Design and Implementation of a Vehicle Classification Module

Undergraduate Student Project

by

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Abstract

Design and Implementation of a Vehicle Classification Module

In a *single* well-written paragraph, this is what we'd like to do. Try to cover Need, Solution, Differentiation, Benefit (NSDB). Use the content of this template as an example for formatting your proposal document, **NOT** as a strict guide for the flow of your discussion and what your proposal must contain.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

This section ideally contains the following sub-sections: background of the project, project objectives, and overview of the project.

1.1 Background of the Project

This section states the reasons why the project is being done. If the project is related to previous projects, a short history of what the previous projects accomplished shall be included. If the project is part of a larger work, a brief mention of the rest of the work shall be made.

1.2 Project Objectives

This section clearly states what the project wishes to achieve.

This section is usually placed on the Introduction chapter for the final documentation of the project. For proposals, however, the objectives are usually presented in another chapter after the review of related work.

1.3 Project Overview

A block diagram giving an overview of the basic building blocks of the project and how they relate to each other shall be shown. If the project will be done by a team, the division of labor can also be mentioned. Just like the previous section, this section is usually presented in another chapter after the review of related work for proposal documents.

1.4 Documentation Flow and Organization

Before you end your introduction chapter, you should provide a brief description of the upcoming chapters. This gives the readers the idea on what to expect in your documentation. Show how each chapter relates to each other.

Chapter 2

Related Work

A review of previous work and other materials related to the project shall be written here. Make sure you do proper citations of original materials taken from various sources. For example, if this sentence is taken from reference #1 in my bibliography, it should be referenced just like this [1]. Avoid copying sources word for word. Always paraphrase. "If it cannot be avoided, enclose the cited material in double quotes just like this" [2]. If this whole paragraph was taken from two different sources, then the citations may be written this way [3], [4].

Chapter 3

Problem Statement and Objectives

The problem statement and objectives are placed on a separated chapter for project proposals after the review of related work. The previous chapter builds up the foundation of the project by highlighting the advantages and disadvantages of the relevant related work. The main problem that the project intends to solve is then presented in this chapter. The project objectives should also be discussed here.

Chapter 4

Preliminary Findings

This is an optional chapter where you present all of your preliminary work, results, and analysis. For final project documentations, this chapter becomes the Results and Analysis chapter.

Bibliography

[1] M.E.V. Alba, A.N. Chua, W.V.V. Lofamia, R.J.M. Maestro, J.R.E. Hizon, J.A.R. Madamba, H.R.O. Aquino, and L.P. Alarcon. An Aggressive Power Optimization of the ARM9-based core using RAZOR. In *TENCON 2012 - 2012 IEEE Region 10 Conference*, pages 1–5, Nov 2012.

[2] N. V. Hung, N. H. Dung, L. C. Tran, T. M. Hoang, and N. T. Dzung. Vehicle classification by estimation of the direction angle in a mixed traffic flow. In *2016 IEEE Sixth International Conference on Communications and Electronics (ICCE)*, pages 365–368, July 2016.

Appendix A

Appendices

If there is only one appendix, it shall be labeled "Appendix:" and the appendix title. If there are more than one appendices, they shall be labeled "Appendix A: [title]", "Appendix B: [title]", etc. For software projects, appendices may include program listings, screen shots, and sample input and output files. For hardware projects, appendices may include printed circuit board layouts and geometric design layouts. Other possible appendices include user manuals (created by the author for the project), long mathematical proofs, and reviews of basic concepts.

You can insert appendices through the **Document** > **Start Appendix Here** option. The appendix should start after the bibiliography section of the main document. Appendices can also have chapters and sections. LyX automatically lists the appendices alphabetically.

Appendix B

Formatting Tips

B.1 Inserting Chapters

On the upper left dropdown menu of the LyX window, select *Chapter*. You can then type the chapter title that you want. Pressing Enter will revert the format to *Standard*, where the content can now be placed. Chapters are numbered and placed on the *Table of Contents* automatically.

B.2 Inserting Sections

On the same dropdown menu where you insert a chapter, select *Sections*. The sections under the chapter are automatically numbered accordingly. These also appear in the generated *Table of Contents*.

B.2.1 Subsections

You can also add subsections and subsubsections. However, use them sparingly, especially the latter.

