AUTOMATED LAB ATTENDANCE SYSTEM
(*ALAS*)

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A report submitted in partial fulfilment
of the requirements for the award
of the degree of
BACHELOR OF COMPUTER SCEINCE
(COMPUTER SYSTEMS & NETWORK)

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OCTOBER 2005

ABSTRACT

People use attendance system to record activities. Attendance is being used in business agencies, industries, universities and etc. attendance system will be very much of help in monitoring their employee attendance, absence and leave application. In Universities, the attendance system can be used by the lecturers on taking students attendance for their class. Furthermore, the system can assist in the management of lab security by recording students entering the lab. Currently, most universities record the student attendance manually. This has creates problems such as data loss, unreliable information and etc. The security of laboratory can also be strengthened by having information of students entering laboratories. The main purpose of this system is to help the lecturers in taking the students attendant, as well as to control the laboratory door access. A prototype of the Automated Lab Attendance System (ALAS) system is developed to assist lecturers to manage class attendance, and to assist Laboratory Administrator in keeping track of the laboratory users.

ABSTRAK

Kebanyakan daripada kita menggunakan sistem kehadiran untuk merekodkan pelbagai aktiviti. Sistem kehadiran ini biasanya digunakan dalam agensi-agensi perniagaan, industri, universiti dan lain-lain lagi. Sistem kehadiran banyak membantu memantau kehadiran, ketidakhadiran, serta permohonan cuti pekerja. Di universiti pula, sistem ini boleh digunakan oleh para pensyarah untuk mencatat kedatangan pelajar bagi sesebuah kelas. Selain daripada itu, sistem ini juga akan dapat membantu dalam pengurusan keselamatan sesebuah makmal dengan merekodkan senarai pelajar yang telah menggunakan makmal. Pada masa sekarang, kebanyakan universiti merekodkan kedatangan para pelajarnya secara manual. Hal ini akan menimbulkan pelbagai masalah seperti kehilangan data, maklumat yang tidak boleh dipercayai, dan sebagainya. Ciri keselamatan untuk penggunaan makmal juga boleh dipertingkatkan dengan mempunyai maklumat berkenaan dengan penggunaan makmal oleh pelajar. Tujuan utama sistem ini dibangunkan adalah untuk membantu para pensyarah bagi mencatat kehadiran pelajar mereka, pada masa yang sama untuk mengawal penggunaan makmal. *Automated Lab Attendance System* (ALAS) merupakan sebuah prototaip sistem yang dibangunkan untuk membantu pensyarah mengendalikan kehadiran kelas,serta untuk membantu Pentadbir Makmal / *admin* untuk mengenalpasti pengguna yang menggunakan sesebuah makmal bagi sesuatu masa.

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LIST OF TERMINOLOGIES

ALAS	-	Automated Lab Attendance System
CAD	-	card acceptor device
DeVRY	-	DeVRY University of Canada
Encryption	-	Process of transforming data into a type that prevents casual observers from deciphering.
EPROM	-	erasable programmable read only memory
EEPROM	-	electrically erasable programmable read only memory
EMV	-	desired in consideration of its capability for supporting potential electronic payment applications
IDE	-	integrated development environment
I/O	-	input/output
ISO	-	International Standards Organization
KUKTEM	-	Kolej Universiti Kejuruteraan & Teknologi M'sia
LEGIC	-	one of company that support all function and maintenance of smart card
PC	-	personal computer
PROM	-	Programmable read only memory
RAM	-	random access memory
ROM	-	read only memory
SDLC	-	System Development Life Cycle
UTP	-	Unshielded Twisted Pair
VB.Net	-	Visual Basic.Net: one of software that we can use to develop system

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.0 Introduction

At the end of this chapter, reader will know about what is *ALAS* where the title of this project is. Beside that, they also will know what kind of *problem statement* that constructs me to build this project. Other than that, reader also will know the *objective* and *cope* of this project. Lastly, reader will give some explanation about *project contribution* and *report organization.*

1.1 Automated Lab Attendance System *(ALAS)*

Automated Lab Attendance System *(ALAS)* is systems that are designed for labs. This system is an integrated system between information system, smart card and auto-locking door system at every lab.

This system is a web-based system which help the lab administrator to keep an eye on the lab from unauthorized person enter the lab. Other than that, this system will help the lecturer to take the attendance when the students scan their smart card in the barcode reader in every outside of the lab.

The admin or lecturer can set lock the auto lock door if the student late 15 minutes. This *ALAS* will store the database in the server. When the student wants to enter the lab, she or he must scan their smart card. If the student name list is has in current lab user, the door will open automatically. If not, the door cannot open.

These systems also store the time in and out for every user in database. In the end of the lab session, if the lecturer wants to know the attendance, he/she can view from the client's system.

