Writing your Dissertation using Latex !

UNIVERSITY *of* LIMERICK

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Your Department

Your Faculty

University of Limerick

Submitted to the University of Limerick for the degree of

PhilosophiæDoctor (PhD) year

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Day of the defense: day month year

Signature from head of PhD committee:

Abstract

Your abstract goes here. Open the abstract.tex file found at:
0_frontmatter/abstract.tex

Declaration

I herewith declare that I have produced this paper without the prohibited assistance of third parties and without making use of aids other than those specified; notions taken over directly or indirectly from other sources have been identified as such. This paper has not previously been presented in identical or similar form to any other Irish or foreign examination board.

The thesis work was conducted from year to year under the supervision of Dr. Name Surname and Dr. Name Surname at University of Limerick.

Limerick, year

Acknowledgements

Your acknowledgment goes here. Open the acknowledgment.tex file found at: 0_frontmatter/acknowledgment.tex

Your dedication goes here. Open the dedication.tex file found at:
0_frontmatter/dedication.tex

Contents

List of Tables

LIST OF TABLES

List of Figures

LIST OF FIGURES

1

Introduction

Here you can write you own text . . . also we can write a footnote like this.[1]

This document offers few basic examples on how to format tables, insert pictures, format text so that you can start using Latex immediately. The main advantage of Latex is that you do not need to care about the formatting of the entire document because Latex will do the job for you! Nice!

Latex can be downloaded free here: `http://www.latex-project.org/`

Usually, the first Chapter of a Dissertation has the following headings (see below). Your dissertation may have different ones, so change these as you wish.

1.1 Aims and Objectives

The main question that this dissertation addresses is E In order to address this question, this work focuses on the following issues in the context of E :

- Firstly, . . .
- Secondly, . . .

[1] It is simple to create a footnote.

1.2 Methodology

In order to address this question the following approach was taken.

1.3 Research Contribution

The primary research contribution is:

1.4 Thesis Outline

The remaining chapters of this dissertation are as follows:

Chapter Two is an introductory discussion to . . .

Chapter Three is a historical review of . . .

Chapter Four presents the . . .

Chapter Five describes the . . .

Chapter Six draws conclusions and evaluates the . . . Lastly, it suggests possible future works.

A series of documents have been included in the Appendix section of this dissertation. These are:

- *Appendix A* outlines . . .
- *Appendix B* presents . . .
- *Appendix C* includes . . .

Attached to this dissertation is a CD containing the following items:

- *folder 1*: . . .
- *folder 2*: . . .

2

Chapter 2

Latex will automatically renumber sections! Also it creates list of figures, list of tables and references! Nice job!

This document is formatted according to the University of Limerick specification for the submission of a Master or PhD dissertation. Double-page printing is already in the code! If you want to change things you need to modify the 'PhDthesisPSnPDF.cls' file found in Latex/Classes

2.1 Font

Normal font **Bold Font** *italics*. List of colours for font can be found at: `http://en.wikibooks.org/wiki/LaTeX/Colors`

2.1.1 Special characters

Special characters such as & and % need to be treated in a special way. Check the full list of special characters here: `http://en.wikibooks.org/wiki/LaTeX/Special_Characters`

2.1.1.1 Subsubsection Title

2.1.2 Wiki page

You can learn more about Latex by clicking here.

2.2 Another Section

2.2.1 Another Subsection

2.2.1.1 Another Subsubsection Title

3

Math formulae in Latex

3.1 Math

In-text Math

- A vector vector $\hat{A}_{ba}\{x_{ba}, y_{ba}, z_{ba}\}$
- Another vector $R^b\{\hat{t}_{1b}, \hat{t}_{2b}, \hat{t}_{3b}\}$ as:

