A SECURED BIOMETRIC ATTENDANCE SYSTEM (THUMSEC SYSTEM) WITH ACCESS LOCK CONTROL

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HEMALATHA D/O APADORE

This report is submitted in partial fulfilment of the requirements for the Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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2011

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I hereby declare that this project report entitled

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DEDICATION

To my beloved parents, Apadore Karian and Ayamah Subbiah for their seems less expressions and love and fully support....

To my supervisor, Madam Syarulnaziah bt Anwar, for making it all worthwhile...

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ABSTRACT

This project presents a secured biometric exam attendance system (ThumSec System) to monitor and control attendance of the student in UTeM exam hall. This system mainly focuses on the effective way of managing and organizing the security aspect in verifying student attendance. ThumSec System is based on image processing technology to recognize and verify the thumbprint sample which is recorded into the system database. This project used Thumbprint scanner that interfacing between server and Peripheral Interface Controller (PIC) to control the Electro-Magnetic Lock on the door. Testing was conducted across heterogeneous characteristics of test participant such as age, gender, and occupation. In addition, different type of input materials is tested to evaluate ThumSec input forgery. The system can also be applied to monitors student attendance in lab and lecture session. The project successfully monitors the attendance of the student in highly secured, effective and timely manner.

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ABSTRAK

Projek ini membentangkan satu sistem kehadiran peperiksaan yang dijamin biometrik (Sistem ThumSec) untuk memantau dan mengawal kehadiran pelajar di dalam dewan peperiksaan UTeM. Sistem ini tertumpu kepada cara berkesan dalam mengurus dan mangatur aspek kelselamatan dalam pengesahan kehadiran pelajar. Sistem ThumSec adalah berdasarkan teknologi pemprosesan imej untuk mengiktiraf dan mengesahkan sampel cap ibu jari yang direkodkan ke dalam pangkalan data sistem Projek ini menggunakan pengimbas cap ibu jari dan menjadi antara muka antara pelayan dan *Peripheral Interface Controller* (PIC) untuk mengawal *Electromagnetic Lock* (EM Lock) pada pintu. Pengujian telah dijalankan di seluruh ciri-ciri heterogen peserta ujian seperti umur, jantina dan pekerjaan. Di samping itu, jenis bahan-bahan input diuji untuk menilai pemalsuan input ThumSec. Sistem ini juga boleh digunakan untuk memantau kehadiran pelajar di dalam sesi makmal dan kuliah. Projek ini telah berjaya memantau kehadiran pelajar dengan cara yang sangat selamat, efektif dan menjimatkan masa.

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TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	ACKNOWLEDGEMENTS	iii
	ABSTRACT	iv
	ABSTRAK	v
	TABLE OF CONTENTS	vi
	LIST OF TABLES	x
	LIST OF FIGURES	xi
CHAPTER I	INTRODUCTION	1
	1.1 Project Background	1
	1.2 Problem Statements	2
	1.3 Objective	4
	1.4 Scope	5
	1.5 Project Significance	6
	1.6 Expected Output	6
	1.7 Conclusion	7
CHAPTER II	LITERATURE REVIEW AND PROJECT METHODOLOGY	8
	2.1 Introduction	8
	2.2 Literature Review	9
	2.2.1 Domain	9
	2.2.2 Keyword	10
	2.2.3 Previous Research	11
	2.2.3.1 Review	11

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	2.2.3.2 Data Collection	12
	2.2.3.3 Technique	12
	2.2.3.4 Software Requirements	13
	2.2.3.5 Hardware Requirements	13
	2.2.3.6 Network Requirements	13
	2.3 Discussion	13
	2.3.1 Project Methodology	14
	2.4 Project Schedule and Milestone	17
	2.5 Conclusion	18
CHAPTER III	**ANALYSIS**	**19**
	3.1 Introduction	19
	3.2 Problem Analysis	20
	3.2.1 Current Scenario	21
	3.3 Requirement Analysis	22
	3.3.1 Functional Requirement	22
	3.3.2 Non-Functional Requirement	23
	3.3.3 Other Requirement	23
	3.4 Conclusion	26
CHAPTER IV	**DESIGN**	**28**
	4.1 Introduction	28
	4.2 High-Level Design	28
	4.2.1 System Architecture	29
	4.2.2 Navigation Design	29
	4.2.3 Input Design	30
	4.2.4 Output Design	31
	4.2.5 Database Design	33
	4.2.5.1 Conceptual and Logistic Database Design	33
	4.3 Detailed Design	37
	4.3.1 Software Design	38
	4.3.1.1 Data store	38

