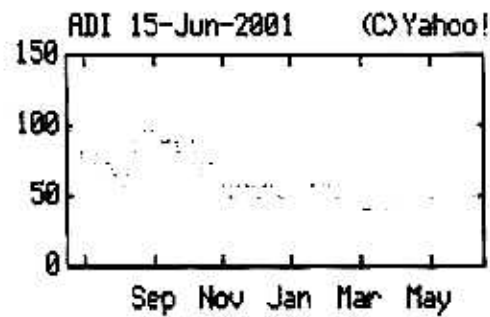
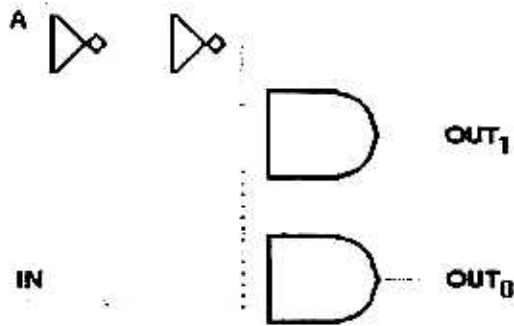




MULTIMEDIA PRESENTATION ON DIGITAL LOGIC



By

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“ In partial fulfillment of the degree of Bachelor of Management of
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DEDICATION

To my parents, whose love and wisdom have enriched my life, may GOD bless them.

To GOD, whose care and guidance have been my towers of strength.

ACKNOWLEDGMENT

Much of my effort involved in the writing of the report was backed by those who gave their time, knowledge, or support to this project. I gratefully acknowledge my supervisor, Mr Adli, who was always giving me encouragement, guidance and he was very understanding.

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Fatimah Sumet Bunyarit

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ABSTRACT/SUMMARY

This project is cover the fundamental topics associated with digital system design, ranging from binary information to system controllers. The project focuses on system presentation, design methodology and some practical examples. Student will gain an appreciation for diversity of a base set of knowledge of the theory and practice of digital logic design.

The objective of this project is, the development of digital electronics as a distinct electronics field has strong links to the growth of the computer industry and to prototype a component-based digital simulation environment using the Macromedia director 8 software. The system created is made up of some dialog boxes, drawing of gates and truth tables, and other multimedia elements. It is not an easy to master the macromedia director program, especially the learning stage it was the most difficult, that needed much time as well as consultation.

Finally, there are some supplementary materials at the appendices; they are the screen print of some stages and some examples of digital logic software.

RESEARCH METHODOLOGY:

The research can be divided into two folds:

- 1 Theoretical (gathering knowledge and idea about the whole concept)
- 2 The implementation of the concept by using the multimedia and computer tool.

The methods can be implemented simultaneously as follow:

- Carrying out the survey and identifying the problems.

- Studying the existing multimedia systems and tool like (Multimedia PCs, Internet access, Multimedia authoring tools such as macromedia packages, Graphics software such as PhotoShop, CD-R/W (read and writing).
- Software (Windows Operating System, Multimedia Director software, and Microsoft office).
- Hardware (Computer PC and printer HP)
- Writing the report based on he survey and the concepts.
- Using the programming and implementing the concepts (lingo language).
- Testing the product.
- Any further enhancements and development.

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Chapter One: Introduction

1.1 Introduction to digital logic:

1.1.1 Number we use in digital electronic:

Most people understand when we say we have nine pennies. The number 9 is part of the decimal number system we use every day. But digital electronic devices use a "strong" number system called binary. Digital computer and microprocessor-based systems use another strong number system called hexadecimal. Men and women who work in electronics must know how to convert numbers from the everyday decimal system to the binary or to the hexadecimal system. Some older computer systems use octal numbers to represent binary information.

Decimal	Binary	Hexadecimal	Octal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	8	10
9	1001	9	11
10	1010	A	12
11	1011	B	13

12	1100	C	14
13	1101	D	15
14	1110	E	16
15	1111	F	17
16	10000	10	20
17	10001	11	21

1.1.2 Gate and Boolean algebra:

Five fundamental logic circuits-AND, OR, INTERVERTER, NAND, and NOR gates. From the basic building blocks for digital design. The term "gate" is used to describe any of the basic logic circuits. The application of the term gates will become evident, as your knowledge of their application unfolds. Electronically, this gate has been built over the years around relay, vacuum tube, diode and transistor circuits. Some well prove designer have evolved into integrated circuits logic families that greatly reduce the design complexities facing the digital logic designers. The basic gates have also been constructed to operate using water, light or air pressure rather than electricity, and future possibility of organic logic gates is being investigated. In any case, regardless of the technology used to implement the logic itself, the concept of what an AND, OR, ONVERTER, NAND OR NOR gate in intended to lay function on which we can progress to more complex logic designs.

