Electrical, Electromagnetic, and Optical Characterization of the InP/InGaAs Alloy System

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A Thesis
Presented to the Faculty of the
Department of Electronics and Communications Engineering
Gokongwei College of Engineering
De La Salle University

In Partial Fulfillment of the
Requirements for the Degree of
Bachelor of Science in Electronics and Communications Engineering

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by

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September, 2018

De La Salle University

ORAL DEFENSE RECOMMENDATION SHEET

This thesis, entitled **Electrical, Electromagnetic, and Optical Characterization of the InP/InGaAs Alloy System**, prepared and submitted by thesis group, ESG-04, composed of:

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in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electronics and Communications Engineering** (**BS-ECE**) has been examined and is recommended for acceptance and approval for **ORAL DEFENSE**.

Dr. Francisco D. Baltasar
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THESIS APPROVAL SHEET

This thesis entitled **Electrical, Electromagnetic, and Optical Characterization of the InP/InGaAs Alloy System**, prepared and submitted by:

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Date: September 24, 2018

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ACKNOWLEDGMENT

Write this prior to binding your thesis if you have submitted necessary requirements and are told by the university that you have passed.

ABSTRACT

Keep your abstract short by giving the gist/nutshell of your thesis. Use the following checklist questions to help you in crafting your abstract.

☐ Did you briefly state what you intend to do?

☐ Did you concisely discuss the problem statement?

☐ Did you tersely mention the objectives in general terms?

☐ Did you succinctly describe the methodology for the target audience?

☐ Did you strongly describe your significant results and your conclusions?

Index Terms—alloy system, characterization, InP, InGaAs.

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ABBREVIATIONS

AC	Alternating Current	65
CSS	Cascading Style Sheet	65
HTML	Hyper-text Markup Language	65
XML	eXtensible Markup Language	65

NOTATION

$\lvert\mathcal{S}\rvert$	the number of elements in the set $\mathcal{S}$	67
$\emptyset$	the set with no elements	67
$h\left(t\right)$	impulse response	57
$\mathcal{S}$	a collection of distinct objects	67
$\mathcal{U}$	the set containing everything	67
$x\left(t\right)$	input signal represented in the time domain	57
$y\left(t\right)$	output signal represented in the time domain	57

Throughout this thesis, mathematical notations conform to ISO 80000-2 standard, e.g. variable names are printed in italics, the only exception being acronyms like e.g. SNR, which are printed in regular font. Constants are also set in regular font like j. Functions are also set in regular font, e.g. in $\sin\left(\cdot\right)$. Commonly used notations are t, f, $\mathrm{j} = \sqrt{-1}$, n and $\exp\left(\cdot\right)$, which refer to the time variable, frequency variable, imaginary unit, nth variable, and exponential function, respectively.

GLOSSARY

Functional Analysis	the branch of Mathematics concerned with the study of spaces of functions
matrix	a concise and useful way of uniquely representing and working with linear transformations; a rectangular table of elements

LISTINGS

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Chapter 1

INTRODUCTION

Contents

1.1 Background of the Study

Understanding human behavior has been one of the most prevalent topic in implementing different applications. One of these human behaviors include Eye Gaze Estimation, where eye tracking technology is used to be able to determine the direction of the gaze of the eyes. Studying this human behavior can have extended applications such as research on psychology, study on the behavior of people with disabilities, analyzing behaviors of drivers, security monitoring, and human-computer interfaces.

There are researches already being conducted in order to minimize the number of devices and models used to implement eye gaze estimation. However, current methods are still requiring to have additional devices to be used. Eye gaze estimation could be done using an RGB-D camera wherein informations such as the depth or distance and the texture could be obtained, where these information are integrated and obtained just by using a kinect.

RGB-D camera capture and shows colored images as well as its depth which helps in 3-D representations and modelling. These cameras augment the usual images with its depth information. The augmentation happens in per-pixel basis. The RGB-D camera to be used in this study will be the Microsoft Kinect. This camera is useful because it is included in the line of motion sensing devices made by a reputable technological company. It makes use of natural user interface to capture images.

One way of determining whether an automobile driver is feeling drowsy or distracted is by observing the eye behaviour. According to Verwey, W.B., and Zaidel, D. M., one of the significant eye metrics that determines whether a driver is feeling drowsy is the frequency of eye closure exceeding one second whereas shorter ones are considered as blinks. The

researchers intend to do the same thing with regards to evaluating driver drowsiness by observing the eyes, if either one or both of the eyes are closed. Eye gaze estimation is used for evaluating whether the driver is distracted or not.

The paper presents the use of Kinect as the RGB-D camera to track eye gazing by using the algorithm from the thesis Eye-Model-Based Gaze Estimation by RGB-D Camera by Jianfeng, L. and Shigang, L. The Kinect sensor is able to acquire the pose and 3D position of the head whereas the problem to be solved is detecting the pupil center of by obtaining it from the 3D eye model. The basis research showed promising results with little error in the algorithm of pupil centering. In addition, the researchers will be implementing the application of driver drowsiness detection that will alert the driver whenever they are positive of drowsiness.

1.2 Prior Studies

The use of eye tracking in daily lives of people is becoming ubiquitous. There have been studies that make use of eye tracking for different applications such as personality tests, focus and attention analysis, and even used in the automotives industry. There have been studies about eye tracking and its general applications. The applications presented include scientific and academic research, market research, neuroscience and psychology, psychology research, medical research, usability research, packaging research, pc and gaming research, human factors and simulation, and ophthalmology (Punde et. al., 2017).

There were also studies that made use of eye tracking in order to study and analyze data from vehicle drivers. The data gathered and analyzed can be used in order to improve road safety and security as well as prevention of road accidents. Programming softwares

such as MATLAB was used in order to test driver's awareness and detect drowsiness in real-time. The addition of an alarm system for drivers will ensure that they can be alerted and reminded.

The data used in these researches came from a large database known as GazeCapture as well as manually captured with the use of different kinds of cameras such as RGB-D and even webcam. The use of webcam is essentially focused on simplicity because it is already integrated in some devices such as laptops. On the other hand, the use of RGB-D camera in some researches showed that the accuracy and quality of images have improved. The microcontrollers used in past researches include Arduino and Raspberry Pi. These microcontrollers were used because of their simplicity, low cost, and low power consumption. The use of microcontrollers was utilized in past researches because algorithms can be programmed easily using applicable softwares.

1.3 Problem Statement

The ideal scenario in using an eye tracking device for driver awareness is to use a laptop for processing the image because it is faster and the device would be able to alert the driver in time before an accident assuming the driver became aware of the alert and was able to prevent the accident from happening.

The use of laptops for implementation of the eye tracking device in automobiles might be impractical due to its size. The researchers propose the use of microcontrollers to solve this problem. Although the use of microcontrollers would limit the robustness of the device. Microcontrollers have lower memories than a laptop therefore there would be less codes that can be embedded and the execution of codes are slower. The researchers would look

for the optimal setup both in hardware and the software so that it would still be usable and could be improved for further researches.

Also the size of the kinect might be a hindrance to the view of the driver and might violate the RA 10913, which is the Anti-Distracted Driving Act. The solution to this is to place the kinect in a place where it can be mounted in accordance to the Anti-Distracted Driving Act.

1.4 Objectives

The main objective of the proposed thesis is to implement eye tracking technology for detecting driver's awareness. The general and specific objectives are as follows:

1.4.1 General Objective(s)

To use a RGB-D camera for capturing the image in need of image processing for detecting eyes and driver's awareness.

To implement an algorithm for detection of driver's awareness based on eye behaviour.

To use existing algorithms for face pose estimation, pupil center estimation, head pose estimation, and eye gaze estimation

To create a standalone microcontroller based eye tracking device for detecting driver awareness

1.4.2 Specific Objectives

1. To interface the microcontroller and RGB-D camera using MATLAB and SIMULINK

2. To make use of MATLAB's libraries for successfully creating a driver awareness algorithm

3. To make use of microsoft kinect as the RGB-D camera

4. To achieve at least 80% of accuracy with regards to detection of driver's awareness

5. To create an alarm system when the device detected that the driver is unaware of his surroundings or is feeling drowsy

1.5 Significance of the Study

Knowing how the human eye behaves in different situations and time shows a number of things about a given situation. The detection of where the eyes look at is helpful in determining one's focus and attention. Moreover, the regions within the eyes' sight that are ignored will also be known. Additional capabilities of eye trackers include detecting drowsiness, consciousness, and other mental states. The integration of these eye trackers to available electronic devices such as computers and mobile phones helps in analysis of consumer's behavior and may lead to further technological advancements. In addition, almost every work and actions require visual information that is why eye tracking is very significant. The list of applications grows as time passes. Eye tracking technology also helps in researches and designs of fields including automotives, medical, defense, and entertainment industries.

By understanding the user's eye behavior, new safety and security measurements may be designed. In addition, there will be improvements on existing work based on data gathered from the eye movements and gaze patterns. The beneficiaries of this study include the

user, the society and industries that make use of visual data for improvements, and future researchers as well. The user and the industries that continue to improve their products and devices help each other in such a way that the safety, security, and satisfaction of the users will be achieved given that their visual data and gaze patterns will be carefully analyzed by different industries. This study also helps in improving and testing of existing algorithms for eye tracking. Thus, this study will be of great help to future researchers that will engage and tackle this topic because eye tracking is important and significant in this modern age.

1.6 Assumptions, Scope and Delimitations

This section provides the assumptions, scope, and delimitations of the research which serves as the guideline of how the research was done

1.6.1 Assumptions

1. It is assumed that there are more people feeling sleepy at night therefore causing drowsy driving
2. If either one or both of the eyes detected are evaluated as closed, then the driver is drowsy and an alarm system will turn on.
3. If the pupil of the eyes is not located at the center, then the driver is distracted and an alarm system will turn on.

1.6.2 Scope

1. Create an algorithm for detection of driver's awareness based on eye behaviour.

2. Device should be available even on low light conditions because of the first assumption.

3. To test for driver's drowsiness, the device should be able to detect whether one or both of the eyes are closed.

4. Can measure the blink rate of the eyes as an additional parameter in determining whether the driver is drowsy or not.

5. Can detect whether driver is distracted by using pupil center estimation

1.6.3 Delimitations

1. Existing algorithms on eye detecting is used.

2. Built in face detection algorithm provided by the Kinect Microsoft is used.

3. In the pupil center estimation, the Kinect Microsoft had a difficulty with detecting the pupil when the driver is looking downward.