A series of Equations:

$$\hat{t}_{1b} = \hat{A}_{ba} \tag{3.1}$$

$$\hat{t}_{2b} = \frac{\hat{A}_{ba} \times \hat{M}_{bm}}{\mid \hat{A}_{ba} \times \hat{M}_{bm} \mid} \tag{3.2}$$

$$\hat{t}_{3b} = \hat{t}_{1b} \times \hat{t}_{2b} \tag{3.3}$$

$$R^a = R^b(R^i)^T = [\hat{t}_{1b}, \hat{t}_{2b}, \hat{t}_{3b}][\hat{t}_{1i}, \hat{t}_{2i}, \hat{t}_{3i}]^T \tag{3.4}$$

where the symbol ^{T} denotes transposition.

$$\hat{t}_{2b} = \frac{\hat{A}_{ba} \times \hat{M}_{bm}}{\mid \hat{A}_{ba} \times \hat{M}_{bm} \mid} \tag{3.5}$$

$$= \frac{(y_{ba}z_{bm} - y_{bm}z_{ba}, z_{ba}x_{bm} - z_{bm}x_{ba}, x_{ba}y_{bm} - x_{bm}y_{ba})}{\mid A_{ba} \mid\mid M_{bm} \mid \sqrt{1 - (\hat{A}_{ba} \cdot \hat{M}_{bm})^2}}$$

$$= \frac{-0.2338, -0.0931, -0.0651}{0.2601}$$

$$= (-0.8989, -0.3579, -0.2503)$$

which if normalised gives:

$$= (-0.8995, -0.3581, -0.2504)$$

A matrix

$$R^b = [\hat{t}_{1b}, \hat{t}_{2b}, \hat{t}_{3b}] = \begin{pmatrix} -0.2698 & -0.8995 & 0.3439 \\ 0.0035 & -0.3581 & -0.9337 \\ 0.9629 & -0.2504 & 0.0997 \end{pmatrix}$$

4

Chapter 5

4.1 References

Open the file 'references_myphd' with BibTex. The file is located in '/7_references/'

The file contains a series of templates for the proper formatting of references according to the Harvard referencing style. Click on each reference in the text below to see how Latex has formatted the reference on the References section.

- **Book**: (**?**, p. 10) (page number required only if referring to an in-text quote)
- **Book Chapter**: (**?**)
- **Book Contribution**: (**?**)
- **MUSIC CD/DVD**: (**?**)
- **Journal Article**: (**?**)
- **Patent**: (**?**)
- **PhD/Master Dissertation**: (**?**)
- **Conference Paper**: (**?**)
- **Technical Report**: (**?**)

- **Unpublished Report**: (**?**)
- **Web Videos**(**?**) (. . . not the name of the person who uploaded the video though)
- **Web Paper**: (**?**)
- **Web Journal Article**: (**?**)
- **Webpage**: (**?**)
- **Downloaded Images or Sounds**: (**?**)

You can also you this kind of referencing if needed in the text:
Surname (**?**) said that . . .

5

Conclusions and Future Directions

5.1 Summary

5.2 Conclusions

5.3 Contributions

5.4 Future Work

5. CONCLUSIONS AND FUTURE DIRECTIONS

Appendix A

Insert a figure

Figure 1: Title of Figure - Description. [Source: (**?**)]

Appendix

Appendix B

Title

Type here you text as usual . . .

Appendix

Appendix C

Code for estimating attitude

AHRS_TRIAD.C

```
/*
 *
 *  Copyright (c) 2013, Giuseppe Torre
 *  All rights reserved.
 *
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 *  modification, are permitted provided that the following conditions are met:
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 *  ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
 *  (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS
 *  SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
 *
 */



#include "ext.h"
#include "ext_mess.h"
#include <string.h>
#include <stdio.h>
#include <math.h>
#define EPSILON 1e-6

//*****************CALIBRATION STUFF************************//
/* INTRODUCE THE OFFSET VALUES IN THE FOLLOWING VARIABLES IN ADC values */
#define ACCELX_OFFSET 2043 //initial offset in accelerometer X
#define ACCELY_OFFSET 2053 // initial offset in accelerometer Y
#define ACCELZ_OFFSET 2264//initial offset in accelerometer Z

#define MagX_OFFSET 1917 //initial offset in Magnetometer X
```