1.1.3 How to use logic gates:

We will not go down to a computer store, buy an AND gate and expect to do any significant computing. However, the various gates we have begun to study are the building blocks to bigger and better things. In fact, such simple functions can be combined to produce the computers, control systems and other sophisticated systems to which we have become accustomed. In general, logic circuits are designed to be connected so that the output of one gate feeds into the input of another gate. An AND gate output feeding an OR gate input, from an AND gate output feeding an OR gate input, from an electronically point of view, the manufacturers have already designed the gates' internal circuitry to accept this kind of connection easily. For now, we just note that a logic gate output can feed more than one logic gate input and that the connections are made simply by attaching a wire between outputs and inputs. A **Boolean algebra** expression is a mathematical way to summarize the effects of a logic circuit on input variables, but attempting to determine how the input variables are logically modified on a gate-by-gate basis. For example, the input variables A and B are immediately ANDed in the circuit, therefore the output of the AND gate is AB. Writing this down on the schematic near the output of the gate will help to keep track of the circuit data flow. The output created by the AND gate now becomes an input to the 2-input OR gate. The term AB still has only two possible binary inputs, which implies that the input is obtained from some previous logical operation; it does not mean that more than two binary levels are possible. The second input to the OR gate comes directly from input C. Thus, input C is ORed with input AB, resulting in the output $Y=AB+C$. Examine the expression $Y=AB+C$; notes that the Boolean representation for the OR function (+) is clearly evident. The AND operation is also indicated. The OR gate

only a 2-input gate, you can easily understand how the C input feeds the Or gate since C is a single input variable, but we should also notice that the OR gate input must be written as a more complex term since it comes from a logic output rather than from a direct input variable.

1.1.4 Why use digital circuits:

Electronic designers and technicians must have a working knowledge of both analog and digital systems. The designer must decide if the system will use analog or digital techniques or a combination of both. The technician must build a prototype or troubleshoot and repair digital, analog and combination systems.

Some of the advantages given for using digital circuitry instead of analog are as follows:

1. Inexpensive ICs can be used with few external components.
2. Information can be stored for short period or indefinitely.
3. Data can be used for precise calculations.
4. System can be designed more easily using compatible digital logic families.
5. System can be programmed and show some manner of intelligence.

The limitations of digital circuitry are as follows:

1. Most real world events are analog in nature.
2. Analog processing is usually simpler and faster.

Digital circuits have become very popular because of the availability of low cost digital ICs. Other advantages of digital circuitry are computer compatibility, memory, accuracy and stability.

1.2 What is Multimedia Director 8:

Macromedia Director 8 is the best selling multimedia authoring program and the leading tool for creating interacting media for the World Wide Web, CDs, information kiosks, presentation and interactive TV. A director is easy to use because it is combine graphics, sound, video and other media in any sequence and then add interactive features with lingo, the program's powerful scripting language. This Macromedia guides us to step by step through the development of several real-world Direct projects, and cover the fundamental of creating interactive multimedia that includes graphics, text, animation, sound, and digital video, provides with ability to take more control of the multimedia elements used in Director projects and in the process of learning Lingo, you will learn how to include interactivity, provide navigation through projects and manipulate graphics, text, sound and video. Is a short course in interactive moviemaking using Macromedia Director 8, the powerful, cross-platform application, and Lingo, the object-oriented scripting language. Learn to use Director 8 at your own pace by following the book's manageable step-by-step sessions, which make up over 50 hours of hands-on instruction involving real-world multimedia and Internet productions.

1.3 Project Objectives and Scope:

The main purpose of this project and research is to explore means of producing a multimedia title to help the students in achieving better performance, gain better understanding to the taught subject.

Addition to that the following objectives are:

1. To assist in educating and teaching students how to understand better by using of images, sound animation etc.
2. It could be used for educative purposes in educational institutions such as smart schools (computer based schools).
3. It is the easy way for the student to understand how to convert the Boolean to circuit and circuit to truth table or another way around.
4. Understanding digital logic level is very important, because it is the basic element of the computer hardware for the study of higher levels.
5. It contains random test in order to test students' understanding.