4. The device had a difficulty in detecting eyes for people with small eye openings.

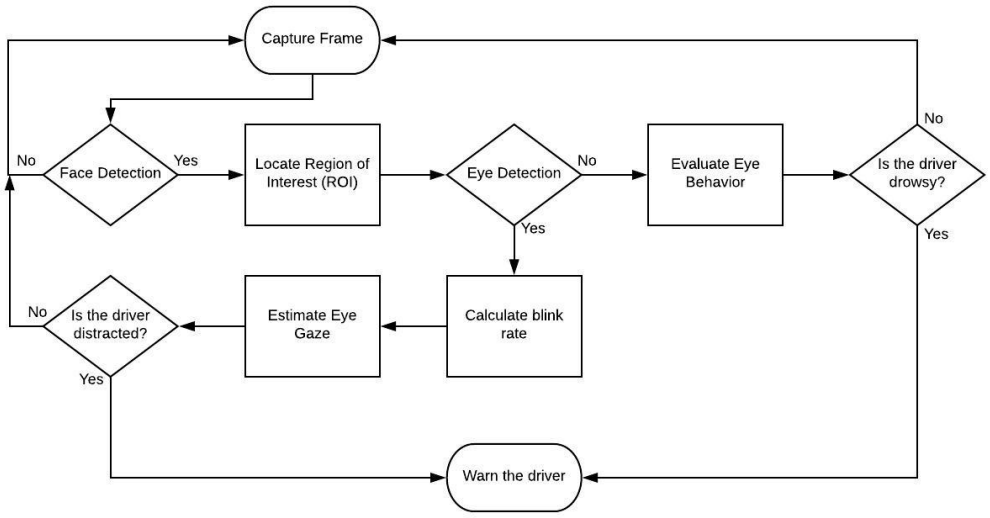
1.7 Description and Methodology

Visual data will be gathered using RGB-D camera. The data gathered will be used by the eye tracker that follows a specific algorithm for each step of eye tracking. This eye tracker will be used to study and analyze the driver's eye movements. Moreover, there will be an alarm system when the eye tracker detects fatigue, drowsiness, or other states which are not suited for driving a vehicle. The eye tracker will be placed in a position that does

not block the driver's vision of the road and other vehicles. In addition, the eye tracker's placement is at a position permitted by the law.

The head pose is estimated using the kinect sensor and a head coordinate system is generated. Using the pupil center estimation algorithm, the 2D position of the pupil center will be taken and then translated later to 3D provided by the RGB-D camera, kinect sensor. Calibration will then take place by detecting the eyeball center. After the pupil center and eyeball center locations have been known, the gaze direction can be estimated.

Using MATLAB and SIMULINK, an algorithm will be made for the evaluation whether the driver is drowsy or distracted and alarm system will sound to alert the driver. It will also be used to interface the materials such as the Microsoft Kinect, microcontroller, and the RGB-D Camera with the laptop and create a standalone microcontroller based device.



1.8 Overview

Provide here a brief summary and what the reader should expect from each succeeding chapter. Show how each chapter is connected with each other.

Chapter 2

LITERATURE REVIEW

Contents

2.1 Existing Work

Cite and summarize here relevant and significant literature (dissertations, theses, journals, patents, notable conference papers) through a table and descriptions to prove that no one has done your work yet. Your focus here is what has been done.

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2.2 Lacking in the Approaches

You can summarize the weaknesses of existing approaches by a tabular comparison of the literature. Your focus here is what has not been done, and/or what features were missed, and then introduce the necessity for doing your proposed solution.

Briefly include here the following in order to remind the reader why you are highlighting the weakness of the solutions of existing literature.

- mentioning of the problem
- showing how your solution is better (can be better (for proposals))

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2.3 Summary

Chapter 3

THEORETICAL CONSIDERATIONS

Contents

Before starting the first section, provide an overview of the purpose of this chapter and its contents, and how they are relevant to your methodology.

This chapter is for providing the context to your panelist/reader. It is actually an expanded form of the Background of the Study that you have put in Chapter 1.

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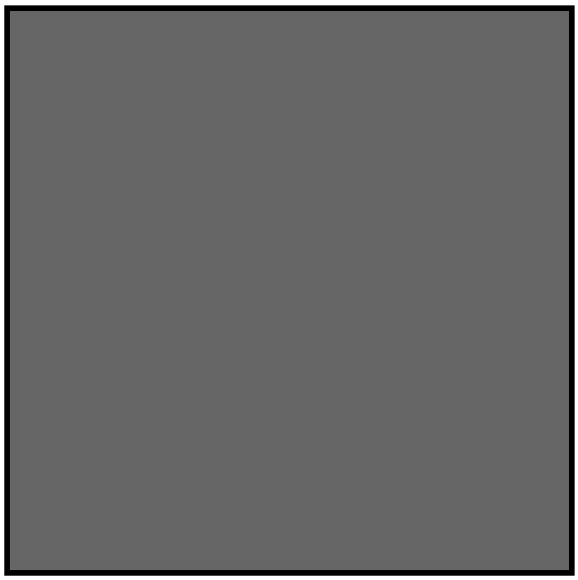

Fig. 3.1 A quadrilateral image example.

3.1 Summary

Chapter 4

DESIGN CONSIDERATIONS

Contents

Before starting the first section, provide an overview of the purpose of this chapter and its contents, and how they are relevant to your methodology.

Your primary goal in the Design Considerations is to describe to your panelist/readers the key topics that fall under Theoretical Considerations. These key topics are those that you have directly adopted in making your solution/methodology.

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4.1 Summary

Chapter 5

METHODOLOGY

Contents

Mention here your methodology flow through a figure (preferably) and provide an overview of it and how your methodology achieves your objectives. How your methodology achieves each of your specific objective is what your panelists/examiners will be looking for. Also make sure that you refer clearly to the chapters on the Literature Review, Theoretical Considerations, and Design Considerations showing how your methodology ties with those that you have discussed in those chapters.

5.1 Implementation

Summarize the process used to create/set-up the work with an explanation of such process, instruments, and materials that you used if any. If the description is lengthy, use condensed bullet points.

Rule of thumb: Implementation is how you made your work; (keywords: implemented, created, made, soldered, programmed, etc.).

If you wrote a program or made a simulation, you must state how the program or simulation functions in this section. An algorithm or a pseudocode as shown in Table B.2 is a good example.

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5.2 Evaluation

Describe the procedures for evaluating the correct behavior and outcome of your work, including what information you need to gather and how you will obtain or measure it.

Rule of thumb: Evaluation is how you tested your work; (keywords: measured, tested, compared, simulated, etc.).

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5.3 Summary

Chapter 6

RESULTS AND DISCUSSION

Contents

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6.1 Summary

Chapter 7

CONCLUSIONS, RECOMMENDATIONS, AND FUTURE DIRECTIVES

Contents

7.1 Concluding Remarks

In this Thesis, . . .

7.2 Contributions

The interrelated contributions and supplements that have been developed in this Thesis are listed as follows.

- the ;
- the ;
- the ;

7.3 Recommendations

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7.4 Future Prospects

There are several prospect related in this research that may be extended for further studies. . . . So the suggested topics are listed in the following.

1. the . . . .
2. the . . . .
3. the . . . .

REFERENCES

[1] D. J. Lipcoll, D. H. Lawrie, and A. H. Sameh, eds., *High Speed Computer and Algorithm Organization*. No. 23 in Fast Computers, New York: Academic Press, third ed., Sept. 1977. This is a cross-referenced BOOK (collection) entry.

[2] *Proc. Fifteenth Annual*, (Boston), 1983. This is a cross-referenced PROCEEDINGS.

[3] *G-Animal's Journal*, vol. 41, July 1986. The entire issue is devoted to gnats and gnus (this entry is a cross-referenced ARTICLE (journal)).

[4] T. Oetiker, H. Partl, I. Hyna, and E. Schlegl, *The Not So Short Introduction to LaTeX 2ε Or LaTeX 2ε in 157 minutes*. n.a., 2014.

[5] ISO, "80000-2," *Quantities and units–Part 2: Mathematical signs and symbols to be used in the natural sciences and technology*, 2009.

[6] 'Chicago', *The Chicago Manual of Style*. University of Chicago Press, 13th ed., 1982.

[7] Aristotle, *The Rhetoric of Aristotle with a commentary by the late Edward Meredith Cope*. 1877.

[8] Aristotle, *De Anima*. 1907.

[9] Aristotle, *Poetics*. Clarendon Aristotle, Clarendon Press, 1968.

[10] Aristotle, *Physics*. G. P. Putnam, 1929.

[11] ABCM, *British chemicals and their manufacturers*. 1959.

[12] R. L. Augustine, *Heterogeneous catalysis for the synthetic chemist*. Marcel Dekker, 1995.

[13] Averroes, *The Epistle on the Possibility of Conjunction with the Active Intellect by Ibn Rushd with the Commentary of Moses Narboni*. No. 7 in Moreshet: Studies in Jewish History, Literature and Thought, Jewish Theological Seminary of America, 1982.

[14] J. Butcher, *Copy-editing*. Cambridge University Press, 2nd ed., 1981.

[15] J. Chapman, *The Icehouse Bottom Site—40MR23*. No. 23 in University of Tennessee Department of Anthropology Publication, Knoxville: Univ. of Tennessee Press, 1975.

[16] M. T. Cicero, *De natura deorum. Über das Wesen der Götter*. Reclam, 1995.

[17] S. T. Coleridge, *Biographia literaria, or Biographical sketches of my literary life and opinions*, vol. 7 of *Bollingen Series*. Routledge and Kegan Paul, 1983.

[18] F. A. Cotton, G. Wilkinson, C. A. Murillio, and M. Bochmann, *Advanced inorganic chemistry*. Wiley, 6 ed., 1999.

[19] A. van Gennep, *Les rites de passage*. Nourry, 1909.

[20] A. van Gennep, *Les rites de passage*. Nourry, 1909.

De La Salle University

[21] A. van Gennep, *The Rites of Passage*. University of Chicago Press, 1960.

[22] M. J. Gerhardt, *The Federal Appointments Process*. Duke University Press, 2000.

[23] R. Gonzalez, *The Ghost of John Wayne and Other Stories*. The University of Arizona Press, 2001.

[24] M. Goossens, F. Mittelbach, and A. Samarin, *The LaTeX Companion*. Addison-Wesley, 1 ed., 1994.

[25] C. Hammond, *The basics of crystallography and diffraction*. International Union of Crystallography and Oxford University Press, 1997.

[26] P. Hershkovitz, *Evolution of Neotropical cricetine rodents (Muridae) with special reference to the phyllotine group*, vol. 46 of *Fieldiana: Zoology*. Chicago: Field Museum of Natural History, 1962.

[27] P. G. Hoel, *Elementary Statistics*. Wiley series in probability and mathematical statistics, New York, Chichester: Wiley, 3rd ed., 1971. ISBN 0 471 40300.

[28] Homer, *Die Ilias*. Artemis & Winkler, 3 ed., 2004.

[29] D. E. Knuth, *Seminumerical Algorithms*, vol. 2 of *The Art of Computer Programming*. Reading, Massachusetts: Addison-Wesley, second ed., 10 Jan. 1981. This is a full BOOK entry.

[30] D. E. Knuth, *Seminumerical Algorithms*. Addison-Wesley, 1981.

[31] D. E. Knuth, *The Art of Computer Programming*. Four volumes, Addison-Wesley, 1973. Seven volumes planned (this is a cross-referenced set of BOOKs).

[32] S. Kullback, *Information Theory and Statistics*. Dover Publications, 1997.

[33] S. Kullback, *Information Theory and Statistics*. Dover Publications, 1997.

[34] S. Kullback, *Information Theory and Statistics*. John Wiley & Sons, 1959.

[35] B. Malinowski, *Argonauts of the Western Pacific*. Routledge and Kegan Paul, 8 ed., 1972.

[36] M. Maron, *Animal Triste*. University of Nebraska Press, 2000.

[37] W. Massa, *Crystal structure determination*. Spinger, 2 ed., 2004.

[38] L. R. McColvin, *Libraries in Britain*. London: Longmans Green, for the British Council, 2004.

