Guidelines to Prepare Dissertation

*For*

*Bachelor of Science in Applied Science Degree*

*Bachelor of Science (Honors) in Applied Science Degree*

*Bachelor of Science in Information Technology Degree*

*Bachelor of Science (Honors) in Information Technology Degree*

*Programs*

Version 5

Department of Computing

Faculty of Applied Sciences

**Rajarata University of Sri Lanka**

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*Published on 10th August, 2019*

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1. **Introduction**

A dissertation is an essay advancing a new point of view resulting from research work carried out to fulfill a requirement for an academic degree. Undergraduate students who wish to submit their dissertations of the final year research project/ third year group project should follow the under mentioned instructions before preparation of their dissertations. The final copies of the dissertations will not be accepted if the students have not prepared the dissertations according to these guidelines.

* 1. **General Objectives and Learning Outcomes**

The general aim of the third year group project/ final year research project is for the students to acquire, develop and demonstrate the requisite knowledge, skills and attitudes/mindset to work independently after graduation. Therefore, to satisfy these requirements, the student shall;

* Develop and demonstrate in-depth knowledge in the chosen field of study for the research project and thereby contribute to the advancement of knowledge.
* Demonstrate an ability to plan and execute advanced tasks within a given timeframe using suitable scientific methods.
* Demonstrate an ability to identify, formulate, propose and implement solutions for complex issues arising in their relevant disciplines in a critical, independent and creative manner.
* Demonstrate an ability to integrate the knowledge acquired from the core courses of the degree program in a systematic and creative manner for research and development oriented tasks.
* Demonstrate an ability to give a clear and cohesive account of and discuss orally (by means of a presentation) and in writing (by means of a report) his/her findings in a logical, clear and concise manner.
* Be able to identify various sources of information, critically evaluate their relevance to the problem in question and to be able to use the correct forms of documentation to summarize them, in an independent manner.
* Be able to defend results from laboratory/field experiments and the fundamental theories behind them in an oral presentation as well as in a well-structured technical report
	1. **Supervision and supervisors**

Each student/ group is assigned a supervisor from the academic staff members of the Department (internal supervisor). The internal supervisor supports the student in his/her work to accomplish a report according to the guidelines and assessment criteria, within the given timeframe. The role of the internal supervisor is to be a continuous advisor during the project period and to monitor the progress and provide feedback on the potential problems and other issues arising during the work. However, because the project is an independent work, it not the task of the internal supervisors to inform the students exactly how to improve their draft report, overall as well as in detail, since the project is an independent work. The internal supervisor therefore shall only attempt to improve the overall quality of the final report by providing comments and suggestions. However, it is the student’s responsibility to plan and carry out the entire project. The draft project report needs to be submitted well in advance of the project presentation in order to receive a comprehensive feedback from the internal supervisor.

The student/group could be assigned an external supervisor, who is an advisor of the student’s work and is usually from the establishment/institute/company where the project is carried out. Therefore the external supervisor is an expert of their relevant industry/academic discipline. The student should regularly discuss the progress of his/her work with the external supervisor and obtain the feedback. It is the duty of the student to make sure that the external supervisor is fully aware of the project objectives. At the end of the project period the student’s respective Department will obtain feedback from the external supervisor and this may also be considered during the final grading of the project. The external supervisor is also invited to take part in the research project presentation sessions.

* 1. **Responsibilities of students**

The students carrying out a third year group project/ final year research project are expected to undertake the following responsibilities:

1. Students should have preliminary discussion with supervisors before starting the project.
2. This project is a compulsory course module, hence it is required to meet and discuss the project related matters regularly having prior appointment with the supervisor. Contacting through official channels such as emails is also recommended.
3. The student should maintain a work diary and need to update the diary regularly with important decision after meeting with the supervisor
4. Students are highly encouraged to refer library and other academic journals, while they are conducting literature search and research tasks. If any research paper is inaccessible, students can request it from supervisor. Supervisor may get necessary actions to provide the paper in his/her best.
5. The students should keep informed supervisor and course coordinator, if any problem is raised interrupting their research work.
6. The students should maintain friendly environment with supervisors and colleagues in laboratories. If the student requires to access university assets such as computers, routers, sensors, and etc., they need a prior approval through proper channel. In such occasions, students should be responsible for the assets and should avoid misusing them.
7. The students should make presentations for defending research proposal and the progress of his/her project at each progress review sessions, arranged by the Project Coordinator. There will be a session at each stage of the project (e.g. the proposal, SRS, inter-mediate implementation, etc.)
8. The students should get necessary actions to finish composing research thesis, presentation slides and posters providing enough time to review by supervisors (at least a week ahead). Students need to make all marked corrections by supervisor prior to submit the final thesis
	1. **Role of a Supervisor**

The supervisor is expected to help the student, under their supervision by following ways to complete the third year group project/ final year research project.

1. Guide students to formulate an appropriate project proposal and outline of the project thesis
2. Conduct meeting regularly.
3. Inform students the progress of their work whether it is satisfactory or not
4. Advise students to improve the research activities, composing thesis and presentations
5. Guide students to publish their work in peer-reviewed conferences or journals
6. Review the draft of research project thesis, presentation slides and poster and provide suggestions to improve them
7. Act as one of the examiners on submission of the project.
8. **Common instructions**
	1. **Number of Copies**

Student must submit **Two (02)** printed copies and **Two (02)** soft copies in CD/DVD format of the dissertation to the Head of the Department.

* 1. **Paper**

Each copy of the dissertation shall be on good quality A4-sized clear white paper having at least 80 gsm. One type of paper must be used throughout the dissertation. However, paper of different quality may be used for figures, photographs, maps, etc.

It is not essential to print the hard copy of the dissertation with colors unless the colors of figures or tables describe specific information.

* 1. **Binding**

Draft version of the Dissertation: The draft version of the dissertation to be submitted to the examiners should be soft bound and the number of copies should be as specified by the department.

Cover Page: See the **Appendix A** for the format of the cover page. Lettering on Cover should be in **GOLD.**

Final Submission of the Dissertation: The final corrected copy of the dissertation must be free from typographical, grammatical and other errors when submitted. After making the alterations mentioned by the examiners, two (02) copies of the dissertation should be hardbound with the dark blue color.

Spine: Short name of the degree and the year submitted should be indicated at the spine as depicted in Appendix - B. The short name of the degree should be mentioned at 20mm from the top of the spine (See **Appendix B**). Lettering on spine should be in GOLD.

* 1. **Language**

You are free to use either British (UK) English or American English. However, consistency must be retained throughout the dissertation. i.e. never mix British and American styles of spelling, etc.

Be aware that British and American English do not only differ in the spelling, but also in the use of some prepositions and phrases.

* 1. **Additional Supplements**

The students doing a group project have to submit a single dissertation for the entire group. However, each member should submit an individual report detailing his/her contribution to the project.

1. **Dissertation Formatting and Styles**
	1. **Page Format**

***Draft Version***: The draft version of the dissertation to be submitted to the examiners should be word processed and single sided. One and a half line spacing is required except abstract, tables and indented quotations where single line spacing may be used.

***Final Submission***: Final submission should be word processed and single sided. One and a half (1.5) line spacing is required, except for the abstract, tables and indented quotations where single line spacing may be used.

Candidates may choose an appropriate spacing for the appendices.

* 1. **Page/Paragraph Breaks**

A new chapter must start on a new odd-numbered page. A section/subsection title should not begin on the last line of a page. A new paragraph should not begin on the last line of a page.