Appendix

```
#define MagY_OFFSET 1813 // initial offset in Magnetometer Y
#define MagZ_OFFSET 1667//initial offset in Magnetometer Z
/* WE SHOULD CALIBRATE THE FOLLOWING VALUES FOR EACH PARTICULAR IMU axis */
#define ACCELX_Resolution 536
#define ACCELY_Resolution 661
#define ACCELZ_Resolution 559
#define MagX_Resolution 186
#define MagY_Resolution 189
#define MagZ_Resolution 170
//****************** END CALIBRATION STUFF  ************************//


void *this_class; // Required. Global pointing to this class

typedef struct _triad // Data structure for this object
{
        t_object m_ob;   // Must always be the first field; used by Max

        Atom m_args[9];  // we want our inlet to be receiving a list of 10 elements

        long m_value;    //inlet

        void *m_R1;              //these are all the outlets for the 3 X 3 Matrix
        void *m_R2;              // R1 --> firts top left cell ..R2 middle cell of the first
            row ...and so on
        void *m_R3;                                     //
        void *m_R4;                                     // End Outlets
             ____________________________________
} t_triad;

                        void *triad_new(long value);


                        void triad_assist(t_triad *triad, void *b, long msg, long arg, char *
                            s);
                        void triad_free(t_triad *triad);



                        void triad_list(t_triad *x, Symbol *s, short argc, t_atom *argv);




                        void MatrixByMatrix(double *Result,double *MatrixLeft,double *
                            MatrixRight);

                        void Matrix2Quat(double *Quat,double *Matrix);
                        void Quat2Matrix(double *Matrix, double *Quat);
                        void inverseQuat(double *InvQuat, double *RegQuat);
                        void NormQuat(double *YesQuat, double *NotQuat);
                        void Slerp(double *NewQuat, double *OldQuat, double *CurrentQuat);
                        void NormVect(double *YesVect, double *NotVect);
                        double orientationMatrix[9];
                        double Result[9];
                        int    i;
                        double InvorientationMatrix[9];

                        double temp[6];
                        double ref[6];
                        double vectAx[3];
                        double vectAy[3];
                        double vectAz[3];
                        double vectBx[3];
                        double vectBy[3];
                        double vectBz[3];
                        double MagnCrosProd_A;
                        double MagnCrosProd_B;
                        double accnorm, magnorm, earthnorm, VectAynorm, VectAznorm,
                            VectBynorm, VectBznorm;
```

```
                        double m[9], n[9];
                        double quat_e[4];
                        double invquat_e[4];
                        double mult;
                        double quat_new[4];
                        double quat_old[4];
                        double ecs,accex_ADCnumber,y,accey_ADCnumber,z,accez_ADCnumber,mx,
                            magnx_ADCnumber,my,magny_ADCnumber,mz,magnz_ADCnumber;
// SLERP Variables
                        double trace, Suca;
                        double tol[4], omega, sinom, cosom, scale0, scale1, tez,
                            orientationMatrixA[9];

int main(void)
{
        // set up our class: create a class definition
        setup((t_messlist**) &this_class, (method)triad_new, (method)triad_free, (short)
            sizeof(t_triad), 0L,A_GIMME, 0);
    addmess((method)triad_list, "list", A_GIMME, 0);
        addmess((method)triad_assist, "assist", A_CANT, 0);
        finder_addclass("Maths","triad");
        post("....I'm_TRIAD_Object!....from_AHRS_Library...",0);
        return 0;
}

/* ------------triad_new ---------------*/

void *triad_new(long value)
{
        t_triad *triad;
        triad = (t_triad *)newobject(this_class);       // create the new instance and return
            a pointer to it
        triad->m_R4 = floatout(triad);
        triad->m_R3 = floatout(triad);
        triad->m_R2 = floatout(triad);
        triad->m_R1 = floatout(triad);

return(triad);
}

etc.

etc.
```