[39] F. Nietzsche, *Sämtliche Werke*. and Walter de Gruyter, 2 ed., 1988.

[40] F. Nietzsche, *Die Geburt der Tragödie. Unzeitgemäße Betrachtungen I–IV. Nachgelassene Schriften 1870–1973*, vol. 1. and Walter de Gruyter, 2 ed., 1988.

[41] P. Piccato, *City of Suspects*. Duke University Press, 2001.

[42] N. Smart, *The religious experience of mankind*. New York: Schribner, 2nd ed., 1976.

[43] L. Vázques de Parga, J. M. Lacarra, and J. Uría Ríu, *Las Peregrinaciones a Santiago de Compostela*. Iberdrola, 1993. Ed. facs. de la realizada en 1948–49.

[44] O. Wilde, *The Importance of Being Earnest: A Trivial Comedy for Serious People*. English and American drama of the Nineteenth Century, Leonard Smithers and Company, 1899.

[45] R. H. Wood, *Plastic and Elastic Design of Slabs and Plates*. London: Thames & Hudson, 1961.

[46] N. Worman, *The Cast of Character*. University of Texas Press, 2002.

[47] S. Wright, *Evolution and the genetics of populations*, vol. 4. Chicago: Univ. of Chicago Press, 1978.

[48] J. C. Knvth, "The programming of computer art." Vernier Art Center, Stanford, California, feb 1988. This is a full BOOKLET entry.

[49] W. V. Oz and M. Yannakakis, eds., *Proc. Fifteenth Annual*, no. 17 in All ACM Conferences, (Boston), Academic Press, Mar. 1983. This is a full PROCEEDINGS entry.

[50] *Proc. Fifteenth Annual*, 1983.

[51] A. von Brandt and E. Hoffmann, "Die nordischen länder von der mitte des 11. jahrhunderts bis 1448," in *Europa im Hoch- und Spätmittelalter* (F. Seibt, ed.), no. 2 in Handbuch der europäischen Geschichte, pp. 884–917, Klett-Cotta, 1987.

[52] BSI, *BS 2570: Natural Fibre Twines*, Table 5. London: British Standards Institution, 3rd ed., 1973.

[53] P. Eckstein and S. Zuckermann, "Morphology of the reproductive tract," in *Marshall's Physiology of Reproduction* (A. S. Parkes, ed.), vol. 1, pp. 43–154, London: Longman, 1960.

[54] F. Feigl, *Spot Tests in Organic Analysis*, ch. 6. Publisher publisher, 5th ed., 1958.

[55] R. Gordon, "The tunes of Chicken Little," in *Playwrights for Tomorrow: A Collection of Plays* (A. H. Ballet, ed.), vol. 13, Minneapolis: University of Minnesota Press, 1975. One of four plays included in vol. 13.

[56] C. W. Hanson, "Subject inquiries and literature searching," in *Handbook of special librarianship and information work* (W. Ashworth, ed.), pp. 414–452, 3rd ed., 1967.

[57] P. G. Hoel, *Elementary Statistics*, pp. 19–33. Wiley series in probability and mathematical statistics, New York, Chichester: Wiley, 3rd ed., 1971. ISBN 0 471 40300.

[58] A. Hyman, "Aristotle's theory of the intellect and its interpretation by averroes," in *Studies in Aristotle* (D. J. O'Meara, ed.), no. 9 in Studies in Philosophy and the History of Philosophy, pp. 161–191, The Catholic University of America Press, 1981.

[59] I. Kant, *Kritik der praktischen Vernunft*, vol. 5, pp. 1–163. Walter de Gruyter, 1968.

[60] I. Kant, *Kritik der Urtheilskraft*, vol. 5, pp. 165–485. Walter de Gruyter, 1968.

[61] D. E. Knuth, *Fundamental Algorithms*, vol. 1 of *The Art of Computer Programming*, section

1.2, pp. 10–119. Reading, Massachusetts: Addison-Wesley, second ed., 10 Jan. 1973. This is a full INBOOK entry.

[62] D. E. Knuth, *Fundamental Algorithms*, ch. 1.2. Addison-Wesley, 1973.

[63] D. D. Lincoll, "Semigroups of recurrences," in *High Speed Computer and Algorithm Organization* (D. J. Lipcoll, D. H. Lawrie, and A. H. Sameh, eds.), no. 23 in Fast Computers, part 3, pp. 179–183, New York: Academic Press, third ed., Sept. 1977. This is a full INCOLLECTION entry.

[64] D. D. Lincoll, "Semigroups of recurrences," in Lipcoll *et al.* [1], pp. 179–183. This is a cross-referencing INCOLLECTION entry.

[65] D. D. Lincoll, "Semigroups of recurrences," in *High Speed Computer and Algorithm Organization*, Academic Press, 1977.

[66] W. H. McNeill, "The era of Middle Eastern dominance to 500 B.C.," in *The Rise of the West*, part 1, Chicago: University of Chicago Press, 1963.

[67] J. Milton, "Paradise lost," in *The Complete Poetical Works of John Milton* (W. V. Moody, ed.), Boston: Houghton Mifflin, Student's Cambridge ed., 1924.

[68] F. Nietzsche, *Unzeitgemässe Betrachtungen. Zweites Stück*, vol. 1, pp. 243–334. and Walter de Gruyter, 1988.

[69] D. Ogilvy, "The creative chef," in *The Creative Organization* (G. A. Steiner, ed.), pp. 199–213, Chicago: University of Chicago Press, 1965.

[70] S. Pines, "The limitations of human knowledge according to al-farabi, ibn bajja, and maimonides," in *Studies in Medieval Jewish History and Literature* (I. Twersky, ed.), pp. 82–109, 1979.

[71] J. Ramsbottom, "Fungi pathogenic to man," in *A System of Bacteriology in relation to Medicine*, vol. 8, pp. 11–70, London: HMSO, for Medical Research Council, 1931.

[72] S. R. Ranganthan, "Colon classification and its approach to documentation," in *Bibliographic Organization* (J. H. Shera and M. E. Egan, eds.), pp. 94–105, 1951.

[73] V. Thomson, "Cage and the collage of noises," in *American Music since 1910*, ch. 8, New York: Holt, Rinehart and Winston, 1971.

[74] G. Westfahl, "The true frontier," pp. 55–65, 2004.

[75] R. C. Wright, *Report Literature*, pp. 46–59. 1963.

[76] S. Wright, "Variability within and among natural populations," in *Evolution and the genetics of populations*, vol. 4, Chicago: Univ. of Chicago Press, 1978.

[77] K. E. Chave, "Skeletal durability and preservation," in *Approaches to paleoecology* (J. Imbrie and N. Newel, eds.), (New York), pp. 377–87, Wiley, 1964.

[78] N. Chomsky, "Conditions on transformations," in *A festschrift for Morris Halle* (S. R. Anderson and P. Kiparsky, eds.), (New York), Holt, Rinehart & Winston, 1973.

[79] P. Moraux, "Le *De Anima* dans la tradition grècque," in *Aristotle on Mind and the Senses* (G. E. R. Lloyd and G. E. L. Owen, eds.), pp. 281–324, 1979.

[80] A. V. Oaho, J. D. Ullman, and M. Yannakakis, "On notions of information transfer in VLSI circuits," in *Proc. Fifteenth Annual ACM* (W. V. Oz and M. Yannakakis, eds.), no. 17 in All ACM Conferences, (Boston), pp. 133–139, Academic Press, Mar. 1983. This is a full INPROCEDINGS entry.

[81] A. V. Oaho, J. D. Ullman, and M. Yannakakis, "On notions of information transfer in VLSI circuits," in *Proc. Fifteenth Annual ACM* [2], pp. 133–139. This is a cross-referencing INPROCEEDINGS entry.

[82] A. V. Oaho, J. D. Ullman, and M. Yannakakis, "On notions of information transfer in VLSI circuits," in *Proc. Fifteenth Annual ACM*, 1983.

[83] A. Salam, "Weak and electromagnetic interactions," in *Elementary particle theory* (N. Svartholm, ed.), pp. 367–377, Almquist & Wiksell, 1968.

[84] L. A. Aamport, "The gnats and gnus document preparation system," in GAJ [3], pp. 73+. This is a cross-referencing ARTICLE entry.

[85] L. A. Aamport, "The gnats and gnus document preparation system," *G-Animal's Journal*, vol. 41, pp. 73+, July 1986. This is a full ARTICLE entry.

[86] L. A. Aamport, "The gnats and gnus document preparation system," *G-Animal's Journal*, 1986.

[87] Ö. Aksın, H. Türkmen, L. Artok, B. Çetinkaya, C. Ni, O. Büyükgüngör, and E. Özkal, "Effect of immobilization on catalytic characteristics of saturated pd-n-heterocyclic carbenes in mizoroki-heck reactions," *Journal of Organometallic Chemistry*, vol. 691, no. 13, pp. 3027–3036, 2006.

[88] A. Angenendt, "In honore salvatoris – vom sinn und unsinn der patrozinienkunde," *Revue d'Histoire Ecclésiastique*, vol. 97, pp. 431–456, 791–823, 2002.

[89] E. J. Aslin, "Photostat recording in library work," *Aslib Proceedings*, vol. 1, pp. 49–52, 1949.

[90] J. C. Baez and A. D. Lauda, "Higher-dimensional algebra v: 2-groups," *Theory and Applications of Categories*, vol. 12, pp. 423–491, 2004.

[91] A. Bertram and R. Wentworth, "Gromov invariants for holomorphic maps on riemann surfaces," vol. 9, no. 2, pp. 529–571, 1996.

[92] I. Bry and L. Afflerbach, "In search of an organizing principle for behavioural science literature," *Community Mental Health*, vol. 4, no. 1, pp. 75–84, 1968.

[93] T. Doody, "Hemingway's style and jake's narration," *The Journal of Narrative Technique*, vol. 4, no. 3, pp. 212–225, 1974.

[94] A. Einstein, "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]," *Annalen der Physik*, vol. 322, no. 10, pp. 891–921, 1905.

[95] W. M. Fletcher and F. G. Hopkins, "Lactic acid in amphibian muscle," *J. Physiol.*, vol. 35, pp. 247–309, 1907.

[96] A. Gillies, "Herder and the preparation of goethe's idea of world literature," *Publications of the English Goethe Society*, vol. 9, pp. 46–67, 1933.

[97] S. Glashow, "Partial symmetries of weak interactions," *Nucl. Phys.*, vol. 22, pp. 579–588, 1961.

[98] G. B. Godfrey, "Joints in tubular structures," *Struct. Eng.*, vol. 37, no. 4, pp. 126–135, 1959.

[99] J. Hanlon, "Designing buildings by computer," *New Scientist*, pp. 429–432, 31 Aug. 1972.

[100] H. Heller and K. Lederis, "Paper chromatography of small amounts of vasopressin and oxytocin," *Nature*, vol. 182, pp. 1231–2, 1958.

[101] W. A. Herrmann, K. Öfele, S. K. Schneider, E. Herdtweck, and S. D. Hoffmann, "A carbocyclic carbene as an efficient catalyst ligand for c–c coupling reactions," vol. 45, no. 23, pp. 3859–3862, 2006.

