 4.1 muito bem. Notem que na lista de figuras não aparece tudo o que está na legenda, mas apenas o que está entre `[]`.



Figura 4.1: O logo da FCUP antigo

As figuras devem usar o posicionamento `[htb]` para serem preferencialmente colocadas no local onde foram declaradas.

4.3.1 Formato

Devem colocar as figuras sempre que possível em pdf. Usem o programa (ou aplicação web) para exportar para pdf. Desse modo a qualidade das mesmas é sempre maior.

No caso em que o pdf gerado ocupe uma página A4 inteira (por exemplo nas ferramentas do MS Office) podem usar o `pdfcrop` no pdf gerado. Este comando está disponível na maior das

distribuições de L^AT_EX.

4.4 Referências a bibliografia

Algumas referências para se ver a ordenação [7] (estão ordenadas pelo apelido do autor). Aqui outra ainda [3].

Temos aqui o Clausen [2]. E para ver várias [3, 6, 7].

No ficheiro bib de referências deve-se colocar entre {} o que se quiser manter com maiúsculas no título. Exemplo: `title = {Addressing the {WLAN} Problem}` resulta em Addressing the WLAN problem, note-se o **p** de *problem*.

Para saber os campos do bibtex relevantes para cada tipo de entrada pode-se utilizar um editor de bibtex como o [JabRef](#).

Os meses indicados no ficheiro bib poderão aparecer em inglês, caso se pretenda deve-se colocar o texto em português explicitamente no ficheiro bib.

4.5 Capa

Para a inclusão da formatação correta para a capa, pode-se criar um pdf usando o pptx disponível ([CapaMSc_PowerPoint.pptx](#), necessário fazer login no Sigarra) e depois incluí-lo com o comando seguinte (comentado no tex original).

```
\includepdf[pages=1]{FrontPage-MSc.pdf}  
\cleardoublepage  
\includepdf[pages=2]{FrontPage-MSc.pdf}  
\cleardoublepage
```

Bloco de Código 4.2: Incluir capas oficiais

4.6 Tabelas

Exemplo de uma tabela mais complexa na tabela 4.1.

Uma tabela de lado exemplificada em 4.2.

Tabela 4.1: BSN versus WSN (with input from Latré and Guang)

| | BSN | WSN |
|---------------------|--|---|
| Distribution | i) Existence of a BS; ii) BS collects, maintains and processes the data; iii) Nodes will do minimal processing, sending all data to the BS; iv) Centralized system where BS controls all nodes; v) Node replacement is difficult in in-body sensor nodes; vi) Smaller number of nodes; vii) Nodes need to take biocompatibility, wearability into account. | i) A BS may or not exist or there may be several BSs (e.g. mobile nodes collect info, clustering); ii) As in BSN, but also on-demand querying; iii) Nodes will do processing, aggregation to alleviate communication or correlate results; iv) Distributed system, nodes decide cooperatively; v) Node replacement is difficult due to location, scale, etc.; vi) (usually) Wide areas covered by large number of nodes. vii) Nodes may need to be environment friendly, indiscernible from surroundings. |
| Comm. | i) One hop to BS; ii) Close range but attenuated by body; iii) Data rates heterogeneous. | i) Multi hop through network of sensor nodes; ii) Long(er) range; iii) Data rates homogeneous. |
| Data | This is some text on this cell. The multirow package does not know the height of the cell and can not center the cell to the right. This is because of the X from tabularx. | This is on two rows of the table |
| Energy | Some more text just to show something | |

4.7 Unidades

Deve-se usar o sistema ISO de unidades e respeitar a capitalização das unidades de acordo com a norma. Ver *Quantities and units* em [Typographic conventions](#) (podem e devem dar uma olhada nas outras partes da página).

4.8 Sugestões na escrita e uso do tex

- usar o ~ para ligar as referências, evita a possível mudança de página: ex.: como o Brandão refere~\cite{bran99}
 - também se deve seguir a mesma regra para \ref, unidades de dados, nº de standard (ex.: IEEE~802.11).