* 1. **Font styles**
* Chapter Heading: Should be written in two lines.
	+ First line: The chapter number - All Capital, 14 Font size, Bold, 2.5 line space, 24 pt space below the line, Right aligned.
	+ Second line: The chapter title – Capitalized each word except prepositions (Title case), 14 Font size, Bold, 2.5 line space, Left aligned.
* Section heading: Sentence case-12 Font size, Bold, 2.5 line space, 2.0 line space, Left aligned.
* Sub-section heading: Sentence case-12 Font size, Bold, 2.0 line space, Left aligned.
* Other sub-sub-section heading: Sentence case-12 Font size, Bold, 2.0 line space, Left aligned.
* Main body text: Sentence case - 12 Font size, 1.5 line space, Justify.
* There should be a space after each paragraph.
* Tables and Illustrations : Font size may be varied while maintaining legibility

Please refer the **Appendix E.**

* 1. **Margins**
* Left margin: 1.5” (3.7cm)
* Right margin: 0.75” (2.0 cm)
* Top margin: 1.25” (3.5cm)
* Bottom margin: 1.25” (3.5cm)
	1. **Headings**

All chapters and their subsections must be numbered and titled. Use numerals up to three levels and use bolded and/or italicized titles for more levels. Please refer the **Appendix E.**

Example:

**CHAPTER 2**

**2.1 Title of the section (second level)**

**2.1.1 Title of the subsection (third level)**

**Title of the sub-subsection (fourth level)**

***Title of the sub-sub-subsection (fifth level)***

* 1. **Pagination**

Pages should be numbered consecutively throughout the dissertation.

Preliminary pages (i.e., title page, statement of declaration, abstract, acknowledgements, table of contents, list of figures, list of tables and list of abbreviations) that precede the main text should be numbered with lower case roman numerals beginning with one (i).

Appendices that follow the list of references should be numbered with upper case roman numerals starting with one (I).

Number the main text consecutively beginning with the Arabic number one (1).

All page numbers should be placed on the bottom right edge of the page.

* 1. **Tables, Figures and Illustrations**

Tables are grids consisting of columns and rows that present numerical or verbal facts by categories. Figures include charts, graphs, diagrams, photographs, maps, musical examples, drawings and other images. All these types of non-textural material are collectively referred to as illustrations.

All tables and figures should be placed after (close to) their first reference in the text and center aligned.

Tables and figures should be numbered with the corresponding chapter number and the image/figure number followed by a colon. An example is given bellow.

* the second figure of the chapter 3 should be named as “Figure 3.2:”
* the sixth table of the chapter 5 should be named as “Table 5.6:”

The table captions should be center aligned and placed above the table and the figure captions should be center aligned and placed below the figure. See the Table 1 and Figure 1 given bellow.

Captions of all tables and figures should be given indicating enough information so that they can be understood without referring to the text. Do not include table/figures that are not referred in the text.

Table 1: Sample table

| **Table Head** | **Table Column Head** |
| --- | --- |
| ***Table column subhead*** | ***Subhead*** | ***Subhead*** |
| data | data | data | data |



Figure 1.1: Sample figure.

* 1. **Formulae**

Formulae should be printed leaving ample space around the formulae. Subscripts and superscripts should be clear. Meanings of all symbols should be given immediately after the equation in which they are first used. Equations should be numbered serially at the right hand side within parentheses.

Use “Insert > Equation” or “Microsoft Equation Editor” to write formulae. An example is given below.

$$HD\_{norm}(X,Y)=\frac{\sum\_{i=1}^{w}\sum\_{j=1}^{l}X\_{i,j}⨁Y\_{i,j}}{w×l} (1)$$

Where;

 $w$ - *Height (number of rows) of the iris template*

$l$ - *Width (number of columns) of the iris template*

 $X,Y$ - *Two iris templates to be compared*

 $X\_{i,j},Y\_{i,j}$ *- bit value at* $i,j^{th}$ *position*

* 1. **References**

All references cited in the dissertation should appear in the reference list, and all references in the reference list should appear as citations. The reference list should be formatted to comply with IEEE reference style.

* 1. **Appendices**

Detailed information or data which may increase the usefulness of the dissertation for examiners and subsequent readers, but which are too detailed for inclusion in the main body of the dissertation may be included as appendices. Appendices must meet standards with respect to margins and be formatted according to the remainder of the dissertation, though text may be single spaced.

* 1. **Style**

Simplicity and directness of writing style is recommended. The dissertation should be free of spelling, grammatical and punctuation errors.

