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E-Learning for basic control system / Chan Wai Fong.

E-LEARNING FOR BASIC CONTROL SYSTEM

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APRIL 2009

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E-LEARNING FOR BASIC CONTROL SYSTEM

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This Report Is Submitted in Partial Fulfillment Of Requirements For
of Bachelor In Electrical Engineering (Power Electronics And I

Fakulti Kejuruteraan Elektrik
Universiti Teknikal Malaysia Melaka

April 2009

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"I hereby declared that I have read through this report entitled "E-le
Basic Control Systems" and found that it has comply the partial fulf
awarding the degree of Bachelor of Electrical Engineering (Power El
Drives)"

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To my dearly loved father and mother…

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ABSTRAK

Pembelajaran Elektronik atau E-Pembelajaran merupakan satu istilah sistem pembelajaran yang menggunakan komputer melalui satu rangkaian, memberikan kita semua peluang untuk belajar pada bila-bila masa dan di mana jua berada. Dalam kata ringkas, E-Pembelajaran adalah sistem pembelajaran melalui komputer. Secara keseluruhan, laporan ini disediakan untuk mengkaji pembangunan perisian E-Pembelajaran bagi subjek Asas Sistem Kawalan. Kebanyakan pelajar menghadapi masalah dalam memahami subjek Sistem Kawalan. Maka, perisian ini adalah dibangunkan untuk membantu pelajar lebih memahami konsep asas dalam Sistem kawalan. Untuk mencapai objektif projek ini, perisian Flash Macromedia perlu digunakan dan dipelajari. Flash Macromedia 8 adalah digunakan untuk membina kesan yang menarik serta gambar animasi. Perisian ini akan menggabungkan interaktif grafik dalam nota dan latihan untuk kemudahan pelajar. Tambahan pula, bunyi dan animasi akan diaplikasikan dalam perisian ini untuk lebih menarik. Pada akhir projek ini, E-Pembelajaran Sistem Kawalan ini akan menuju ke sistem pembelajaran yang lebih unik.

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ABSTRACT

Electronic Learning or E-Learning is term that describes learning done at a computer, usually connected to a network, giving us the opportunity to learn almost anytime, anywhere. In simplified, E-Learning is used to describe learning done at a computer. This report presents an overview of the development of E-Learning Basic control systems. It has been found, that students who are faced with the principles of Basic Control System have problems in understanding and dealing with the high complexity of these systems. Therefore, the development of an E-learning application will greatly help students to understand the basic concepts in control system. In order to achieve the objectives, software learning is required that is Flash 8. Flash 8 can used to build attractive effect and animated picture. This software will incorporate interactive and graphical for convenience and user-friendly Control System notes with Assessments, animation including sounds to make the presentation more interesting. At the end of this project along with its unique features, E-Learning for Basic Control Systems is an experience that will leads to comprehension and mastery of new skills and knowledge.

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CONTENTS

CHAPTER	TITLE	PAGE
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	CONTENTS	vii
	LIST OF TABLES	xi
	LIST OF FIGURES	xii
	LIST OF APPENDIXES	xiv
I	**INTRODUCTION**	
	1.1 Objective	2
	1.2 Project Scope	3
	1.3 Project Statement	4
II	**LITERATURE REVIEW**	
	2.1 Introduction	5
	2.2 Review on N.S Nise CD ROM	6
	2.3 Water level Closed-Loop Control	8
	2.4 Research on macromedia Flash 8	9
	2.5 Conclusion	12
III	**THEORY OF BACKGROUND**	
	3.1 Open-Loop System	13
	3.2 Closed-Loop System	15
	3.3 Stability	17

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	3.3.1 Routh Hurtwitz criterion	18
	3.3.1.1 Interpreting the Basic Routh table	19
	3.3.1.2 Zero Only in the First Column	19
	3.4 First order System and Second order Sysem	20
	3.4.1 First Order Time response	20
	3.4.2 Second Order System	21
	3.5 Steady state response	23
IV	**PROJECT METHODOLOGY**	
	4.1 Background study and Literature Review	24
	4.2 Software Learning	25
	4.3 Learning Design/Story Board	25
	4.4 Develop E-Learning Software	25
V	**SOFTWARE DEVELOPMENT**	
	5.1 Introduction	28
	5.1.1 Phase 1: Learning Design and Story Board	28
	5.1.2 Phase 2: Main menu at time frame for each topic	29
	5.1.3 Phase 3: Design suitable background colour and graphic design	30
	5.1.4 Phase 4: Animation design	31
	5.1.5 Phase 5: Functional button	31
	5.1.6 Phase 6: Action script and behaviour	32
	5.1.7 Phase 7: Software testing	33
VI	**RESULT AND DISCUSSION**	
	6.1 Open-loop system and closed loop	35
	6.1.1 Notes and theory of open-loop and closed-loop are collected	35
	6.1.2 Voice generator in open-loop system	36
	6.1.3 Interactive tutorial	37
	6.2.1 Notes and theory of first order and second order system are collected	37
	6.2.2 Interactive notes in second order system	38