[102] M. J. Hostetler, J. E. Wingate, C.-J. Zhong, J. E. Harris, R. W. Vachet, M. R. Clark, J. D. Londono, S. J. Green, J. J. Stokes, G. D. Wignall, G. L. Glish, M. D. Porter, N. D. Evans, and R. W. Murray, "Alkanethiolate gold cluster molecules with core diameters from 1.5 to 5.2 nm," *Langmuir*, vol. 14, no. 1, pp. 17–30, 1998.

[103] W. W. Howells, "Population distances: Biological, linguistic, geographical and environmental," *Current Anthropology*, vol. 7, pp. 531–540, 1966.

[104] W. W. Howells, "Variability in family lines vs. population variability," *Annals of the New York Academy of Sciences*, vol. 134, pp. 624–631, 1966.

[105] W. W. Howells, "Factors of human physique," *American Journal of Physical Anthropology*, vol. 9, pp. 159–192, 1951.

[106] R. Jackson, "Running down the up-escalator: Regional inequality in Papua New Guinea," *Australian Geographer*, vol. 14, pp. 175–84, May 1979.

[107] G. B. Johnson, "Enzyme polymorphism," *Science*, vol. 184, pp. 28–37, 1974.

[108] G. E. Moore, "Cramming more components onto integrated circuits," *Proceedings of the IEEE*, vol. 86, no. 1, pp. 82–85, 1998.

[109] G. E. Moore, "Cramming more components onto integrated circuits," *Electronics*, vol. 38, no. 8, pp. 114–117, 1965.

[110] O. Prufer, "The Hopewell cult," *Scientific American*, pp. 90–102, Dec. 1964.

[111] T. R. Reese, "Georgia in anglo-spanish diplomacy, 1736-1739," *William and Mary Quarterly*, vol. 15, pp. 168–190, 1958.

[112] M. Sarfraz and M. F. A. Razzak, "Technical section: An algorithm for automatic capturing of the font outlines," *Computers and Graphics*, vol. 26, no. 5, pp. 795–804, 2002.

[113] B. Shore, "Twice-born, once conceived," *American Anthropologist*, vol. 93, no. 1, pp. 9–27, 1991.

[114] E. Sigfridsson and U. Ryde, "Comparison of methods for deriving atomic charges from the electrostatic potential and moments," *Journal of Computational Chemistry*, vol. 19, no. 4, pp. 377–395, 1998.

[115] S. Weinberg, "A model of leptons," *Phys. Rev. Lett.*, vol. 19, pp. 1264–1266, 1967.

[116] M. S. Yoon, D. Ryu, J. Kim, and K. H. Ahn, "Palladium pincer complexes with reduced bond angle strain: efficient catalysts for the heck reaction," *Organometallics*, vol. 25, no. 10, pp. 2409–2411, 2006.

[117] W. B. Croft, *Organizing and searching large files of document descriptions*. PhD thesis, Cambridge University, 1978.

[118] J. Maguire, *A taxonomic and ecological study of the living and fossil Hystricidae with particular reference to southern Africa*. Ph.d. diss., Department of Geology, University of the Witwatersrand, Johannesburg, 1976.

[119] A. E. Mann, *The palaeodemography of Australopithecus*. Ph.d. diss., University of California, Berkeley, 1968.

[120] É. Masterly, "Mastering thesis writing," master's project, Stanford University, English Department, June-Aug. 1988. This is a full MASTERSTHESIS entry.

[121] É. Masterly, "Mastering thesis writing," Master's thesis, Stanford University, 1988.

[122] F. P. Phony-Baloney, *Fighting Fire with Fire: Festooning French Phrases*. PhD dissertation, Fanstord University, Department of French, June-Aug. 1988. This is a full PHDTHESIS entry.

[123] F. P. Phony-Baloney, *Fighting Fire with Fire: Festooning French Phrases*. PhD thesis, Fanstord University, 1988.

[124] 'Brunswick', "The piper and the rats: A musical experiment," Tech. Rep. 1984, Rodent Activities Termination Section (RATS), Pest Control Division, Brunswick Public Welfare Department, Hamelin, 1985.

[125] BSI, "Citation of unpublished documents," BS 6371, British Standards Institution, 1983.

[126] BSI, "Citing publications by bibliographic references," BS 5606, British Standards Institution, 1978.

[127] BSI, "Bibliographic references," BS 1629, British Standards Institution, 1976.

[128] BSI, "Natural fibre twines," BS 2570, British Standards Institution, London, 1973. 3rd. edn.

[129] B. Ellis and A. K. Walton, "A bibliography on optical modulators," Tech. Rep. RAE-TR-71009, Royal Aircraft Establishment, 1971.

[130] T. Térrific, "An $O(n \log n / \log \log n)$ sorting algorithm," Wishful Research Result 7, Fanstord University, Computer Science Department, Fanstord, California, Oct. 1988. This is a full

TECHREPORT entry.

[131] T. Terrific, "An $O(n \log n / \log \log n)$ sorting algorithm," tech. rep., Fanstord University, 1988.

[132] Winget Ltd., "Detachable bulldozer attachment for dumper vehicles," GB Patent Specification 1060631, 8 Mar. 1967.

[133] U. Ünderwood, N. Ñet, and P. P̄ot, "Lower bounds for wishful research results." Talk at Fanstord University (this is a minimal UNPUBLISHED entry), 2004.

[134] U. Ünderwood, N. Ñet, and P. P̄ot, "Lower bounds for wishful research results." Talk at Fanstord University (this is a full UNPUBLISHED entry), Nov., Dec. 1988.

[135] W. J. Downes, "Systemic grammar and structural sentence relatedness." London School of Economics. Mimeo., 1974.

[136] Exchequer, "Act books." Edinburgh, Scottish Record Office, E.4/5, 1634–1639.

[137] J. Pym, "Diary." Northampton, Northamptonshire Record Office, Finch-Hatton 50, 1624.

[138] E. Traquair, "Letter to Marquess of Hamilton, 28 Aug.." Lennoxlove (E. Lothian), Muniments of Duke of Hamilton and Brandon, C.1, no. 963, 1638.

[139] J. L. Almendro, J. Martín, A. Sánchez, and F. Nozal, "Elektromagnetisches signalhorn," 1998.

[140] J. C. Baez and A. D. Lauda, "Higher-dimensional algebra v: 2-groups," 2004.

[141] W. W. Chiu and W. M. Chow, "A hybrid hierarchical model of a multiple virtual storage (mvs) operating system," 1978.

[142] H. [pseud.] Hunt, "Interview." Tape recording, Pennsylvania Historical and Museum Commission, Harrisburg, 1976. Interview by Ronald Schatz, 16 May 1976.

[143] N. Itzhaki, "Some remarks on 't hooft's s-matrix for black holes," 1996.

[144] F. Kowalik and M. Isard, "Estimateur d'un défaut de fonctionnement d'un modulateur en quadrature et étage de modulation l'utilisant," 1995.

[145] X. Laufenberg, D. Eynius, H. Suelzle, S. Usbeck, M. Spaeth, M. Neuser-Hoffmann, C. Myrzik, M. Schmid, F. Nietfeld, A. Thiel, H. Braun, and N. Ebner, "Elektrische einrichtung und betriebsverfahren," 2006.

[146] N. C. Loh, "High-resolution micromachined interferometric accelerometer," 1992.

[147] N. Markey, "Tame the beast," 2005.

[148] J.-B. Missilany, "Handing out random pamphlets in airports." Handed out at O'Hare, Oct. 1984. This is a full MISC entry.

[149] J. Padhye, V. Firoiu, and D. Towsley, "A stochastic model of tcp reno congestion avoidance and control," 1999.

[150] R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "High-speed digital-to-rf converter," 1997.

[151] J. Wassenberg and P. Sanders, "Faster radix sort via virtual memory and write-combining," 2010.

[152] "Contemporary literary criticism," 1990.

[153] 2004. This is a minimal MISC entry.

[154] "Computers and graphics," 2011.

LaTeX-comment this and the following texts after you have implemented them. See the following references for helpful guides for the bibliography and script editing in general. Note that the links might be unavailable, but the names can be searched in the Web.

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Appendix A
ANSWERS TO QUESTIONS TO THIS THESIS

De La Salle University

How important is the problem to practice?

A possible answer to this question is the summary of your Significance of the Study, and that portion of the Problem Statement where you describe the ideal scenario for your intended audience.

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How will you know if the solution/s that you will achieve would be better than existing ones?

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How will you measure the improvement/s?

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What is/are your basis/bases for the improvement/s?

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Why did you choose that/those basis/bases?

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How significant are your measure/s of the improvement/s?

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What is the difference of the solution/s from existing ones?

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How is it different from previous and existing ones?

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What are the assumptions made (that are behind for your proposed solution to work)?

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Will your proposed solution/s be sensitive to these assumptions?

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Can your proposed solution/s be applied to more general cases when some of the assumptions are eliminated? If so, how?

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What is the necessity of your approach / proposed solution/s?

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What will be the limits of applicability of your proposed solution/s?

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What will be the message of the proposed solution to technical people? How about to non-technical managers and business men?

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How will you know if your proposed solution/s is/are correct?

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Will your results warrant the level of mathematics used (i.e., will the end justify the means)?

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Is/are there an/_ alternative way/s to get to the same solution/s?

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Can you come up with illustrating examples, or even better, counter examples to your proposed solution/s?

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a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Is there an approximation that can arrive at the essentially the same proposed solution/s more easily?

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If you were the examiner of your Thesis, how would you present the Thesis in another way? Give your remarks, especially for your methodology and the results and discussions.

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What are the weaknesses of your Thesis, specifically your methodology and the results and discussions?

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Appendix B
USAGE EXAMPLES

The user is expected to have a working knowledge of LaTeX. A good introduction is in [4]. Its latest version can be accessed at http://www.ctan.org/tex-archive/info/lshort.

Equations

The following examples show how to typeset equations in LaTeX. This section also shows examples of the use of `\gls{ }` commands in conjunction with the items that are in the `notation.tex` file. **Please make sure that the entries in `notation.tex` are those that are referenced in the LaTeX document files used by this Thesis. Please comment out unused notations and be careful with the commas and brackets in `notation.tex` .**

In (B.1), the output signal $y\left(t\right)$ is the result of the convolution of the input signal $x\left(t\right)$ and the impulse response $h\left(t\right)$.

$$y\left(t\right) = h\left(t\right) * x\left(t\right) = \int_{-\infty}^{+\infty} h\left(t-\tau\right) x\left(\tau\right) \mathrm{d}\tau \tag{B.1}$$

Other example equations are as follows.

$$\begin{bmatrix} V_1 \\ \overline{I_1} \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} V_2 \\ \overline{I_2} \end{bmatrix} \tag{B.2}$$

$$\frac{1}{2} < \left| \mathrm{mod}\left(\left\lfloor \frac{y}{17} \right\rfloor 2^{-17\lfloor x \rfloor - \mathrm{mod}(\lfloor y \rfloor, 17)}, 2 \right) \right|, \tag{B.3}$$

$$|\zeta(x)^3 \zeta(x+iy)^4 \zeta(x+2iy)| = \exp \sum_{n,p} \frac{3 + 4\cos(ny \log p) + \cos(2ny \log p)}{np^{nx}} \geq 1 \tag{B.4}$$

The verbatim LaTeX code of Sec. B is in List. B.1.