1. **Organization of the Dissertation**

A dissertation should contain the following parts in the given order.

* Cover page
* Title page
* Declaration page of the candidate & supervisor
* Abstract
* Dedication (if available)
* Acknowledgements
* Table of contents
* List of figures (if available)
* List of tables (if available)
* List of abbreviations (if available)
* List of appendices (if available)
* The main body of the dissertation
* Reference list
* Appendices (if available)
	1. **Cover**

The dissertation presented **for evaluation** should be **spiral/soft bound**.

The dissertations submitted **after the evaluation** (with the recommended changes suggested by the examination panel at the student’s defense) should be **hard bound** with a **dark blue color (2 Copies)**.

The title should be based 3cm from the top, in a font size equivalent to 22 of Times New Roman. The author’s name/ names with initials and the year of submission should be placed 2cm from the bottom, in a font size of 20. All text should be centered. Gold colored lettering should be placed in the hard cover (See **Appendix A**).

* 1. **Title Page**

A sample title page (only required in the final hard bound dissertation) is included in **Appendix C.**

* 1. **Declaration**

The declaration should be made by the candidate following the signature and the date. A candidate, after a discussion with the supervisor/s can request an embargo for a particular dissertation for a given work for a given time or indefinitely. Such an embargo may override the statement made in the dissertation itself. See **Appendix D** for statement of declaration.

* 1. **Abstract**

The abstract should be a concise description of the problem addressed in the project work, the method of solution, the results, evaluation and conclusions. The abstract should not exceed 250 words and written with single line spacing. It should conclude with a short entry `Keywords' nominating several words or word phrases by which a computerized library search would find the project. The keywords are significant or memorable words or terms in the title, abstract, or text of a document that describe the contents of a document.

It is a mandatory requirement to include your abstract in the booklet of abstracts prepared by the department for the Annual Project Presentation Session. It must be submitted to the departmental coordinating editor, who prepares the booklet of abstracts. Specific guidelines for formatting the abstract are given in **Appendix F**.

* 1. **Dedication**

The student is feel free to include this section.

* 1. **Acknowledgement**

In the acknowledgement section, the student is required to declare the extent of assistance which has been given by his/her faculty/department staff, fellow students and external bodies or others in the collection of materials and data, the design and construction of apparatus, the analysis of data and preparation of the dissertation. If the research was sponsored, it is necessary to mention the name of the funding organization and other details (if any). In addition, it is appropriate to highlight the supervision and advice given by the dissertation supervisor.

* 1. **Table of Contents**

All the main chapters and subsections (up to level 3) of each chapter must be included in the table of contents with their page numbers. The page numbers of abstracts, acknowledgement and others which come first in the dissertation should also be included. Also, if there are any appendices and other supplements, should be included in the table of contents.

* 1. **List of Figures**

If the dissertation contains any figures then separate list should be prepared including the name of the object and the page number. The chapter number should be included in defining the number of figures. Use a separate page to insert the list of figures.

* 1. **List of Tables**

If the dissertation contains any tables then separate list should be prepared including the name of the object and the page number. The chapter number should be included in defining the number of tables. Use a separate page to insert the list of tables.

* 1. **List of abbreviations**

Abbreviations must follow the International standards. When an abbreviation is used in first time, it must be explained in the text. A separate list should be prepared for all abbreviations used in dissertation with their full meaning. The abbreviations in the list should be arranged according to the alphabetical order. Use a separate page to insert the list of abbreviations.

* 1. **List of Appendices**

If the dissertation contains appendices then separate list should be prepared including the name of the Appendix and the page number. Use a separate page to insert the list of appendices.

* 1. **The main body of the dissertation**

The dissertation should be started from an introduction and the last part of the dissertation should include the conclusions and recommendations. All the chapters of dissertation should have title and a chapter number. All new chapters should be started from a new page.