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6.2.3 User-friendly calculation 39
6.2.4 Interactive tutorial with solution 40
6.3 Stability : Interactive notes 40
6.4 Discussion 41

VII **CONCLUSION AND RECOMMENDATION**
7.1 Suggestion and recommendations 42
7.1.1 Commercializes E-learning software in market 42
7.1.2 E-learning as teaching material in class 43
7.1.3 User-friendly e-learning tutorial 43
7.2 Conclusion 43

REFERENCE 44

APPENDIXES A-F 45-50

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LIST OF TABLES

NO	TITLE	PAGE
3.1	Different Between Open-Loop And Closed-Loop System	17
3.2	Initial Layout for Routh table	18
3.3	Completed Routh table	19
3.4	Second-order response as a function of damping ratio	22

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LIST OF FIGURES

NO	TITLE	PAGE
2.1	Notes and Assessment	7
2.2	E-learning Closed-Loop System	8
3.1	Open-loop System	13
3.2	Example of Open-loop System	14
3.3	Closed-Loop System	15
3.4	Example of Closed-Loop System	16
3.5	Equivalent closed-loop transfer function	18
3.6	First order System and Poles Plot	20
3.7	First-order system response to a unit step	20
3.8	Step responses for second-order system damping cases	21
4.1	Project Methodology Flow chart	27
5.1	Main menu for each topic	29
5.2	First order system with attractive colour background	30
5.3	Animation of stability system	31
5.4	Step by step for tutorial	32
5.5	Example of action script for next button	33
5.6	E-learning software development flow chart	34
6.1	Closed-loop notes in flash document	36
6.2	Text-voice of open-loop system	36
6.3	Interactive of Open-loop system tutorial	37
6.4	First-order system notes in flash document	38
6.5	Animated second order system response	38
6.6	User-friendly calculation for first–order system	39

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6.7	User-friendly calculation for second-order system	39
6.8	Solution in tutorial for first-order system	40
6.9	Interactive stability notes	41

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LIST OF APPENDIXES

NO	TITLE	PAGE
A	Main menu scene	45
B	First-order system notes	46
C	Tutorial scene	47
D	Solution scene	48
E	Tutorial for Open Loop System	49
F	Tutorial for Closed Loop System	50

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CHAPTER I

INTRODUCTION

Electronic learning (E-Learning) is a type of education where the medium of instruction is using computer technology. E-learning is used interchangeably in a wide variety of contexts. E-Learning can also refer to educational web sites such as those offering learning scenarios, worksheets and interactive exercises for children. The term is also used extensively in the business sector where it generally refers to cost-effective online training. In most Universities, e-learning is used to define a specific mode to attend a course or programme.

This project is to develop e-learning software for Basic Control Systems with notes, assessment or tutorial for students. Most of the teaching sources used are based on Microsoft Office Power Point animation and simple notes. Students feel bored and can't concentrate after a long time sitting and listen to lecture. Therefore, this software is generally designed to guide students to comprehend this subject.

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1.1 Objective

In order to develop this project successfully, there are few objectives are evaluated. The objective of this project is determine the learning object and come out with its outcomes. Learning object deals with a very specific item of knowledge: educational content, a problem to be solved through or evaluation exercises. In this project, we hope that students able to understand the learning of each chapter and come out with its outcomes and also able to acquire the concept or skill and the tasks to be performed.

The main objective of this project is to develop an E- learning application for Basic Control Systems with notes and theory using Macromedia Flash. Flash Macromedia 8 can used to build attractive effect and animated picture. This software will be used throughout the whole process of this project. This software is develop using sounds effect. This project is built with some sound effects and music to make this e-learning more attractive and presentation more interesting

Secondly, this project will involve incorporate interactive and graphical for convenience and user-friendly notes for students. Animation and attractive diagram will attract students in this subject at the same time it can instill interest in students in this subjects. Examples and tutorials are added by the end of each chapter for student's understanding.

Lastly, the combination of all elements above will develop an interactive, convenience and user-friendly technique E-learning software. With its unique features, this project will greatly help students to understand the basic concepts in Control System.

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1.2 Project Scope

In this project, E-learning software is develop to help students to master Basic Control System subject. This project will involve incorporate interactive and graphical for convenience and user-friendly notes for students. Animation and attractive diagram will attract students in this subject at the same time it can instill interest in students in this subjects. Tutorials are added by the end of each chapter for student's understanding.