1.2 Problem Statement

Recently, at KUKTEM, we know that security of lab usage is still in average level. Actually, anyone who wants to use the lab no need to should touch their smartcard to the card reader to enter it. So, everyone who want to use the lab can enter it either they have a smartcard or not. Administrator cannot secure the lab since there is no data or information regarding the person who enters the place. It will make easier to anyone who wants to steal any devices or tools from lab like happen nowadays.

Beside that, lecturers also have faced a problem to record a student attendance with the manual system. As we know, the current attendance system was not really systematic to the lecturers and students at KUKTEM where it is only one piece of paper that can lost at anytime and anywhere. Sometimes, the manual attendance system will no prove the students whether they're really attend the class on the day or not.

1.3 Objective

The objective of this project is to:-

i. To develop a prototype of the Automated Lab Attendance System (ALAS) from the manual system to computerized system.
ii. To make the lab attendance to be more organized.
iii. To make the lab is more secure by using the smart cards/student card.

1.4 Scope

The scope of this project is to:-

i. This system will used Windows XP as a platform.
ii. Database stores the student's information and used it to enter and out from the lab (by using smart card) to open the door.
iii. Barcode reader is used to read data from the smart card and verify data for current user from database in server.
iv. This system also will used VB.net and MS SQL Server as a language for build system.
v. A simple hardware is develop to control the door to show is it the student that want to enter in the lab is valid or not.
vi. This is a web-based system.

This system is will into 4 parts. Which are admin/server, client, smart card and smart card reader. My scope consists of Admin/Server, Smart Card and Smart Card Reader.

1.5 Project Contribution

In the project contribution, reader will elaborate about how far this project will give a benefit to the users. Actually, this project can be useful to many sides. The main contribution in this project is for admin and the second contribution is for lecturers.

For the admin, this system can be helping them to make the lab more secure. In the other word, it makes easily for them to track how many times students / staffs get in the lab. Besides that, it also can help them to manage lab management to be more secure and systematic.

Simultaneously, it also can give a good opportunity to changes the manual system to an automated system for attendances record. As we know, the current manual system becomes a lot of problem especially for lecturers to tread whether their student is truly come to their lab or not. So that, for generally, this system can helps many sides like from student, lecturers, admin or even KUKTEM.

1.6 Report Organization

In the Report Organization, reader will know generally about overall of this project at the end of their reading. This thesis contains six chapters. The first chapter is the Introduction.

As we know, in the Introduction chapter, everyone will discuss an overview of their project. It also will be include the problem statement where were elaborates about the current problem that occur in the project area. Beside that, it also will include the objectives and scopes of this project.

Other than that, the project contribution also state in this chapter. It will discuss about how far this project can be useful like for KUKTEM, lecturer and student. Lastly, the last part in this chapter is report organization where will explain generally about the entire chapter in the report of project.

Literature Review (Chapter 2) also one of the important part of this project. In this chapter, it will add in all information that we're gathering from anywhere that is related about this project. It will includes about smart card, smart card reader, bar code reader, an overall application process, advantages of using smart card, comparison with a new system to current system and the advantages of using this system

Every system has own methodology that used to build the system. Because of thus, user also will give an exposure of Chapter 3 where is about the methodology used of this system. In this ALAS, will develop according to System Development Life Cycle (SDLC). The SDLC model includes the following steps that will be described details in the Chapter 3:-

1. System Planning
2. System Analysis
3. System Design
4. System Testing
5. System Implementation

After doing a testing and implementation of project, in Chapter 4 (Result and Discussion), we will discuss about result that faced by doing this project based on our objective of this project. The result that we have is become from the testing phase that we've already done. In discussion part, we'll discuss about features, assumptions, constraints, further research and recommendations of this project.

Lastly, in this Chapter 5 (Conclusion), it will be conclude about overall information about this project. So that, after reader read this chapter, hopefully that they will know generally an overview of this project.

CHAPTER 2

LITERATURE REVIEWS

2.0 Introduction

Literature review will explain about all information that we're gathering from anywhere that is related about this project. It will include about smart card, the physical structure of smart card and the different type of smart card. Other than that, it also will include information of smart card reader and bar code reader.

In the middle of this chapter also will include how the bar codes are read and the types of bar code scanner. Reader also will describe on how to print bar code by using Code 39. Beside that, an overview of overall application process will explain to show on how the system running. Lastly, this chapter also will elaborate of an advantage of using smart card, comparison to current system and the advantages of using this system.

2.1 Smart Card

The smart card, an intelligent token, is a credit card sized plastic card embedded with an integrated circuit chip. It provides not only memory capacity, but computational capability as well. The self-containment of smart card makes it resistant to attack, as it does not need to depend upon potentially vulnerable external resources. Because of this

characteristic, smart cards are often used in different applications that require strong security protection and authentication [1].

In the near future, the traditional magnetic strip card will be replaced and integrated together into a single card by using the multi-application smart card, which is known as an electronic purse or wallet in the smart card industry. The smart card is becoming more and more significant and will play an important role in our daily life. It will be used to carry a lot of sensitive and critical data about the consumers ever more than before when compared with the magnetic strip card. Therefore, there are many arguments and issues about whether or not the smart card is secure and safe enough to store that information. This has always been a source of controversy [1].