Tabela 4.2: Sensor examples

| Device | Availability | Sensed | Technology | Frequency | Data Rate [×] | Energy [◇] |
|---|---------------------------------|---|--|---|---------------------------|----------------------------|
| BioHarness BT | commercial | HR Breathing rate | detection of <i>QRS</i> complex in ECG | 1 Hz | 8 bps | 21 h transmitting |
| | | | conductive elastic measurement of thorax excursion | 1 Hz | 7 bps | |
| | | ECG 3D Accelerometer | variability of a weight reference | 50 Hz [⌘] | 500 bps [⌘] | |
| | | | potential difference across electrodes in body | 250 Hz | 2500 bps | |
| | | | angular momentum | 1 Hz | 9 bps | |
| Actigraph GT3X+ [1] | commercial | Gyroscope | thermistor | 1 Hz | 9 bps | 31 days |
| | | Skin temperature | | | | |
| | | 3D Accelerometer | variability of a weight reference | 30-100 Hz [⌘] | 360-1200 bps [⌘] | |
| Shimmer Research GSR Sensor | commercial | Galvanic skin response | measure skin conductivity | up to 15.9 Hz | 191 bps | 60 μ A |
| Nonin Onyx II [5] | commercial | O ₂ saturation (full waveform) O ₂ saturation (display format) | measure light absorption by blood haemoglobin | 75 Hz | 1200 bps | 2×1.5 V AAA (600 tests) |
| | | | | 1 Hz | 8 bps | |
| Medtronic iPro CGM | commercial | continuous glucose meter | electrochemical detection of glucose through its reaction with glucose oxidase | 0.1 Hz [◁] | 1 bps [▷] | up to 72 h |
| Brain sensor by Nurmikko et al. | in research [‡] | brain activity | microelectrode arrays detect neuron firing | 40 k samples/sec×16 channels [⌘] | N/A | 12 mW |
| Molecular biomarkers by Ling et al. | research prototype [*] | serum cardiac troponin I, creatinine kinase, myoglobin | magnetic properties of sensors vary according to presence of biomarker | | | |
| Electrochemical dopamine sensor by Chan et al. [⊗] | research | dopamine | Interdigitated micro electrodes measured electrochemical reaction | 50 Hz | – | 10 pA |

[×] data rates are based on the frequency and the accuracy in bits stated in the references; they do not include time stamps or message headers.

[◇] values taken from the references as available.

[⌘] for each of the 3 axis.

[◁] sensor data is collected every 10 s by collector.

[▷] our assumption of 9 bits per measure (up to 512 mg/dL (USA glucose units)).

[‡] prototypes and clinical trials exist for devices with 16 channels.

[⌘] more channels are needed (e.g. for decoding arm joint angles); 100 channels arrays are being developed.

^{*} tested on mice; measurement using Magnetic Resonance Imaging (MRI), but test values were extracted from explanted sensors.

[⊗] the developed sensor was not made of nano tubes, which according to the authors, led to poor sensitivity.

4.9 Sugestões na escrita

- em inglês não usar a *short form*. Em textos formais deve-se manter a *long form*. Incorreto: “don’t use”. **Correto:** “do not use”
- em inglês (e também português) não usar a forma reflexiva ou indireta, preferir sempre a forma direta (que é mais assertiva e torna as frases menos complexas).
 - incorreto: “Python was used to program”; Correto: “we used Python”

4.10 Referências para outras fontes de informação

Capítulo 5

Experiências e Testes

O referente ao “Materials and Methods” do capítulo 2.

Outro acrônimo pode ser Transmission Control Protocol (TCP) (que deve estar expandido aqui, apesar de ter sido usado já no capítulo 4).

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Capítulo 6

Resultados e análise

Capítulo 7

Conclusões

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7.1 Trabalho Futuro

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