Macromedia Flash 8 is studied and used to build attractive effect and animated picture. This software will be used throughout the whole process of this project. This software is develop using sounds effect. This project is built with some sound effects and music to make this e-learning more attractive and presentation more interesting.

The topics that will involve are open loop system, closed loop system, first order system, second order system, transient response (peak time, settling time, rise time, percent overshot, and damping ratio), steady-state response and stability.

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1.3 Problem Statement

It has been found, that students who are faced with the principles of Basic Control System have problems in understanding and dealing with the high complexity of these systems. Many Students feel that they could not comprehend the Control System Subject because too many formula need to applied in this subject. Besides that, many students faced problem in memorizing long notes. Therefore, student need early exposure so that they able to understand rather than memories a subject.

Teaching material play an important role in order to make sure the student get the learning outcome of each topic they studied. Most of the teaching material is based on simple power point slides show where most of the students feel that the materials are not effective. Most of the notes that are given in class are hard to understand and tutorial those students don't understand. Therefore, teaching material should insert some animations and sounds so that it will be more interactive for students.

Sounds recording based on the notes will create more interactive effects. Students will be more attractive to this new software and this will somehow instill student's interest in Control System and help students to solve Control System tutorial. Therefore, this user-friendly software is developed to ease students.

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CHAPTER II

LITERATURE REVIEW

This chapter review existing intellectual articles, books and other sources such as Internet or conference held relevant to a particular issue, area of research, or theory, providing a description, summary, and critical evaluation related with Basic Control System. This literature review includes studies and research on reference book, internet and also lecturers.

2.1 Introduction

Nowadays, computers are used commonly as learning medium. As we know, learning through Internet and Compact Disc are more easy compare to lesson done in class as it is more interactive and user-friendly. Besides that e-learning is one of he most convenient learning material as e-learning allows users to learn anywhere and anytime.

However, few e-learning on markets shows some weakness and need to modified to achieve the objectives of this project. Besides that, there are also pro and cons on previous project that need to take in account as reference. All the weakness and downfall of the previous project will be discussed to improve this project.

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In order to achieve e-learning of Basic Control System effectively, few previous project and modules are discussed. It is discussed so that the weakness of the previous project can be corrected and improve for a better future e-learning.

- N. S. Nise, Control Systems Engineering, Fourth Edition, Wiley, New York, NY, 2004 (CD ROM)
- Water level closep-loop control (http://www.atp.rub.de/DynLAB/dynlabmodules/Examples/WhatIs Control/WaterLevel5.html)
- "A Critical Literature Review on e-Learning Limitations" by Dominic Wong. (This journal is about the limitations in e-Learning)

2.2 Review on N. S. Nise, Control Systems Engineering, Fourth Edition, Wiley, New York, NY, 2004 (CD ROM)

This e-learning is built in a compact disc (CD-ROM) which is came along with a Control System engineering references book which is mostly used by students and lecturers of UTeM in Control System subjects. There are pros and cons that need to be studied to develop this project. From the researches, there are few results that can be benefit.

- Notes and theory are presentable and easy to understand – This e-learning developed in a CD-ROM contains texts and theory which are presentable. The notes and explanation are details and clearly stated. It uses simple notes and application. The contents combine application of theory and practical.
- Complete tutorials – This e-learning not only comes with notes, it also inserted with tutorials with each solution for each question.

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There are also few weakness found in this e-learning. Such as:-

- There are too many texts in notes – In this e-learning there are many texts are used in notes. Too many texts somehow will make students feel bored in reading long sentences and student might find it hard to understand as they start to lose concentration.
- Unattractive colours and background – In this e-learning, the background colour used are too normal i.e white as the background and black as the word fonts. In order to overcome this problem, this project will contains light brown as the background and blue and red as the words colour to create more attractive effects.
- Less interactive e-learning – E-learning is defined as one of the learning medium which involved interactive between students and the study material. In this e-learning, it can be found that it is less interactive to develop student understanding. Less animation and sounds in notes make this e-learning less interactive for students to comprehend this subject. In order to overcome this problem, this project is developed with animation and sound for students to create and instill student's interest in this subject. Figure 3. 1 shows unattractive and less interactive notes and tutorials.