Candidates may have some flexibility in the structure of the body of the dissertation itself and should consult their supervisor(s). In general, a dissertation may consist of:

* An **introduction** to the dissertation, setting the work in the context of existing knowledge, the domain of application, establishing the need for the current study and its significance, and stating the aims and objectives and a brief overview of the contents of the rest of the dissertation;
* A **literature review**, that arises out of the survey of already available literature that is relevant to the particular area of research;
* A **methodology** section (This however may vary among dissertations) and Middle chapters dealing with various software/hardware development, experiments, etc;
* A **results and discussion** section;
* A **conclusion** providing an integrated discussion of results and suggestions for future work;
	1. **References**

A reference list is the list of all books, articles, and other source of materials, which were referred and should be listed according to the international referencing method adopted. IEEE Style is recommended.

List and number all bibliographical references in 12-point Times New Roman, single-spaced, at the reference section of the dissertation. When referenced in the text, enclose the citation number in square brackets, for example [1]. Where appropriate, include the name(s) of editors of referenced books. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] was the first . . .”

The ‘Reference list’ does not contain a chapter number.

Example:

1. G. Eason, B. Noble, and I. N. Sneddon, “On certain integrals of Lipschitz-Hankel type involving products of Bessel functions,” Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955. (references)
2. J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.
3. S. Jacobs and C. P. Bean, “Fine particles, thin films and exchange anisotropy,” in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.

See the following links for details and examples for IEEE reference style:

<https://www.ieee.org/documents/ieeecitationref.pdf>

All web references should give the complete URL and the date of access, in addition to the standard reference details.

* 1. **Appendices**

Supplementary material could be included as Appendices rather than in the main text. For example, Appendices may contain questionnaires, detailed descriptions on apparatus, extensive tables of raw data, computer algorithms, etc. If appendices contain photocopied material, the photocopies should be of letter quality.

1. **Assessment Criteria**
	1. **Awards**

In order to encourage students, the department will award certificates to the best project/research (for 3rd year General degree and 4th year Honors degree) and the best presenter (for 4th year Honors degree) at the Annual Project/Research Presentation Session.

1. **Cover Page**

3 inch

**Smart Pattern Recognition Method for Human Facial Recognition**

**Letters : Title case, Bold**

**Font : Times New Roman, size 22**

**Font color : Black**

**Line spacing: 1.5 lines**

**Alignment : Center**

**Letters : Bold**

**Font : Times New Roman, size 20**

**Font color : Black**

**Line spacing: 1.5 lines**

**Alignment : Center**

**A.B. Perera**

**2010**

**2 inch**

1. **Dissertation Spine**

**B. Sc. Applied Sciences 2010**

**Write appropriate name of the degree;**

**B.Sc. in Applied Sciences**

**B.Sc. (Honors) in Applied Sciences**

**B.Sc. in Information Technology**

**B.Sc. (Honors) in Information Technology**

1. **Title Page**

**SMART PATTERN RECOGNITION METHOD FOR HUMAN FACIAL RECOGNITION**

A.B. Perera – Registration No

**Letters : All Capital, Bold**

**Font : Times New Roman, size 16**

**Font color : Black**

**Line spacing: 1.5 lines**

**Alignment : Center**

**Letters : Bold**

**Font : Times New Roman, size 14**

**Font color : Black**

**Line spacing: 1.5 lines**

**Alignment : Center**

**Letters : Sentence Case**

**Font : Times New Roman, size 12**

**Font color : Black**

**Line spacing: 1.5 lines**

**Alignment : Center**

Dissertation submitted in partial fulfillment of the requirements for the degree of Bachelor of the Science in Information Technology.

Department of Computing

Rajarata University of Sri Lanka.

**Letters : Title Case**

**Font : Times New Roman, size 14**

**Font color : Black**

**Line spacing: 1.5 lines**

**Alignment : Center**

**Letters : Bold**

**Font : Times New Roman, size 116**

**Font color : Black**

**Line spacing: 1.5 lines**

**Alignment : Center**

**2010**

1. **Declaration**

***The following certification should be added ONLY in the hard bound dissertation that is submitted after the project defense.***

**Declaration**

The dissertation is our original work and has not been submitted previously for a degree at this or any other university/institute. To the best of our knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

Student’s name ……………………………….. Date ………………

Signature ……………………………………….