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	4.3.2 Physical Database Design	39
	4.3.2.1 Data Definition Language (DDL)	39
	4.4 Conclusion	40
CHAPTER V	**IMPLEMENTATION**	**41**
	5.1 Introduction	41
	5.2 Software Development Environment Setup	42
	5.2.1 Software Setup	43
	5.2.2 Hardware Setup	43
	5.3 Software Configuration Management	44
	5.3.1 Configuration Environment Setup	45
	5.3.2 Version Control Procedure	45
	5.4 Implementation Status	48
	5.5 Conclusion	48
CHAPTER VI	**TESTING**	**50**
	6.1 Introduction	50
	6.2 Test Plan	51
	6.2.1 Test Organization	51
	6.2.1.1 False acceptance rate (FAR) vs. false rejection rate (FRR)	53
	6.2.2 Test Environment	54
	6.2.3 Test Schedule	55
	6.3 Test Strategy	56
	6.3.1 Classes of tests	56
	6.4 Test Design	58
	6.4.1 Test Description	58
	6.4.2 Test Data	59
	6.5 Test Result and Analysis	62
	6.5.1 Gender and Age	63
	6.5.2 Occupation	64
	6.5.3 Material	63
	6.5.4 Discussion System Performance	64

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	6.6 Conclusion	65
CHAPTER VII	**PROJECT CONCLUSION**	**66**
	7.1 Observation and weaknesses and strength	66
	7.1.1 Strengths	67
	7.1.2 Weakness	67
	7.2 Proposition for Improvement	67
	7.3 Contribution	68
	7.4 Conclusion	69
	REFERENCES	70
	APPENDIXES	72

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LIST OF TABLES

TABLE	TITLE	PAGE
2.1	Project Milestone	17
3.0	Specification of computer device	25
4.1	Input Design for Interface	29
4.2	Output Design for Interface	31
4.3	Data type that is use to create table Using Microsoft SQL 2005	33
4.4	First Normalized Form	34
4.5	Second Normalized Form	34
4.6	Third Normalized Form	35
5.1	Hardware Setup	43
5.2	Check in and Checkout table from one version to another	47
5.3	Activity Schedule	48
6.1	Test Organization	51
6.2	Test Facilities Component	54
6.3	Test Schedule	54
6.4	Classes of Test	56
6.5	Security testing for Student Verification Module	57
6.6	Stress testing for Attend Class Module	57
6.7	Test Data for Student Registration Module	59
6.8	Test Data for Attend Class Verification Module	60

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LIST OF FIGURES

FIGURES	TITLE	PAGE
2.0	Software Development Life Cycle	14
3.1	Use Case Diagram of Thumbprint Based Authentication	23
4.0	The Architecture of the system	29
4.1	Navigation Flow	30
4.2	Entity Relationship Diagram	33
4.3	Sequence Diagram of Thumbprint based Authentication	37
5.1	System Architecture of ThumbSec System	42
5.2	Hardware Setup	44
5.3	Tracking of Source Code Version by Window	46
5.4	Process of door open and close	47
6.0	Age and gender of volunteer crew	52
6.1	Finger Impression on Glass Table	61
6.2	Finger Impression on paper	61

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LIST OF APPENDIX

APPENDIX	TITLE	PAGE
A	Proposal	72
B	Gantt Chart	76
C	User Manual	78
D	Hardware Description	85

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CHAPTER I

INTRODUCTION

1.1 Project Background

In this rapid advancement of technology, there is always something new in almost everything we see. Door locks are not an exception. Biometric access control is becoming the foundation of an extensive array of highly secure identification and personal verification solutions. With thumb print door locks increasing in popularity, it would not be long enough before we no longer see door keys, padlocks and chains used to secure doors.

Biometric personal authentication uses data taken from size. Such data is unique to the individual and remains so during one's life. This technology has been applied for controlling access to high-security facilities, but it is now being widespread developed in information systems such as network, e-commerce, and retail applications. In this technology, fingerprint becomes the most mature and popular biometrics technology used in automatic personal identification. The reason for the popularity of fingerprint verifying is that fingerprints convince uniqueness, stability, permanency and easily taking. Just for this, a number of fingerprint verification approaches have been proposed until now.

A thumb print door lock is a high-tech security system that uses adapted human features to permit access. With thumb scanner, access can be granted through voice recognition, oral scan, full face scan, fingerprint, and hand scan. It provides a

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lot of ease in terms of opening doors. No need to use keys, PIN codes, magnetic swipe cards, etc. You can open the biometric door lock with presently a touch of your hand, a fingerprint, or just the sound of your voice.

This project will propose which has been, a secured biometric attendance system (ThumbSec System) was developed for validating, monitoring and controlling the security within buildings. The ultimate purpose of developing a security system is to enforce security features of the entire building structure, equipped with appropriate management control, particularly is to secure all entrance doors within the entire building. The ThumbSec System is using fingerprint to solve problems of illegal breaking and entering that are commonly happened due to lacking of attention to the security issues. Furthermore, this system focuses on the security and safety of the lab, class room and lecture room precisely the effective way of managing and organizing the security and works with the attendance of the students in faculty and also helps out on students exams attendance in secured.