Listing B.1: Sample LaTeX code for equations and notations usage

```
1  The following examples show how to typeset equations in \LaTeX.  This
       section also shows examples of the use of \verb| \gls{ } | commands
       in conjunction with the items that are in the \verb| notation.tex |
       file. \textbf{Please make sure that the entries in} \verb| notation.
       tex |\textbf{  are those that are referenced in the \LaTeX \
       document files used by this \documentType.  Please comment out
       unused notations and be careful with the commas and brackets  in} \
       verb| notation.tex |.
2
3  In~\eqref{eq:conv}, the output signal \gls{not:output_sigt} is the
       result of the convolution of the input signal \gls{not:input_sigt}
       and the impulse response \gls{not:ir}.
4
5  \begin{eqnarray}
6       y\left( t \right) = h\left( t \right) * x\left( t \right)=\int_{-\
            infty}^{+\infty}h\left( t-\tau \right)x\left( \tau \right) \
            mathrm{d}\tau
7     \label{eq:conv}
8  \end{eqnarray}
9
10 Other example equations are as follows.
11
12 \begin{eqnarray}
13    \left[ \dfrac{ V_{1} }{ I_{1} } \right] =
14    \begin{bmatrix}
15       A & B \\
16       C & D
17    \end{bmatrix}
18    \left[ \dfrac{ V_{2} }{ I_{2} } \right]
19    \label{eq:ABCD}
20 \end{eqnarray}
21
22 \begin{eqnarray}
23 \dfrac{1}{2} < \left\lfloor \mathrm{mod}\left(\left\lfloor \dfrac{y}{17}
       \right\rfloor 2^{-17 \lfloor x \rfloor - \mathrm{mod}(\lfloor y\
       rfloor, 17)},2\right)\right\rfloor,
24 \end{eqnarray}
25
26 \begin{eqnarray}
27 | \zeta(x)^3 \zeta(x + iy)^4 \zeta(x + 2iy) | =
28 \exp\sum_{n,p} \frac{3 + 4 \cos( ny \log p) + \cos (2ny \log p)}{np^{nx
       }} \ge 1
29 \end{eqnarray}
```

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Notations

In order to use the standardized notation, the user is highly suggested to see the ISO 80000-2 standard [5].

See https://en.wikipedia.org/wiki/Help:Displaying_a_formula and https://en.wikipedia.org/wiki/List_of_mathematical_symbols for LaTeX maths and other notations, respectively.

The following were taken from `isomath-test.tex` .

Math alphabets

If there are other symbols in place of Greek letters in a math alphabet, it uses T1 or OT1 font encoding instead of OML.

mathnormal	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$
mathit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \text{˚}, !, v, w, 0, 1, 9$
mathrm	$\mathrm{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \text{˚}, !, v, w, 0, 1, 9}$
mathbf	$\mathbf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \text{˚}, !, v, w, 0, 1, 9}$
mathsf	$\mathsf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \text{˚}, !, v, w, 0, 1, 9}$
mathtt	$\mathtt{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \uparrow, \downarrow, ß, \text{˚}, !, v, w, 0, 1, 9}$

New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-italic.

mathbfit	$\boldsymbol{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}$
mathsfit	$\mathit{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}$
mathsfbfit	$\boldsymbol{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}$

Do the math alphabets match?

$ax\alpha\omega\boldsymbol{ax\alpha\omega ax\alpha\omega}\quad \mathit{TC\Theta\Gamma TC\Theta\Gamma} TC\Theta\Gamma$

Vector symbols

Alphabetic symbols for vectors are boldface italic, $\boldsymbol{\lambda} = \boldsymbol{e}_1 \cdot \boldsymbol{a}$, while numeric ones (e.g. the zero vector) are bold upright, $\boldsymbol{a} + \mathbf{0} = \boldsymbol{a}$.

Matrix symbols

Symbols for matrices are boldface italic, too:[1] $\boldsymbol{\Lambda} = \boldsymbol{E} \cdot \boldsymbol{A}$.

[1] However, matrix symbols are usually capital letters whereas vectors are small ones. Exceptions are physical quantities like the force vector $\boldsymbol{F}$ or the electrical field $\boldsymbol{E}$.

Tensor symbols

Symbols for tensors are sans-serif bold italic,

$$\boldsymbol{\alpha} = \boldsymbol{e} \cdot \boldsymbol{a} \quad \Longleftrightarrow \quad \alpha_{ijl} = e_{ijk} \cdot a_{kl}.$$

The permittivity tensor describes the coupling of electric field and displacement:

$$\boldsymbol{D} = \epsilon_0 \boldsymbol{\epsilon}_\mathrm{r} \boldsymbol{E}$$

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Bold math version

The "bold" math version is selected with the commands `\boldmath` or `\mathversion{bold}`

mathnormal	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$
mathit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \circ, !, v, w, 0, 1, 9$
mathrm	$\mathrm{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \circ, !, v, w, 0, 1, 9}$
mathbf	$\mathbf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \circ, !, v, w, 0, 1, 9}$
mathsf	$\mathsf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, \circ, !, v, w, 0, 1, 9}$
mathtt	$\mathtt{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \uparrow, \downarrow, ß, \circ, !, v, w, 0, 1, 9}$

New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-italic.

mathbfit	$\boldsymbol{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}$
mathsfit	$\mathsf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}$
mathsfbfit	$\mathsf{\boldsymbol{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}}$

Do the math alphabets match?
$ax\alpha\omega ax\alpha\omega ax\alpha\omega \quad TC\Theta\Gamma TC\Theta\Gamma TC\Theta\Gamma$

Vector symbols

Alphabetic symbols for vectors are boldface italic, $\boldsymbol{\lambda = e_1 \cdot a}$, while numeric ones (e.g. the zero vector) are bold upright, $\boldsymbol{a + 0 = a}$.

Matrix symbols

Symbols for matrices are boldface italic, too:[2] $\boldsymbol{\Lambda = E \cdot A}$.

Tensor symbols

Symbols for tensors are sans-serif bold italic,

$$\boldsymbol{\alpha = e \cdot a} \quad \Longleftrightarrow \quad \boldsymbol{\alpha_{ijl} = e_{ijk} \cdot a_{kl}}.$$

The permittivity tensor describes the coupling of electric field and displacement:

$$\boldsymbol{D = \epsilon_0 \epsilon_r E}$$

[2] However, matrix symbols are usually capital letters whereas vectors are small ones. Exceptions are physical quantities like the force vector $\boldsymbol{F}$ or the electrical field $\boldsymbol{E}$.

The verbatim LaTeX code of Sec. B is in List. B.2.

Listing B.2: Sample LaTeX code for notations usage

```
% A teststring with Latin and Greek letters::
\newcommand{\teststring}{%
% capital Latin letters
% A,B,C,
A,B,
% capital Greek letters
%\Gamma,\Delta,\Theta,\Lambda,\Xi,\Pi,\Sigma,\Upsilon,\Phi,\Psi,
\Gamma,\Delta,\Theta,\Lambda,\Xi,\Pi,\Sigma,\Phi,\Psi,\Omega,
% small Greek letters
\alpha,\beta,\pi,\nu,\omega,
% small Latin letters:
% compare \nu, \omega, v, and w
v,w,
% digits
0,1,9
}


\subsection*{Math alphabets}

If there are other symbols in place of Greek letters in a math
alphabet, it uses T1 or OT1 font encoding instead of OML.

\begin{eqnarray*}
\mbox{mathnormal} &  & \teststring \\
\mbox{mathit} &  & \mathit{\teststring}\\
\mbox{mathrm} &  & \mathrm{\teststring}\\
\mbox{mathbf} &  & \mathbf{\teststring}\\
\mbox{mathsf} &  & \mathsf{\teststring}\\
\mbox{mathtt} &  & \mathtt{\teststring}
\end{eqnarray*}
 New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-
    italic.
\begin{eqnarray*}
\mbox{mathbfit}     &  & \mathbfit{\teststring}\\
\mbox{mathsfit}     &  & \mathsfit{\teststring}\\
\mbox{mathsfbfit} &  & \mathsfbfit{\teststring}
\end{eqnarray*}
%
Do the math alphabets match?

$
\mathnormal  {a x \alpha \omega}
\mathbfit    {a x \alpha \omega}
\mathsfbfit{a x \alpha \omega}
\quad
\mathsfbfit{T C \Theta \Gamma}
\mathbfit    {T C \Theta \Gamma}
\mathnormal  {T C \Theta \Gamma}
$

\subsection*{Vector symbols}

```

```
Alphabetic symbols for vectors are boldface italic,
$\vec{\lambda}=\vec{e}_{1}\cdot\vec{a}$,
while numeric ones (e.g. the zero vector) are bold upright,
$\vec{a} + \vec{0} = \vec{a}$.

\subsection*{Matrix symbols}

Symbols for matrices are boldface italic, too:%
\footnote{However, matrix symbols are usually capital letters whereas
    vectors
are small ones. Exceptions are physical quantities like the force
vector $\vec{F}$ or the electrical field $\vec{E}$.%
}
$\matrixsym{\Lambda}=\matrixsym{E}\cdot\matrixsym{A}.$


\subsection*{Tensor symbols}

Symbols for tensors are sans-serif bold italic,

\[
   \tensorsym{\alpha}  =  \tensorsym{e}\cdot\tensorsym{a}
   \quad \Longleftrightarrow \quad
   \alpha_{ijl}  =  e_{ijk}\cdot a_{kl}.
\]


The permittivity tensor describes the coupling of electric field and
displacement: \[
\vec{D}=\epsilon_{0}\tensorsym{\epsilon}_{\mathrm{r}}\vec{E}\]



\newpage
\subsection*{Bold math version}

The ``bold'' math version is selected with the commands
\verb+\boldmath+ or \verb+\mathversion{bold}+

{\boldmath
   \begin{eqnarray*}
   \mbox{mathnormal} &  & \teststring \\
   \mbox{mathit} &  & \mathit{\teststring}\\
   \mbox{mathrm} &  & \mathrm{\teststring}\\
   \mbox{mathbf} &  & \mathbf{\teststring}\\
   \mbox{mathsf} &  & \mathsf{\teststring}\\
   \mbox{mathtt} &  & \mathtt{\teststring}
   \end{eqnarray*}
    New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-
       italic.
   \begin{eqnarray*}
   \mbox{mathbfit}     &  & \mathbfit{\teststring}\\
   \mbox{mathsfit}     &  & \mathsfit{\teststring}\\
   \mbox{mathsfbfit} &  & \mathsfbfit{\teststring}
   \end{eqnarray*}
   %
   Do the math alphabets match?
```