1.4 Statement of Problems:

Students, who understand how to design logic systems from basic gate structure to complex systems using the fundamental aspect of logic design rather than prepackaged building blocks, become innovative creative logic designers. If the student wish to implement the function using redesigned parts, the task will be easy. If student wish to create the function using more advanced logic technologies, the task will still easy because the designs approach is still based on fundamentals. The students are taught how to design using logic concepts as their guide. Learning using the conventional way has many limitations for example, learning from the books and listening to the lecturer he/she will feel bored and loose interest because sometimes they can't understand everything that written in the books without demonstration, but because of the interactive nature of the multimedia, the students will learn faster.

The university/institute's philosophy is that new technologies should be used in the most appropriate way to provide a quality flexible learning experience for students. Using multimedia in teaching and learning will focus on the needs of the learner:

- What and how do we want students to learn,
- What and how do students want to learn,
- What is the best learned in face-to-face teaching,
- What is best learned with technology?

Chapter Two: Literature Review

2.1 Survey

The survey for this project is based on observing some few products, which is available in the market, conducted some compare and contrast in the features of the product and the efficiency of using them. The survey is also based on the journal publishes research papers and occasionally surveys or exposition on digital logic from other related areas, such as theoretical computer science or philosophy, as long as the digital logic play a significant role. Also there are some as electronic newsletter and www services called "Colibri" that aimed at people interested in the field of natural language processing speech processing and/or digital logic.

It is difficult to attend any conference, read newspapers/journals etc in the area of higher education without hearing or reading about the use of new technologies (such as multimedia) to replace face-to-face teaching. There are several approaches to using multimedia in teaching and learning:

1. **Multimedia Teaching Materials for Electronic Design Software: Novel**
multimedia teaching materials will be developed to allow students to learn modern electronic design methods while addressing manufacturing issues. The materials will be built around three commercial computer-aided designs, and printed circuit board design, from industrial partners Altera, Microchip and PADs, respectively. The materials will consist of videos, written materials and software design examples, such as which will be available on the World Wide Web for broad dissemination. This is a continuation and expansion of an earlier

effort supported by industry and the academy for integrating manufacturing into upper-level computer design courses.

2. **Objective and Motivation:** This course describes the development of new multimedia for teaching about manufacturing in ECE design courses. The original teaching materials were developed with Academy support in the 1995.

The objective of this is creating new teaching materials for three CAD software packages that were recently in a senior computer design lab course. By making this commercial software package available to student, the students are exposed to the manufacturing issues in the three facets of electronics system design. In particular design for manufacturing, testability, reliability and quality are addressed. CAD package provide designers with the ability to analyze the cost, performance and reliability of their systems prior to fabrication, thus allowing them to optimize and verify that specification are met.

2.2 Existing Digital logic softwares

There are many types of digital logic simulation software:

Unix:

The digital logic simulation software available in the solarium is chipmunk.

MacOS and Windows:

Logic Works is an integrated schematic editor/ logic circuit simulator. Addison-Wesley and its resellers, including Computer Literacy Bookshops, sell logic Works, with complete documentation. Libraries available for logic Works include the 7400 device series, along with many others.

Windows only:

Digital simulation is a point-and-click schematic generator/ logic simulator for Windows 95 or Windows 3.1. It's free to students and people who work for educational institution.

MMLogic is a point-and-click schematic generator/logic simulator for Windows 95 (or Windows 3.1, if you have Win32). Currently a beta test version is free.

Digital Simulation has a toolbar of digital circuit elements, including logic gates, flip-flops, switches and indicators. Drawing a circuit with Digital Simulator is like using a paint program; you just click the element's icon on the toolbar, and then click where you want the element to go. There is a similar procedure to draw wires and indicate connections. Digital Simulation is a full-featured program. Its features include:

Emulation of a wide range of devices, logic Analyzer, Hypertext On-line Help, and design size limited only by memory and disk space.

MacOS only:

Logic Sim is a very useful, easy-to-use schematic generator and logic simulator for Macintosh.

Java (Unix / MacOS / Windows 95 only):

The university of Hamburg, Germany has developed an excellent set of Java applets that demonstrate the principles of CMOS devices and gates.

Beige Bag Software:

Electronic Circuit Design & Simulation Software for Windows and Macintosh. B2 Spice A/D 2000 is a fully featured mixed mode simulator that combines powerful capabilities with a deceptively easy to use interface. mixed mode more parts- 4400 analog and digital

parts including BSIM3 support 16 powerful simulations and an interactive digital mode integrated symbol/ device editor and a separate parts database editor custom graphs and plots and much much more....