In order to manage more secured laboratory in faculties, ThumbSec System are implemented to identify and notify lab users in faculty. Besides that, ThumbSec System also will control every entrance of the students in faculty included laboratory entrance. ThumbSec System based to use image processing technology to recognize the thumbprint sample which recorded in the system database. Every user should register them to access through the laboratory. The lab door only will open if your thumbprint recognized by the system through the database. By having ThumbSec System, all the observation criteria will be carried out in the system and the result will be shown very quickly. Therefore provides better security efficiency for all laboratories, faculty and classes for faculty.

ThumbSec System will register the students according to faculty, course, course code and subject code. All the details will be registered and verify securely by using the students fingerprints. Once the students register in the system, it will automatically load all the details when the students scan their fingerprint to attend the laboratories or exams. In order to open the door of the lab also it will load the student's data and verify the details of the student to open the door of lab.

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Furthermore, in the case of exams for the student, the attendance of the student will be captured by ThumbSec System from the fingerprint scan into the system.

1.2 Problem Statement

In the case of attendance controlling system using access card, punch card, matrix card, and RFID chips can be cheated easily whereby the real person no need to present to do so, they can pass it to anyone to do so. It shows that, the system can be fooled without doubt because the system only focused to the cards or chips only not to the person behavioral or physical. The attendance of the person cannot be detected more efficiently using this technique or systems. If it happens, the residents of company being ruled to deficit a very high, because the working load become more and the present of the person not recognized. The same thing happens in student's attendance using matrix card. The students easily fooled the lecturer by using their card to scan for attendance by giving to other person if they absent for that class.

The ThumbSec System aimed to create a secured entrance for all laboratories in faculty. The failure of key access door on security is the one of the reason for the existence of security system using biometric object. The problem of handle key kits is user cannot always keep the keys in their hand as having the hand phone. The tendency of misplacing the key is high, so it makes the lock of the door broken and changed to a new lock always. Besides, the duplication of the key can be done easily. It could be advantage for the thief to easily manage to open the door using duplication keys if they manage to find your lost keys. Besides that, in business residents, the key of the office or the shops need to duplicate to be use by many users to access the doors. At the time, it's not only cost the company, it also makes the residents of the company not fully secured. In the case lock was faulty, all of the users need to change the key and duplicate it. It not only makes the work more, the professionalism of the company also was spoiled.

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The access card door lock was a bit advanced from the key access door. But the problem having card along is also similar to having the keys. The tendency for the card to lose is high because nowadays user not only having that access card with them, there were more bank need to be carried together. The tendencies for us to misplace the card are high. By the case of misplacing the card, the card can be access by anonymous. It tremendously situates a way for the place to be not fully secured. In some of the case the card that they using can be spoiled by environmental reasons such water, hot sun and etc.

1.3 Objectives

- **To design biometric object (thumb print) system to verify authorized user.**

  Multiple fingerprints can be entered in the lock system which can help you when you have guests over. By implement this system, with biometric access control used for doors, labs are a lot more secure. Since personal features are programmed in a biometric lock, only authorized personnel can have access to the rooms. This prevents unauthorized access which can result in lost or tampering of important materials kept within the room.

- **To applied the proposed system into exam attendance system.**

  Biometric provides a wide variety of fingerprint attendance systems for extreme outdoor conditions and for indoor use. Implementation of biometric fingerprint attendance system helps the examiner to safe the energy and work load by storing all the data through server.

- **To develop a secured system using biometric object (thumb print) on the door of lecture room, lab or exam hall.**

  ThumbSec System tremendously will overcome or become a great solution for latch of key kids. The users no need to fear of loses their keys and has to change all your locks; you can open the biometric door lock with just a touch of your hand, a fingerprint. As the level of security breaches and transaction

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fraud increases, the need for highly secure identification and personal verification technologies is becoming apparent.

- **To ensure effective security monitoring.**
  Biometric offers a complete range to meet the security needs. Most existing access control systems needs to carry a card or remember a PIN to access the premises but with ThumbSec system, no need to spend a single penny on access cards or PIN management. Fingerprint access will more secured than other devices.

1.4 Scope

- **Prototype**
  The prototype of ThumbSec System is fingerprint image identifying and verifying system and exam attendance system. The fingerprint image identifying and verifying system, requires to identifying the fingerprint scan to the scanner 4 times and will store the data into system. Once the data of fingerprint stored into data, when the same student scan the fingerprint, the system need to verify the student's fingerprint and allow the student to enter in the laboratories. The exam attendance system needs to verify the user's fingerprint and identify the exam's subject, subject code before enter the exam hall.