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```
108
109     $
110     \mathnormal  {a x \alpha \omega}
111     \mathbfit    {a x \alpha \omega}
112     \mathsfbfit{a x \alpha \omega}
113     \quad
114     \mathsfbfit{T C \Theta \Gamma}
115     \mathbfit    {T C \Theta \Gamma}
116     \mathnormal  {T C \Theta \Gamma}
117     $
118
119     \subsection*{Vector symbols}
120
121     Alphabetic symbols for vectors are boldface italic,
122     $\vec{\lambda}=\vec{e}_{1}\cdot\vec{a}$,
123     while numeric ones (e.g. the zero vector) are bold upright,
124     $\vec{a} + \vec{0} = \vec{a}$.
125
126
127
128
129     \subsection*{Matrix symbols}
130
131     Symbols for matrices are boldface italic, too:%
132     \footnote{However, matrix symbols are usually capital letters whereas
            vectors
133     are small ones. Exceptions are physical quantities like the force
134     vector $\vec{F}$ or the electrical field $\vec{E}$.%
135     }
136     $\matrixsym{\Lambda}=\matrixsym{E}\cdot\matrixsym{A}.$
137
138
139     \subsection*{Tensor symbols}
140
141     Symbols for tensors are sans-serif bold italic,
142
143     \[
144         \tensorsym{\alpha}  =  \tensorsym{e}\cdot\tensorsym{a}
145         \quad \Longleftrightarrow \quad
146         \alpha_{ijl}  =  e_{ijk}\cdot a_{kl}.
147     \]
148
149     The permittivity tensor describes the coupling of electric field and
150     displacement: \[
151     \vec{D}=\epsilon_{0}\tensorsym{\epsilon}_{\mathrm{r}}\vec{E}\]
152 }
```

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Abbreviation

This section shows examples of the use of LaTeXcommands in conjunction with the items that are in the `abbreviation.tex` and in the `glossary.tex` files. Please see List. B.3. **To lessen the LaTeX compilation time, it is suggested that you use `\acr{ }` only for the first occurrence of the word to be abbreviated.**

Again please see List. B.3. Here is an example of first use: alternating current (ac). Next use: ac. Full: alternating current (ac). Here's an acronym referenced using `\acr` : hyper-text markup language (html). And here it is again: html. If you are used to the `glossaries` package, note the difference in using `\gls` : hyper-text markup language (html). And again (no difference): hyper-text markup language (html). Here are some more entries:

- extensible markup language (xml) and cascading style sheet (css).
- Next use: xml and css.
- Full form: extensible markup language (xml) and cascading style sheet (css).
- Reset again.
- Start with a capital. Hyper-text markup language (html).
- Next: Html. Full: Hyper-text markup language (html).
- Prefer capitals? Extensible markup language (XML). Next: XML. Full: extensible markup language (XML).
- Prefer small-caps? Cascading style sheet (CSS). Next: CSS. Full: cascading style sheet (CSS).
- Resetting all acronyms.
- Here are the acronyms again:
- Hyper-text markup language (HTML), extensible markup language (XML) and cascading style sheet (CSS).
- Next use: HTML, XML and CSS.
- Full form: Hyper-text markup language (HTML), extensible markup language (XML) and cascading style sheet (CSS).

- Provide your own link text: style sheet.

The verbatim LaTeX code of Sec. B is in List. B.3.

Listing B.3: Sample LaTeX code for abbreviations usage

```
Again please see List.~\ref{lst:abbrv}. Here is an example of first use:
    \acr{ac}. Next use: \acr{ac}. Full: \gls{ac}.  Here's an acronym
   referenced using \verb| \acr |: \acr{html}.  And here it is again: \
   acr{html}. If you are used to the \texttt{glossaries} package, note
   the difference in using \verb| \gls |: \gls{html}. And again (no
   difference): \gls{html}. Here are some more entries:

\begin{itemize}

   \item \acr{xml} and \acr{css}.

   \item Next use: \acr{xml} and \acr{css}.

   \item Full form: \gls{xml} and \gls{css}.

   \item Reset again. \glsresetall{abbreviation}

   \item Start with a capital. \Acr{html}.

   \item Next: \Acr{html}. Full: \Gls{html}.

   \item Prefer capitals? \renewcommand{\acronymfont}[1]{\
      MakeTextUppercase{#1}} \Acr{xml}. Next: \acr{xml}. Full: \gls{xml
      }.

   \item Prefer small-caps? \renewcommand{\acronymfont}[1]{\textsc{#1}}
      \Acr{css}. Next: \acr{css}. Full: \gls{css}.

   \item Resetting all acronyms.\glsresetall{abbreviation}

   \item Here are the acronyms again:

   \item \Acr{html}, \acr{xml} and \acr{css}.

   \item Next use: \Acr{html}, \acr{xml} and \acr{css}.

   \item Full form: \Gls{html}, \gls{xml} and \gls{css}.

   \item Provide your own link text: \glslink{[textbf]css}{style}

\end{itemize}
```

Glossary

This section shows examples of the use of `\gls{ }` commands in conjunction with the items that are in the `glossary.tex` and `notation.tex` files. Note that entries in `notation.tex` are prefixed with "`not:`" label (see List. B.4).

Please make sure that the entries in `notation.tex` are those that are referenced in the LaTeX document files used by this Thesis. Please comment out unused notations and be careful with the commas and brackets in `notation.tex` .

- Matrices are usually denoted by a bold capital letter, such as $\boldsymbol{A}$. The matrix's (i, j)th element is usually denoted a_{ij}. Matrix $\mathbf{I}$ is the identity matrix.
- A set, denoted as $\mathcal{S}$, is a collection of objects.
- The universal set, denoted as $\mathcal{U}$, is the set of everything.
- The empty set, denoted as $\emptyset$, contains no elements.
- Functional Analysis is seen as the study of complete normed vector spaces, i.e., Banach spaces.
- The cardinality of a set, denoted as $|\mathcal{S}|$, is the number of elements in the set.

The verbatim LaTeX code for the part of Sec. B is in List. B.4.

Listing B.4: Sample LaTeX code for glossary and notations usage

```
\begin{itemize}

   \item \Glspl{matrix} are usually denoted by a bold capital letter,
       such as $\mathbfit{A}$. The \gls{matrix}'s $(i,j)$th element is
       usually denoted $a_{ij}$. \Gls{matrix} $\mathbf{I}$ is the
       identity \gls{matrix}.

   \item A set, denoted as \gls{not:set}, is a collection of objects.

   \item The universal set,  denoted as \gls{not:universalSet}, is the
       set of everything.

   \item The empty set, denoted as \gls{not:emptySet}, contains no
       elements.

   \item \Gls{Functional Analysis} is seen as the study of complete
       normed vector spaces, i.e., Banach spaces.

   \item The cardinality of a set, denoted as \gls{not:cardinality}, is
       the number of elements in the set.

\end{enumerate}
```

Figure

This section shows several ways of placing figures. PDFLaTeX compatible files are PDF, PNG, and JPG. Please see the `figure` subdirectory.

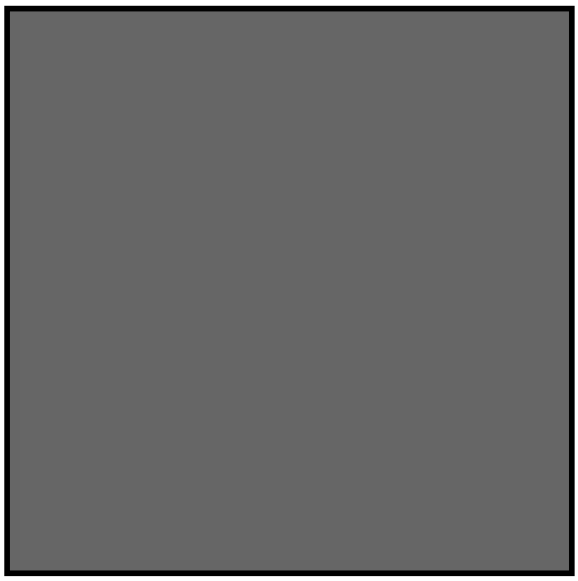
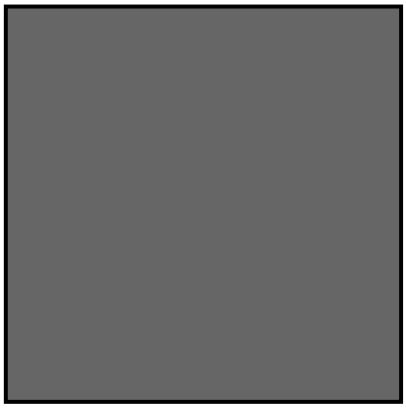


Fig. B.1 A quadrilateral image example.

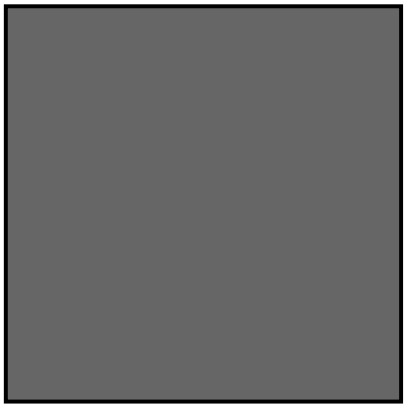
Fig. B.1 is a gray box enclosed by a dark border. List. B.5 shows the corresponding LaTeX code.

Listing B.5: Sample LaTeX code for a single figure

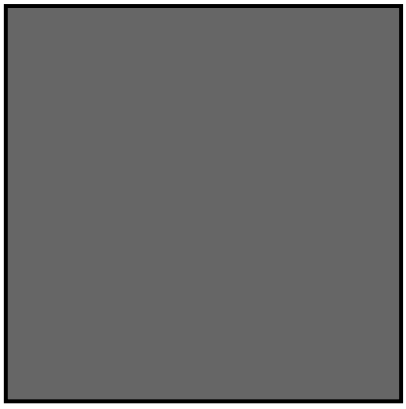
```
\begin{figure}[!htbp]
   \centering
      \includegraphics[width=0.5\textwidth]{example}
   \caption{A quadrilateral image example.}
   \label{fig:example}
\end{figure}
\cleardoublepage