Student’s name ……………………………….. Date ………………

Signature ……………………………………….

Student’s name ……………………………….. Date ………………

Signature ……………………………………….

This is to certify that this dissertation titled **<title>** is based on the work of **<name of the student/students>** under my/our supervision. The dissertation has been prepared according to the format stipulated and is of acceptable standard.

Certified by

Supervisor 1 Name ………………………….. Date ………………...

Signature ………………………..

Supervisor 2 Name …………………………… Date ………………..

Signature …………………………

…………………………………..

Head/ Department of Computing,

Faculty of Applied Sciences,

Rajarata University of Sri Lanka,

Mihintale.

Date ……………………………

1. **Font styles of Headings**

**CHAPTER 4**

**Results and Discussion**

**4.1 Introduction**

The iris recognition performance of the setup as a whole is examined and discussed in this chapter. Main experiments were carried out to find the best separation of intra-class and inter-class variations, also to ensure the accuracy of the recognition setup. So that False Accept Rate and False Reject Rate are minimized. Apart from them, some other experiments were carried out to ensure the uniqueness of iris template and to find the best number block size and word size of an iris template.

**4.2 Uniqueness of final bit vector patterns**

One of the major characteristics of a template which is to be used as biometric authentication template is the uniqueness. The patterns of each biometric template of different users should be distinguishable. Before to use any biometric trait (or type) in an authentication system, it is essential to confirm the templates of the desired biometric trait are unique (or divergent) from each other. Hamming Distance (HD) and Degrees-of-Freedom (DoF) are two measures that could be used to measure such characteristics.

**4.2.1. Use of hamming distance and degrees-of-freedom**

The enrolled templates of different individuals were compared to each other in order to determine the uniqueness. Such a comparison could be categorized into inter-class comparison.

**Inter-class comparison**

From every single comparison, a value for hamming distance was obtained. Since the proposed approach could be executed for a different possible number of repetitions of XOR function and word sizes, this experiment was executed for a selected possible number of repetitions of XOR function while keeping word size as 20.

1. **Abstract Template**

Title: Upper Case, Times NR, 12pt, Bold, Centered, 10pt space after title

Authors: Times NR, 12pt, centered, 10pt space after names

\* for corresponding author,

**EFFECTIVE PRIVACY-PRESERVING IRIS RECOGNITION**

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Affiliation: Times NR, 12pt, Italic, Centered, single line space, 10pt space after last affiliation

Biometric recognition plays a vital role in modern identity management and access control systems. The patterns of the structure of the irises are differed and unique to every single person. Also, it keeps a stable structure through the whole life of an adult. These properties make good interest towards using iris as a biometric trait for authentication or identification of individuals. There are numerous research works have been done on developing novel approaches to authenticate legitimate users while keeping their privacy based on two main technical streams; Feature Transformation Techniques and Biometric Cryptosystems. Though these techniques are theoretically sound, they rarely guarantee the required non-invertibility and non-linkability properties, whereas revocability is realized quickly.

Body Text: Times NR, 12pt, justified, 1.5 line space, 10pt space after each paragraph, max 250 words

By following feature transformation techniques, we propose an effective biometric recognition system for iris templates based on XOR function, while protecting the privacy of these iris templates. As a new method to transform extracted features, we use XOR function to encode an original iris code into another representation. An application specific key is XORed with each column of input iris vector; then each column is XORed with its adjacent columns up to the desired number of rounds.

Compared to the recognition performances of the other existing works, we have succeeded to come to closer recognition performances of existing works. The morsel value of probability to rebuild the original iris template of a single subject from enrolled iris bit vector templates in either single application or different applications, ensures the irreversibility and renewability. The use of application specific key within the approach ensures the unlinkability. The final results of the research are fairly positive. The study opens for future enhancements.

Key words: maximum five keywords

**Key Words:** Biometric Recognition, Privacy Protection, Iris, Feature Transformation Technique, XOR