- **Environment**
  The environment of this project take place is at Faculty of Information Technology & Communication (FTMK). Mostly the project will be implemented at the faculty labs and examination hall.

- **User**
  The type of authenticated user in ThumbSec System is FTMK lecturers, other staff like technicians and students who have the authority to access the thumb print scanner.

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1.5 Project Significance

The significance of this project towards the society is their personal particulars are no longer on threat. Threat, in this context means, there is no two finger print can be found equal or same, so it is purely secure and confidential. This becomes an advantage for us to do such a system to overcome duplication and fraud. The ThumbSec system is basically a system to make the door access more secured and used by the authorized person only. The thumbprint scanner here plays a role to detect using the physical of the person; that is fingerprint to identify a person; as how the government had been used in most of our identification card.

The project will be demonstrated on exam attendance system, whereby all the students will scan their fingerprint before enter the exam hall. The system will captured all the students' details and stored the data into the system. By doing this, the students attendance for the exam will be securely captured into the system. It helps to avoid any fraud by the students to attend the exam. This project helps out the lecturer and the staff to protect the attendance of the students safely and systematically. It also will reduce the work load of the lecturers or examiners to walk around to get the students details and attendances.

1.6 Expected Output

As what has been planned and decided on planning phase, the ThumbSec System is developed to build a secured door lock. The use of thumb print scanner rather than a key lock or card access lock is to make the door security to be more effective. The thumb print that used is connected directly to the system and the programmable logic controller. The system is created to store all the database of the authorized user to access the door. Once the data had been stored, the system

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will identify through the database to recognize the fingerprint that scanned in the thumb print scanner.

If the user recognized in the system, the system will activate the programmable logic controller to communicate with electromagnetic lock on the door. The door will open or remain closed according to the Peripheral Interface Controller (PIC) response through the system. The result of this security system is to only allow the authorized user to access the door and to monitor the entire user that access through the door for security purpose.

1.7 Conclusion

Apart from door locks, biometric technology is also being used in laptops, desktop computers, safety boxes, and gun safe boxes. Besides that, the fact that biometric access control is the safest and most secure locking system available today, it also provides a lot of convenience in terms of access. A lot of research had been done to make the system even more convenience to the user to access through it. There is different types of hardware was implemented through this project, a lot more to learn regarding the hardware and the interface had created to make the user to employ the system easily and friendly.

The next chapter which is Chapter II will discuss more about the literature review and the project methodology that should be used in this project. This chapter will investigate and research more about this project by comparing the existing similar projects. Additionally, it will also discuss more about the project requirement, project schedule and milestone of this project.

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CHAPTER II

LITERATURE REVIEW & PROJECT METHODOLOGY

2.1 Introduction

This chapter discusses and studies more on Literature Review and Methodology about the biometric object based project which to build a secured door lock security system and access control system. For this project, the research will be done by reference to books, articles, online journal about the existing systems that are available in market nowadays. This chapter starts with Literature Review that branch to domain, keyword and previous research. It is then continued to Project Methodology which explains about the methodology going to be used for this project and followed by Project Schedule and Milestones and finally conclusion.

In developing any new project, the initial step that an engineer should take is; doing research and study so that he or she can identify information, ideas, and methods that relevant to his or her project. By this theoretical base for research, one can determine the nature of the project that they developed. The greatly increased biometric applications do benefit the industry in as much as many more individuals are familiar with the term and the technology. Even though in earlier the finger print method used to discover the identities of criminals. Now the method had been applied in too many applications mostly to security purpose. In most of application, thumb print door access lock becomes one of the popular applications to be used for security purposes.

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2.2 Literature Review

Literature Review is a result of collecting information from different kinds of resources such as websites, books, journals, and other related materials. Literature review comprises domain, keyword and previous research.

2.2.1 Domain

According to Professor Sir Randolph Quirk, writer of Longman (2006), the author of "*Thumbprint security biometric object*", dictionary states that, domain means an area of activity, interest or knowledge.

For much of the history of commercial biometric technology, an ongoing argument was whether convenience (in the form of reduced password management or increased access to public services) or security (in the form of logical and physical access controls) would be the primary driver of biometric industry growth according to (R.G. Rage, 2008). Many of the fundamental assumptions about the applications and environments in which biometric technology would eventually gain acceptance were rendered old-fashioned, and many ancient impediments to large-scale biometric technology implementation were eliminated. According to Conventional Wisdom, (1982) states that the need for security and reliable identification in numerous public and private sector environments will lead to substantial increases in the number of biometric technologies and systems deployed, which will in turn directly benefit the developers, manufacturers, and integrators of biometric technology.

The use of biometric technologies in conjunction with government-issued documents –such as passports, visas, licenses, identity cards, and the like is not a new concept, but had traditionally faced strong objections on the grounds of civil

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