Fig.~\ref{fig:example} is a gray box enclosed by a dark border. List.~\
    ref{lst:onefig} shows the corresponding \LaTeX \ code.
\end{figure}
```



(a) A sub-figure in the top row.



(b) A sub-figure in the middle row.

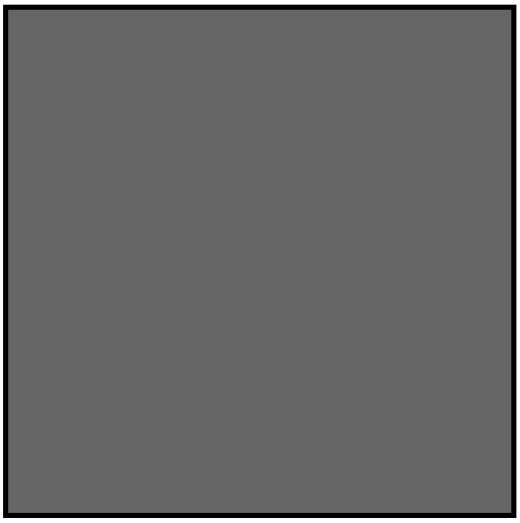


(c) A sub-figure in the bottom row.

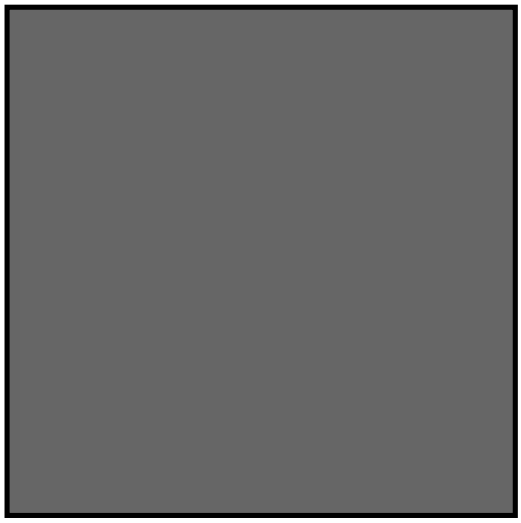
Fig. B.2 Figures on top of each other. See List. B.6 for the corresponding LaTeX code.

Listing B.6: Sample LaTeX code for three figures on top of each other

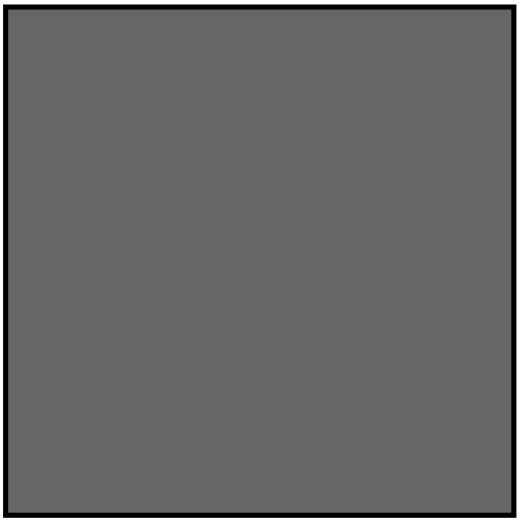
```
\begin{figure}[!htbp]
\centering
\subbottom[A sub-figure in the top row.]{
\includegraphics[width=0.35\textwidth]{example_gray_box}
\label{fig:top}
}
\vfill
\subbottom[A sub-figure in the middle row.]{
\includegraphics[width=0.35\textwidth]{example_gray_box}
\label{fig:mid}
}
\vfill
\subbottom[A sub-figure in the bottom row.]{
\includegraphics[width=0.35\textwidth]{example_gray_box}
\label{fig:botm}
}
\caption{Figures on top of each other}
\label{fig:tmb}
\end{figure}
```



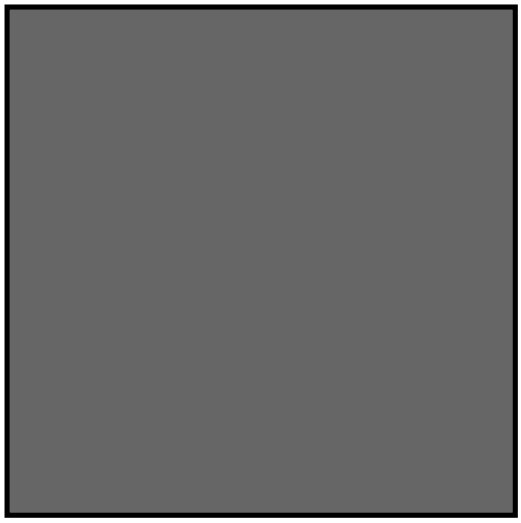
(a) A sub-figure in the upper-left corner.



(b) A sub-figure in the upper-right corner.



(c) A sub-figure in the lower-left corner.



(d) A sub-figure in the lower-right corner

Fig. B.3 Four figures in each corner. See List. B.7 for the corresponding LaTeX code.

Listing B.7: Sample LaTeX code for the four figures

```
\begin{figure}[!htbp]
\centering
\subbottom[A sub-figure in the upper-left corner.]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:upprleft}
}
\hfill
\subbottom[A sub-figure in the upper-right corner.]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:uppright}
}
\vfill
\subbottom[A sub-figure in the lower-left corner.]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:lowerleft}
}
\hfill
\subbottom[A sub-figure in the lower-right corner]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:lowright}
}
\caption{Four figures in each corner. See List.~\ref{lst:fourfigs} for
    the corresponding \LaTeX \ code.}
\label{fig:fourfig}
\end{figure}
```

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Table

This section shows an example of placing a table (a long one). Table B.1 are the triples.

TABLE B.1 FEASIBLE TRIPLES FOR HIGHLY VARIABLE GRID

Time (s)	Triple chosen	Other feasible triples
0	(1, 11, 13725)	(1, 12, 10980), (1, 13, 8235), (2, 2, 0), (3, 1, 0)
2745	(1, 12, 10980)	(1, 13, 8235), (2, 2, 0), (2, 3, 0), (3, 1, 0)
5490	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
8235	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
10980	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
13725	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
16470	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
19215	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
21960	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
24705	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
27450	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
30195	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
32940	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
35685	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
38430	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
41175	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
43920	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
46665	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
49410	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
52155	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
54900	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
57645	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
60390	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
63135	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
65880	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
68625	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
71370	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
74115	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
76860	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
79605	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
82350	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
85095	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
87840	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
90585	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
93330	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
96075	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
98820	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
101565	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
104310	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
107055	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
109800	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
112545	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
115290	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
118035	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
120780	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
123525	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

Continued on next page

Continued from previous page

Time (s)	Triple chosen	Other feasible triples
126270	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
129015	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
131760	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
134505	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
137250	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
139995	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
142740	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
145485	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
148230	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
150975	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
153720	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
156465	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
159210	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
161955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
164700	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

List. B.8 shows the corresponding LaTeX code.

Listing B.8: Sample LaTeX code for making typical table environment

```
\begin{center}
{\scriptsize
\begin{tabularx}{\textwidth}{p{0.1\textwidth}|p{0.2\textwidth}|p{0.5\textwidth}}
\caption{Feasible triples for highly variable grid} \label{tab:triple_grid} \\
\hline
\hline
\textbf{Time (s)} &
\textbf{Triple chosen} &
\textbf{Other feasible triples} \\
\hline
\endfirsthead
\multicolumn{3}{c}%
{\textit{Continued from previous page}} \\
\hline
\hline
\textbf{Time (s)} &
\textbf{Triple chosen} &
\textbf{Other feasible triples} \\
\hline
\endhead
\hline
\multicolumn{3}{r}{\textit{Continued on next page}} \\
\endfoot
\hline
\endlastfoot
\hline

0 & (1, 11, 13725) & (1, 12, 10980), (1, 13, 8235), (2, 2, 0), (3, 1, 0) \\
2745 & (1, 12, 10980) & (1, 13, 8235), (2, 2, 0), (2, 3, 0), (3, 1, 0) \\
5490 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
8235 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
10980 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
13725 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
16470 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
19215 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
21960 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
24705 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
27450 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
30195 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
32940 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
35685 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
38430 & (1, 13, 10980) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
```

```
41175 & (1, 12, 13725) & (1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
43920 & (1, 13, 10980) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
46665 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
49410 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
52155 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
54900 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
57645 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
60390 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
63135 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
65880 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
68625 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
71370 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
74115 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
76860 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
79605 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
82350 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
85095 & (1, 12, 13725) & (1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
87840 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
90585 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
93330 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
96075 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
98820 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
101565 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
104310 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
107055 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
109800 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
112545 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
115290 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
118035 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
120780 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
123525 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
126270 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
129015 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
131760 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
134505 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
137250 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
139995 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
142740 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
145485 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
148230 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
150975 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
153720 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
156465 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
159210 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
161955 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
164700 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
\end{tabularx}
}
\end{center}
```

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Algorithm or Pseudocode Listing

Table B.2 shows an example pseudocode. Note that if the pseudocode exceeds one page, it can mean that its implementation is not modular. List. B.9 shows the corresponding LaTeX code.

TABLE B.2 CALCULATION OF $y = x^n$

Input(s):		
n	:	nth power; $n \in \mathbb{Z}^+$
x	:	base value; $x \in \mathbb{R}^+$
Output(s):		
y	:	result; $y \in \mathbb{R}^+$

Require: $n \geq 0 \vee x \neq 0$
Ensure: $y = x^n$
1: $y \Leftarrow 1$
2: **if** $n < 0$ **then**
3: $X \Leftarrow 1/x$
4: $N \Leftarrow -n$
5: **else**
6: $X \Leftarrow x$
7: $N \Leftarrow n$
8: **end if**
9: **while** $N \neq 0$ **do**
10: **if** N is even **then**
11: $X \Leftarrow X \times X$
12: $N \Leftarrow N/2$
13: **else** $\{N$ is odd$\}$
14: $y \Leftarrow y \times X$
15: $N \Leftarrow N - 1$
16: **end if**
17: **end while**

Listing B.9: Sample LaTeX code for algorithm or pseudocode listing usage

```
\begin{table}[!htbp]
   \caption{Calculation of $y = x^n$}
   \label{tab:calcxn}
   {\footnotesize
   \begin{tabular}{lll}
   \hline
   \hline
   {\bfseries Input(s):} & & \\
   $n$ & : & $n$th power; $n \in \mathbb{Z}^{+}$ \\
   $x$ & : & base value; $x \in \mathbb{R}^{+}$ \\
   \hline
   {\bfseries Output(s):} & & \\
   $y$ & : & result; $y \in \mathbb{R}^{+}$  \\
   \hline
   \hline
   \\
   \end{tabular}
   }
   \begin{algorithmic}[1]
   {\footnotesize
      \REQUIRE $n \geq 0 \vee x \neq 0$
      \ENSURE $y = x^n$
      \STATE $y \Leftarrow 1$
      \IF{$n < 0$}
            \STATE $X \Leftarrow 1 / x$
            \STATE $N \Leftarrow -n$
      \ELSE
            \STATE $X \Leftarrow x$
            \STATE $N \Leftarrow n$
      \ENDIF
      \WHILE{$N \neq 0$}
            \IF{$N$ is even}
                  \STATE $X \Leftarrow X \times X$
                  \STATE $N \Leftarrow N / 2$
            \ELSE[$N$ is odd]
                  \STATE $y \Leftarrow y \times X$
                  \STATE $N \Leftarrow N - 1$
            \ENDIF
      \ENDWHILE
   }
   \end{algorithmic}
\end{table}
```

Program/Code Listing

List. B.10 is a program listing of a C code for computing Fibonacci numbers by calling the actual code. Please see the `code` subdirectory.

Listing B.10: Computing Fibonacci numbers in C (./code/fibo.c)

```
/* fibo.c -- It prints out the first N Fibonacci
 *           numbers.
 */

#include <stdio.h>

int main(void) {
    int n;        /* Number of fibonacci numbers we will print */
    int i;        /* Index of fibonacci number to be printed next */
    int current;  /* Value of the (i)th fibonacci number */
    int next;     /* Value of the (i+1)th fibonacci number */
    int twoaway;  /* Value of the (i+2)th fibonacci number */

    printf("How many Fibonacci numbers do you want to compute? ");
    scanf("%d", &n);
    if (n<=0)
       printf("The number should be positive.\n");
    else {
      printf("\n\n\tI \t Fibonacci(I) \n\t=====================\n");
      next = current = 1;
      for (i=1; i<=n; i++) {
   printf("\t%d \t\t\t%d\n", i, current);
   twoaway = current+next;
   current = next;
   next    = twoaway;
      }
    }
}

/* The output from a run of this program was:

How many Fibonacci numbers do you want to compute? 9

   I   Fibonacci(I)
   =====================
   1      1
   2      1
   3      2
   4      3
   5      5
   6      8
   7      13
   8      21
   9      34

*/
```

List. B.11 shows the corresponding LaTeX code.

Listing B.11: Sample LaTeX code for program listing

```
1 List.~\ref{lst:fib_c} is a program listing of a C code for computing
    Fibonacci numbers by calling the actual code. Please see the \verb|
    code | subdirectory.
```

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Referencing

Referencing chapters: This appendix is in Appendix B, which is about examples in using various LaTeX commands.

Referencing sections: This section is Sec. B, which shows how to refer to the locations of various labels that have been placed in the LaTeX files. List. B.12 shows the corresponding LaTeX code.

Listing B.12: Sample LaTeX code for referencing sections