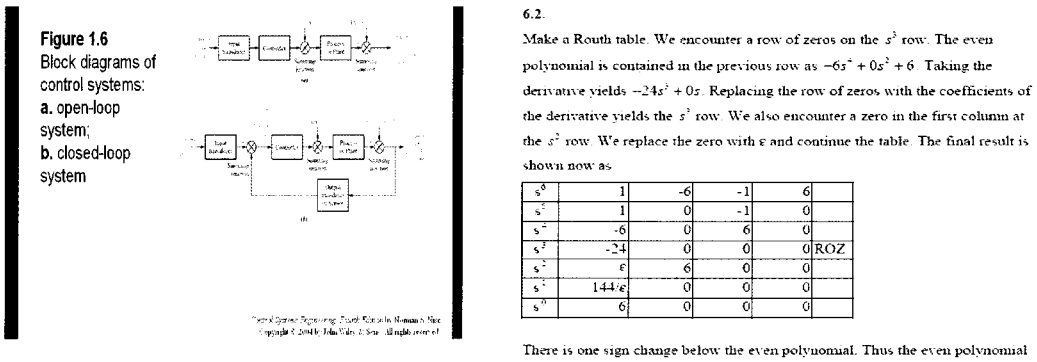

Figure 1.6
Block diagrams of control systems:
a. open-loop system;
b. closed-loop system

6.2.

Make a Routh table. We encounter a row of zeros on the s^3 row. The even polynomial is contained in the previous row as $-6s^4 + 0s^2 + 6$. Taking the derivative yields $-24s^2 + 0s$. Replacing the row of zeros with the coefficients of the derivative yields the s^3 row. We also encounter a zero in the first column at the s^2 row. We replace the zero with ϵ and continue the table. The final result is shown now as

s^6	1	-6	-1	6	
s^5	1	0	-1	0	
s^4	-6	0	6	0	
s^3	-24	0	0	0	ROZ
s^2	ϵ	6	0	0	
s^1	$144/\epsilon$	0	0	0	
s^0	6	0	0	0	

There is one sign change below the even polynomial. Thus the even polynomial

Figure 2.1 : Notes and Assessment

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2.3 Water level closep-loop control (http://www.atp.rub.de/DynLAB/dynlabmodules/Example/WhatIsControl/WaterLevel5html)

This water level closed-loop control E-learning is presentable. The animation of the water level is attractive. However, it only comes with simple notes and interactive examples for Closed-Loop systems (not applicable for other topic) and it does not provide tutorial by the end of the chapter. Figure 3.2 shows the e-learning online of closed loop control system.

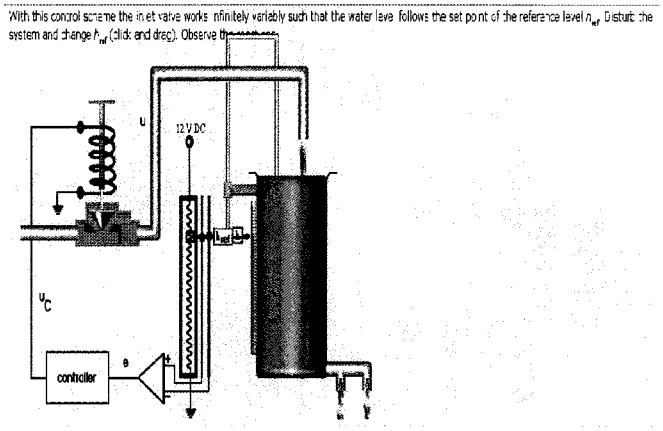

Figure 2.2: E-Learning Open-Loop System

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2.4 Research on Macromedia Flash 8

Macromedia Flash Professional 8 is a powerful development tool that offers tremendous capabilities. It features amazing graphic effects, integrated and stand-alone video encoding complete with support for alpha transparency, high-quality text rendering with advanced anti-aliasing control, text tools, and a new video plug-in. Flash has several key benefits, including small file sizes, fast downloading speed, precise visual control advanced interactivity, the capability to combine bitmap and vector graphics and include video and animation, and scalable and streaming content.

Flash is commonly used to create animation. Flash has become a popular method for adding animation and interactivity to web pages. Flash can manipulate vector and raster graphics and supports bi-directional streaming of audio and video. It contains a scripting language called ActionScript. an implementation of the ECMAScript standard which therefore has the same syntax as JavaScript, but in a different programming framework with a different associated set of class libraries. ActionScript is used to create almost all of the interactivity (buttons, text entry fields, drop down menus) seen in many Flash applications. Files in the SWF format, traditionally called "ShockWave Flash" movies, "Flash movies" or "Flash games", usually have a .swf file extension and may be an object of a web page, strictly "played" in a standalone Flash Player, or incorporated into a Projector, a self-executing Flash movie (with the .exe extension in Microsoft Windows). Flash uses pogramming languages such as PHP, JAVA, XML and etc. Flash can combine with 3D Studio Max, Lighwave, Anime Studio to creates character animation and used to authoring environment for creating interactive websites, digital experiences and mobile content.

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