B.3 Inserting Labels

On the chapter/section/image/table that you want to reference, click **Insert** > **Label**. You can use the default label that LyX generates for you. To 'call' it anywhere in your document, click the **Insert** > **Cross-reference**. This provides an efficient way of pointing out figure/table and chapter/section numbers, without the need to type out explicitly what the numbers are in the document.

B.4 Inserting Floats

Figures and tables shall be included in the body of the documentation to illustrate or clarify the accompanying text. Thus, figures and tables must be referenced in the text in order for them to be meaningful. By convention, figure names should be placed below the image, while table names should be placed on top of the table.

Moreover, figures or tables should not appear in the document before they are mentioned in the text. By default, LyX does not follow this rule and places images or tables near, but not exactly after, the text referencing it. You can force the rule by right-clicking on the *float:Figure* label in the LyX editor and going to *Settings*. In the window that appears, shown in Figure B.1, uncheck *Use default placement* and check *Here definitely* instead.

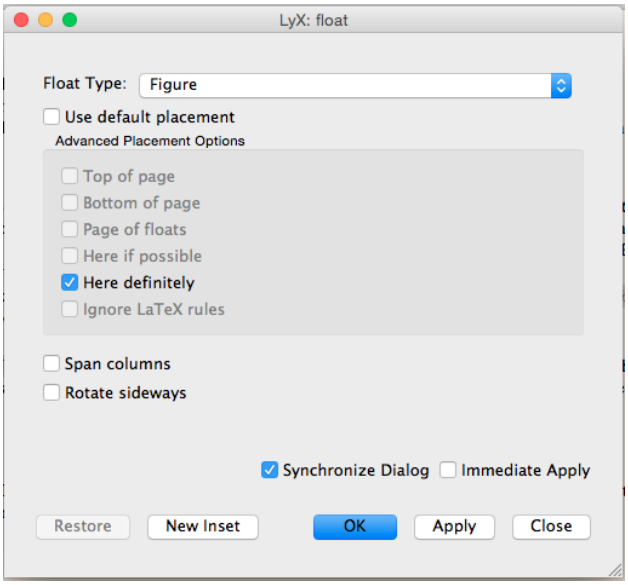


Figure B.1: Forcing float placement

B.4.1 Inserting Images

Place your cursor on the area where you want to insert the image. Select **Insert** > **Float** > **Figure**. Insert the actual image by selecting **Insert** > **Graphics**. It is a recommended practice that all images should be placed on a single folder on the same directory of this LyX document template.

You can also center the image by putting first your cursor on the side of the image that you want to center. Right click then select *Paragraph Settings*. Finally, select the *Center* button.

You can scale the images inside the document by clicking on the image. As shown in

Figure B.2, images can be scaled relative to the column width. For two column document formats, scale the image relative to the text width.