Digital logic Fault Simulation:

From Epax Software Incorporated, Epax Software Incorporated develops and markets software for digital logic fault simulation and test generation. The company has extensive experience in concurrent fault simulation, and in IDDQ test generation. Recent advances in workstation and server hardware have made full fault simulation of very large ICs truly feasible. However, many older fault simulations do not take full advantage of the new host technology. Epax is currently developing a high- speed, high capacity, and multithreads concurrent fault simulation for use on multiprocessor systems.

Java CMOS gate Demonstration:

This demonstrates how CMOS translators and basic gates work, in CMOS technology, both N-type and P-type transistors are used to realize logic functions. CMOS technology the dominant semiconductor technology for microprocessors, memories and application specific integrated circuits (ASICs). This applets demonstrate the N-type and P-type transistors used in CMO technology, the basic CMOS inverter, NAND and NOR gates, and an AOI32 complex gate. Finally, it demonstrates the CMOS transmission –gate and a transmission D-lat

2.3 This table is to compare and contrast between the software in terms of OS,

Version, description and price:

Name of Software	OS	Version	Description	Price
1- Digital logic Simulation.	Unix	N/A	The digital logic simulation available in the Solarium is chipmunk	N/A
2-Logic Works.	Mac and Windows	3.0.x-3.0.3 (2.3MB, Binary) For Windows. 3.0.x-3.0.3 (72KB,text) for Mac.	Is an integrated schematic editor/logic simulator, with complete documentation.	N/A
3-Digital Simulator	Windows	Window 95 or Windows 3.1	Is a point-and-click schematic generator/logic simulator.	It's free.
4-Logic Sim	Mac	The Motorola 680x0	Is a very useful, easy to use schematic generator and logic.	N/A
5- CMOS	Unix, Mac, Windows 95	N/A	Has developed by set of java applets that demonstrate the principle of devices and gates.	N/A
6- Beige Bag (Electronic Circuit Design and	Windows and Mac	B2 Spice 2 and B2 logic	Is a full-featured mixed mode simulator that combines powerful capacity with a	\$299

simulation)			deceptively easy to use.	
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* **Remark:** this is just basic information for each software, in order to download the whole software it's required a lot of money that I couldn't afford.

The only software I could review was Digital Works, see and view the copy on Appendix D

After researching many papers and journals of related topics, I have set up some important projects of digital logic simulations:

1. This project is to prototype a component-based digital simulation using java. Traditionally, mapping the behavior of the entire digital system into machine-dependent executable program creates digital simulation. In this new approach, they break up the top-level digital system into many smaller function blocks hierarchically: the behavior of each block is encapsulated into a design object called *component*. The complete simulation at the top level can be viewed as many self-simulation components concurrently interacting with each other at their own level of abstraction. Because of its inherent modularity and distributability, the simulation environment based on the new approach excels the traditional single-simulator approach in terms of the adaptiveness to the rapid-evolving design style. In addition, they approach could potentially improve the simulation performance via the efficient leverage of the numerous computing resources across the network. Java is the language of they choice, for it provides platform-independent software environment for distributed systems

2. The journals intended to provide a forum for articles in which classical philosophical texts are interpreted by drawing on the resources of modern formal logic. By implementing logical analysis as an instrument of interpretation, the interpretive focus shifts from the more common, purely exegetical approach towards a given text to the systematic reconstruction of a theory encompassing the pertinent issues discussed.
3. International journal for the History of mathematical foundations of mathematics servers as a vehicle for rapid publication of high-quality historical studies and expository surveys of nineteenth and twentieth century mathematical logic, set theory and foundations of mathematics. They strive to represent every major area of mathematical logic, including model theory recursion theory, algebras, general set theory and point set theory, proof theory and constructive mathematics.
4. View of electricity CD-ROM by mark Cosgrove from UTS was developed after several years of research which revealed that students are very good at solving problems which require putting numbers in equation and calculating an answer. The CD aims to help students understand what electricity is
5. StayPlay: was developed by Geoff and Neil to help students overcome their naive statistical beliefs about central statistical concepts.
6. Remote fieldwork is one area of research and development, the research was on environment and health risk associated with a uranium mine tailing in the Elliot Lake region of Northern Ontario.

This kind of learning experience uses technology to enable effective individualized learning, where the most effective kind of learning experience for that student, for that

content. And then, selecting the most appropriate technology to use, be it a book, a videoconferences or a multimedia simulation. It is only through these large-scale changes however, that we will realize the full potential of new technologies to do more than repackage old, unsuccessful learning experiences.