```
1 Referencing sections: This section is Sec.~\ref{sec:ref}, which shows
    how to refer to the locations of various labels that have been
    placed in the \LaTeX \ files. List.~\ref{lst:refsec} shows the
    corresponding \LaTeX \ code.
```

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A subsection

Referencing subsections: This section is Sec. B, which shows how to refer to a subsection. List. B.13 shows the corresponding LaTeX code.

Listing B.13: Sample LaTeX code for referencing subsections

```
1 Referencing subsections: This section is Sec.~\ref{sec:subsec}, which
    shows how to refer to a subsection. List.~\ref{lst:refsub} shows the
     corresponding \LaTeX \ code.
```

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A sub-subsection

Referencing sub-subsections: This section is Sec. B, which shows how to refer to a sub-subsection. List. B.14 shows the corresponding LaTeX code.

Listing B.14: Sample LaTeX code for referencing sub-subsections

```
1 Referencing sub-subsections: This section is Sec.~\ref{sec:subsubsec},
    which shows how to refer to a sub-subsection. List.~\ref{lst:
    refsubsub} shows the corresponding \LaTeX \ code.
```

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Citing

Citing bibliography content is done using BibTeX. It requires the creation of a BibTeX file (.bib extension name), and then added in the argument of `\bibliography{ }` . For each .bib file, separate them by a comma in the argument `\bibliography{ }` without the extension name. Building your BibTeX file (references.bib) can be done easily with a tool called JabRef (www.jabref.org).

The following subsections are examples of citations.

Books

- [6]
- [7]
- [8]
- [9]
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- [1]

Booklets

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Proceedings

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- [2]

In books

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In proceedings

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Journals

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Theses/dissertations

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Technical Reports and Others

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Miscellaneous

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- [154]

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Index

For key words or topics that are expected (or the user would like) to appear in the Index, use `index{key}` , where `key` is an example keyword to appear in the Index. For example, Fredholm integral and Fourier operator of the following paragraph are in the Index.

If we make a very large matrix with complex exponentials in the rows (i.e., cosine real parts and sine imaginary parts), and increase the resolution without bound, we approach the kernel of the Fredholm integral equation of the 2nd kind, namely the Fourier operator that defines the continuous Fourier transform.

List. B.15 is a program listing of the above-mentioned paragraph.

Listing B.15: Sample LaTeX code for Index usage

```
1 If we make a very large matrix with complex exponentials in the rows (i.
    e., cosine real parts and sine imaginary parts), and increase the
    resolution without bound, we approach the kernel of the \index{
    Fredholm integral} Fredholm integral equation of the 2nd kind,
    namely the \index{Fourier} Fourier operator that defines the
    continuous Fourier transform.
```

Adding Relevant PDF Pages

Examples of such PDF pages are Standards, Datasheets, Specification Sheets, Application Notes, etc. Selected PDF pages can be added (see List. B.16), but note that the options must be tweaked. See the manual of `pdfpages` for other options.

Listing B.16: Sample LaTeX code for including PDF pages

```
\includepdf[pages={8-10},%
offset=3.5mm -10mm,%
scale=0.73,%
frame,%
pagecommand={},]
{./reference/Xilinx2015-UltraScale-Architecture-Overview.pdf}
```

Virtex UltraScale FPGA Feature Summary

Table 6: **Virtex UltraScale FPGA Feature Summary**

	VU065	VU080	VU095	VU125	VU160	VU190	VU440
Logic Cells	626,640	780,000	940,800	1,253,280	1,621,200	1,879,920	4,432,680
CLB Flip-Flops	716,160	891,424	1,075,200	1,432,320	1,852,800	2,148,480	5,065,920
CLB LUTs	358,080	445,712	537,600	716,160	926,400	1,074,240	2,532,960
Maximum Distributed RAM (Mb)	4.8	3.9	4.8	9.7	12.7	14.5	28.7
Block RAM/FIFO w/ECC (36Kb each)	1,260	1,421	1,728	2,520	3,276	3,780	2,520
Total Block RAM (Mb)	44.3	50.0	60.8	88.6	115.2	132.9	88.6
CMT (1 MMCM, 2 PLLs)	10	16	16	20	30	30	30
I/O DLLs	40	64	64	80	120	120	120
Fractional PLLs	5	8	8	10	15	15	0
Maximum HP I/Os(1)	468	780	780	780	650	650	1,404
Maximum HR I/Os(2)	52	52	52	104	52	52	52
DSP Slices	600	672	768	1,200	1,560	1,800	2,880
System Monitor	1	1	1	2	3	3	3
PCIe Gen3 x8	2	4	4	4	5	6	6
150G Interlaken	3	6	6	6	8	9	0
100G Ethernet	3	4	4	6	9	9	3
GTH 16.3Gb/s Transceivers	20	32	32	40	52	60	48
GTY 30.5Gb/s Transceivers	20	32	32	40	52	60	0

Notes:
1. HP = High-performance I/O with support for I/O voltage from 1.0V to 1.8V.
2. HR = High-range I/O with support for I/O voltage from 1.2V to 3.3V.

Virtex UltraScale Device-Package Combinations and Maximum I/Os

Table 7: **Virtex UltraScale Device-Package Combinations and Maximum I/Os**

Package[1][2][3]	Package Dimensions (mm)	VU065	VU080	VU095	VU125	VU160	VU190	VU440
		HR, HP GTH, GTY	HR, HP GTH, GTY	HR, HP GTH, GTY	HR, HP GTH, GTY	HR, HP GTH, GTY	HR, HP GTH, GTY	HR, HP GTH, GTY
FFVC1517	40x40	52, 468 20, 20	52, 468 20, 20	52, 468 20, 20				
FFVD1517	40x40		52, 286 32, 32	52, 286 32, 32				
FLVD1517	40x40				52, 286 40, 32			
FFVB1760	42.5x42.5		52, 650 32, 16	52, 650 32, 16				
FLVB1760	42.5x42.5				52, 650 36, 16			
FFVA2104	47.5x47.5		52, 780 28, 24	52, 780 28, 24				
FLVA2104	47.5x47.5				52, 780 28, 24			
FFVB2104	47.5x47.5		52, 650 32, 32	52, 650 32, 32				
FLVB2104	47.5x47.5				52, 650 40, 36			
FLGB2104	47.5x47.5					52, 650 40, 36	52, 650 40, 36	
FFVC2104	47.5x47.5			52, 364 32, 32				
FLVC2104	47.5x47.5				52, 364 40, 40			
FLGC2104	47.5x47.5					52, 364 52, 52	52, 364 52, 52	
FLGB2377	50x50							52, 1248 36, 0
FLGA2577	52.5x52.5						0, 448 60, 60	
FLGA2892	55x55							52, 1404 48, 0

Notes:

1. Go to Ordering Information for package designation details.
2. All packages have 1.0mm ball pitch.
3. Packages with the same last letter and number sequence, e.g., A2104, are footprint compatible with all other UltraScale architecture-based devices with the same sequence. The footprint compatible devices within this family are outlined. See the UltraScale Architecture Product Selection Guide for details on inter-family migration.

Virtex UltraScale+ FPGA Feature Summary

Table 8: **Virtex UltraScale+ FPGA Feature Summary**

	VU3P	VU5P	VU7P	VU9P	VU11P	VU13P
Logic Cells	689,640	1,051,010	1,379,280	2,068,920	2,147,040	2,862,720
CLB Flip-Flops	788,160	1,201,154	1,576,320	2,364,480	2,453,760	3,271,680
CLB LUTs	394,080	600,577	788,160	1,182,240	1,226,880	1,635,840
Max. Distributed RAM (Mb)	12.0	18.3	24.1	36.1	34.8	46.4
Block RAM/FIFO w/ECC (36Kb each)	720	1,024	1,440	2,160	2,016	2,688
Block RAM (Mb)	25.3	36.0	50.6	75.9	70.9	94.5
UltraRAM Blocks	320	470	640	960	1,152	1,536
UltraRAM (Mb)	90.0	132.2	180.0	270.0	324.0	432.0
CMTs (1 MMCM and 2 PLLs)	10	20	20	30	12	16
Max. HP I/O(1)	520	832	832	832	624	832
DSP Slices	2,280	3,474	4,560	6,840	8,928	11,904
System Monitor	1	2	2	3	3	4
GTY Transceivers 32.75Gb/s	40	80	80	120	96	128
PCIe Gen3 x16 and Gen4 x8	2	4	4	6	3	4
150G Interlaken	3	4	6	9	9	12
100G Ethernet w/RS-FEC	3	4	6	9	6	8

Notes:
1. HP = High-performance I/O with support for I/O voltage from 1.0V to 1.8V.

Virtex UltraScale+ Device-Package Combinations and Maximum I/Os

Table 9: **Virtex UltraScale+ Device-Package Combinations and Maximum I/Os**

Package (1)(2)(3)	Package Dimensions (mm)	VU3P	VU5P	VU7P	VU9P	VU11P	VU13P
		HP, GTY	HP, GTY	HP, GTY	HP, GTY	HP, GTY	HP, GTY
FFVC1517	40x40	520, 40					
FLVF1924	45x45					624, 64	
FLVA2104	47.5x47.5		832, 52	832, 52	832, 52		
FHVA2104	52.5x52.5(4)						832, 52
FLVB2104	47.5x47.5		702, 76	702, 76	702, 76	624, 76	
FHVB2104	52.5x52.5(4)						702, 76
FLVC2104	47.5x47.5		416, 80	416, 80	416, 104	416, 96	
FHVC2104	52.5x52.5(4)						416, 104
FLVA2577	52.5x52.5				448, 120	448, 96	448, 128

Notes:
1. Go to Ordering Information for package designation details.
2. All packages have 1.0mm ball pitch.
3. Packages with the same last letter and number sequence, e.g., A2104, are footprint compatible with all other UltraScale devices with the same sequence. The footprint compatible devices within this family are outlined.
4. These 52.5x52.5mm overhang packages have the same PCB ball footprint as the corresponding 47.5x47.5mm packages (i.e., the same last letter and number sequence) and are footprint compatible.

Appendix C
PUBLICATION LIST AND AWARD

Journal (example only)

1. Ö. Aksın, H. Türkmen, **L. Artok**, B. Çetinkaya, C. Ni, O. Büyükgüngör, and E. Özkal, "Effect of immobilization on catalytic characteristics of saturated pd-n-heterocyclic carbenes in mizoroki-heck reactions," *Journal of Organometallic Chemistry*, vol. 691, no. 13, pp. 3027–3036, 2006.

2. . . .

Conference

1. . . .

2. . . .

Others

1. . . .

2. . . .

Award

1. . . .

2. . . .

Appendix D
VITA

Juan Z. dela Cruz received the B.Sc., M.Sc., and Ph.D. degrees in chemistry all from the Pamantasan ng Pilipinas, San Juan, Metro Manila, Philippines, in 2013, 2015 and 2018 respectively. He is currently taking up his B.Sc. Electronics and Communications Engineering studies. He has developed several high-speed packet-switched network systems and node modules. His research interests include high-speed packet-switched networks, high speed radio interface design, discrete simulation and statistical models for packet switches.

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