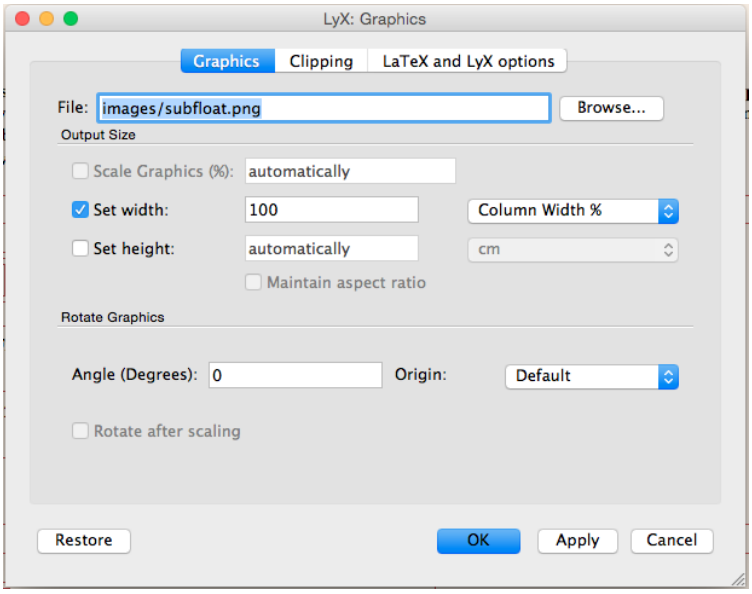
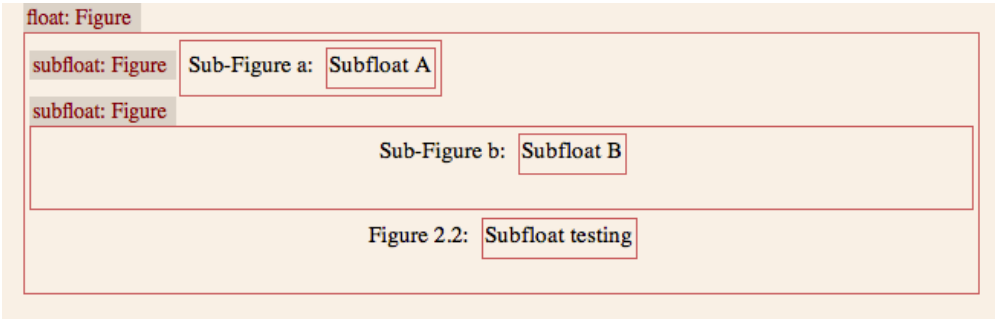
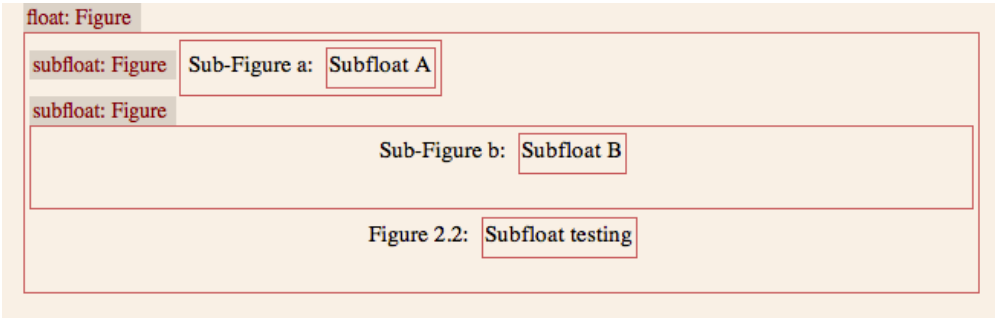


Figure B.2: LyX Graphics options

As shown in Figure B.3, we can also insert floats within the float. To put the subfloat to the document center, click on the side of the *subfloat: Figure* field, instead of the image within the subfloat, and then access the *Paragraph Settings* as described in the previous steps.



(a) Subfloat A



(b) Subfloat B

Figure B.3: Subfloat Sample

B.4.2 Inserting Tables

Tables can be inserted just like Figure floats. Tables can also be centered just like the images in the same way. Note that some tables might be too long to fit the page. Again, by convention, table descriptions are placed on top of tables as demonstrated in Table B.1. Make it fit by setting the column width (**Right click the whole column -> More -> Settings**).

Table B.1: Sample Table

Row 1, Column 1	Row 1, Column 2	Row 1, Column 3	Row 1, Column 4	Row 1, Column 5

B.5 Inserting Citations

To download the BibTEX formatted citation from IEEEXplore, see Figure B.4.

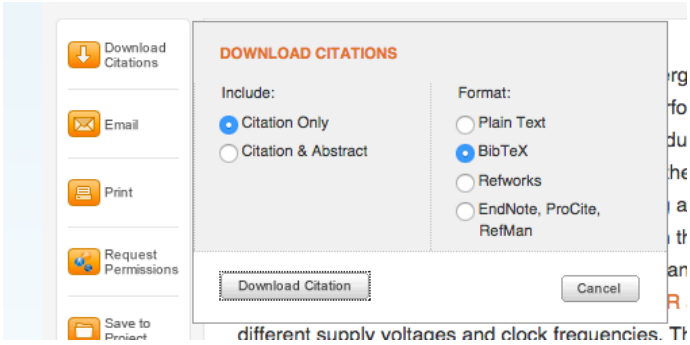


Figure B.4: BibTEX from IEEEXplore

Put whatever text returned by IEEEXplore to your BibTEX file (.bib). The references should follow the BibTEX format. To cite your paper [1], click **Insert** > **Citation**, select the desired paper, then click *Add*, see Figure B.5.