2.2 Physical Structure Of Smart Card

The physical structure of a smart card is specified by the International Standards Organization (ISO) 7810, 7816/1 and 7816/2. Generally it is made up of three elements. The plastic card is the most basic one and has the dimensions of 85.60mm x 53.98mm x 0.80mm. A printed circuit and an integrated circuit chip are embedded on the card. Figure 2.1 shows an overview of the physical structure of a smart card [1].

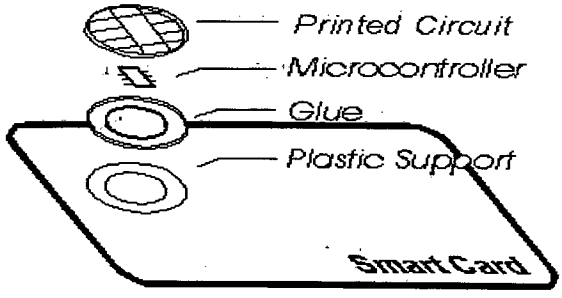

Figure 2.1 *Physical structure of a smart card (Source: Philips DX smart card reference manual, 1995*

The printed circuit conforms to ISO standard 7816/3 which provides five connection points for power and data. It is hermetically fixed in the recess provided on the card and is burned onto the circuit chip, filled with a conductive material, and sealed with contacts protruding. The printed circuit protects the circuit chip from mechanical stress and static electricity. Communication with the chip is accomplished through contacts that overlay the printed circuit [2].

The capability of a smart card is defined by its integrated circuit chip. Typically, an integrated circuit chip consists of a microprocessor, read only memory (ROM), no static random access memory (RAM) and electrically erasable programmable read only memory (EEPROM) which will retain its state when the power is removed. The current circuit chip is made from silicon which is not flexible and particularly easy to break. Therefore, in order to avoid breakage when the card is bent, the chip is restricted to only a few millimeters in size.

Furthermore, the physical interface which allows data exchange between the integrated circuit chip and the card acceptor device (CAD) is limited to 9600 bits per second. The communication line is a bi-directional serial transmission line which conforms to ISO standard 7816/3. [2] All the data exchanges are under the control of the central processing unit in the integrated circuit chip. Card commands and input data are sent to the chip which responses with status words and output data upon the receipt of these commands and data. Information is sent in half duplex mode, which means transmission of data is in one direction at a time. This protocol together with the restriction of the bit rate prevents massive data attack on the card [2].

In general the size, the thickness and bend requirements for the smart card are designed to protect the card from being spoiled physically. However, this also limits the memory and processing resources that may be placed on the card. As a result, the smart card always has to incorporate with other external peripherals to operate. For example, it may require a device to provide and supply user input and output, time and date

information, power and so on. These limitations may degrade the security of the smart card in some circumstances as the external elements are entrusted and precarious [2].

2.3 Different Types of Smart Card

There is several type of the Smart Card. There are:

2.3.1 Java cards

These Java Cards specifications enable Java technology to run on smart cards and other devices with limited memory. This Java Card technology enables multiple applications to co-exist securely on a single smart card. Other than that, in this card we can install new applications securely. In the Security purpose, this type of card Relies on the inherent security of the Java programming language to provide a secure execution environment and Platform's proven industry deployments and security evaluations ensure that card issuers benefit from the most capable and secure technology available today [2].

2.3.2 Contact Smart Cards

Size of the Contact Smart Card is a conventional credit or debit card with a single embedded integrated circuit chip that contains just memory or memory plus a microprocessor. This type of cards most popular uses to Network Security, vending, meal plans, loyalty, electronic cash, government IDs, campus IDs, e-commerce, health cards [2].

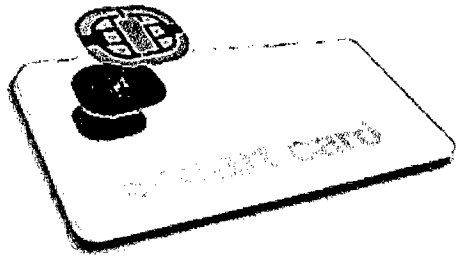

Figure 2.2 *Contact Smart Card*

2.3.3 Contact Less Smart Card

The Contact Less Smart Card containing an embedded antenna instead of contact pads attached to the chip for reading and writing information contained in the chip's memory. This type card is mostly used to Student identification, electronic passport, vending, parking, tolls, IDs [2].

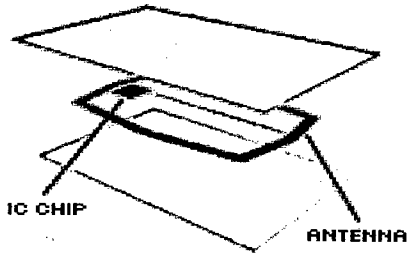

Figure 2.3 *Contact Less Smart Card*