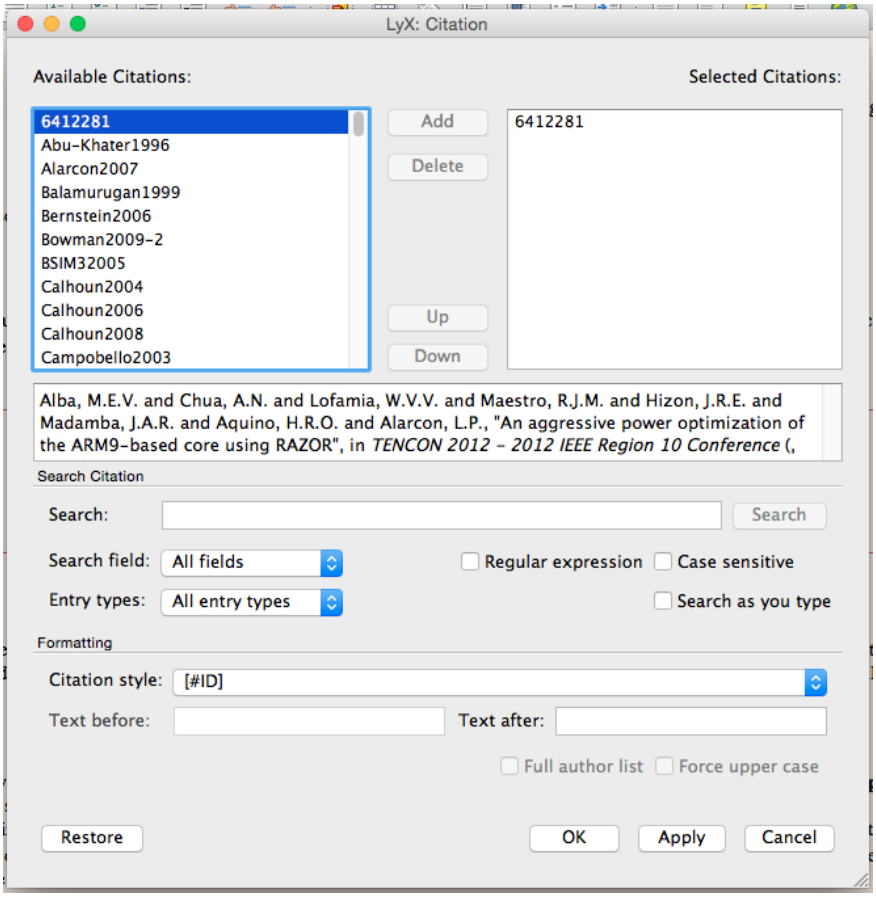


Figure B.5: Selecting citations

As shown in Figure B.6, work titles on bibliographies generated by BibTEX are not au-

tomatically capitalized. Capitalization can be forced by editing the BibTEX file (.bib) and then enclosing the capital letters of the titles with {}, such as "**title={An {A}ggressive {P}ower {O}ptimization of the {ARM9}-based core using {RAZOR}},**".

Bibliography

[1] M.E.V. Alba, A.N. Chua, W.V.V. Lofamia, R.J.M. Maestro, J.R.E. Hizon, J.A.R. Madamba, H.R.O. Aquino, and L.P. Alarcon. An aggressive power optimization of the arm9-based core using razor. In *TENCON 2012 - 2012 IEEE Region 10 Conference*, pages 1–5, Nov 2012.

Figure B.6: Bibliographies with no auto-capitalization

B.6 Inserting Equations

You can insert inline equations like this: $V = IR$ by going to **Insert -> Math -> Inline Equation**. You can also insert numbered equations through **Insert > Math > Numbered Formula**.

$$x/y = \frac{x}{y} \tag{B.1}$$

$$P(Z > 1) = P(Z < 0) = \frac{1}{2}\left[1 + erf\left(\frac{Z - 0.5}{\sqrt{2(0.18)}}\right)\right] = 0.1193 \tag{B.2}$$

$$T_P = \frac{\left[10^{\text{bits}/\text{preamble}} + (4^{\text{bytes}/\text{packet}})(8^{\text{bits}/\text{byte}})\right](16^{\text{symbols}/\text{bit}})}{450^{\text{ksymbols}/\text{second}}} = 1.493ms \tag{B.3}$$

A math toolbar, as shown in Figure B.7, will appear whenever you try to edit an equation field. This greatly helps in creating professional-looking equations. It is required that all equations appearing in the document be written out using this option.

Figure B.7: Math toolbar for equation writing