



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AUTOMATIC CLASS ATTENDANCE

This report is submitted in accordance with the requirement of Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Telecommunications) with Honours

by

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I hereby, declared this report entitled “Automatic Class Attendance” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor in Electronics Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

.....
(Mr. Hasrul 'Nisham bin Rosly)

ABSTRACT

Students attendance during lecture is really important to all educational institutions. The process of taking the attendance manually in lecture room leads to time wasted. Nowadays, instead of calling names of students one by one, most educational institutions used attendance sheet for students to put their signatures on it and indicate their presence during lecture period. However, this method is very time consuming and gives high probability for students to sign the attendance on behalf of their absence friends, which can be called as cheating. The main objective of this project is to develop radio frequency identification (RFID) technology device with integration of real-time computing system in helping, monitoring and managing attendance as well as eliminating time-wasted during manual collection of attendance and reducing the used of paper. Automatic Class Attendance is functioned once the student places the card in front of the RFID reader. Then, it would read the data stored in the card and programmable integrated circuit (PIC) helps in transferring the data to smart phone through Bluetooth communication. Smart phone will display the information card identification (ID) like name, matriculation number and telephone number of the student and saved them in real-time system using Microsoft Excel. The system is controlled by the lecturers through smart phone. Lastly, the attendance reports can be generated and send to email.

ABSTRAK

Kehadiran pelajar semasa sesi pembelajaran adalah sangat penting bagi semua institusi pendidikan. Proses manual dalam pengambilan kehadiran para pelajar di dalam bilik kuliah menyumbang kepada pembaziran masa. Pada masa kini, selain memanggil nama pelajar seorang demi seorang, kebanyakan institusi pelajaran telah menggunakan kertas kehadiran untuk para pelajar menandatangani kertas tersebut sebagai tanda kehadiran mereka dalam sesi pembelajaran. Walaubagaimanapun, kaedah ini sangat mengambil masa dan memberi peluang kepada pelajar untuk menipu. Ini kerana, mereka boleh menandatangani kehadiran bagi pihak rakan mereka yang tidak hadir. Objektif utama projek ini ialah untuk menghasilkan suatu alat yang menggunakan teknologi *Radio Frequency identification* (RFID) dengan gabungan sistem computer dalam membantu, mengawasi dan mengurus kehadiran para pelajar di samping menyingkirkan pembaziran masa ketika proses manual pengambilan kehadiran pelajar dan mengurangkan penggunaan kertas. *Automatic Class Attendance* berfungsi apabila pelajar meletakkan kad di hadapan pengimbas RFID. Kemudian, ia akan membaca data yang tersimpan dalam kad tersebut dan PIC membantu dalam memindahkan data ke telefon pintar melalui komunikasi *Bluetooth*. Telefon pintar akan memaparkan informasi pelajar seperti identiti kad, nama, nombor matrikulasi dan nombor telefon dan informasi tersebut akan disimpan dalam system masa nyata yang menggunakan *Microsoft Excel*. Sistem tersebut dikawal penuh oleh pensyarah melalui telefon pintar. Terakhir sekali, laporan kehadiran boleh dihasilkan dan dihantar ke emel.

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To my beloved parents, siblings and fellow friends;

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Mustafa Akhyar

Mustafal Kamil

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LIST OF ABBREVIATIONS

RFID	Radio Frequency Identification
ID	Identification
LED	Light Emitting Diode
PCB	Printed Circuit Board
PIC	Programmable Integrated Circuit
GUI	Graphical User Interface
IC	Integrated Circuit
RF	Radio Frequency
UHF	Ultra High Frequency
VLF	Very Low Frequency
EHF	Extremely High Frequency
LCD	Liquid Crystal Display
GPS	Global Positioning System
SMS	Short Messaging System
3D	3-dimensional
PC	Personal Computer
RSSI	Received Signal Strength Indicator
RXL	Receiver Level

CHAPTER 1

INTRODUCTION

1.0 Introduction

Throughout this chapter, it declares about several introductions of the project that contain the background, objective, scope, problem statement and report structure.

1.1 Project Background

Due to development of technology and easy accessibility to the internet in obtaining almost all information, students are less motivated to attend lecture session in university. The situation leads to problem that the number of students in lecture room is less than the number of signatures on attendance paper. However, an action is taken but it is not really efficient. Manual computation in taking attendance in class produces errors. As a method to solve the problem, lecturers will count the number of their students manually. Consequently, the process wasted a lot of time. Sometimes, it takes the process of counting to two or three times repeatedly that leads to time wasted instead of the time should be filled with teaching session. Moreover, the situation of lecturers forgets to bring along the attendance paper due to rush action also leads to the possibilities of not taking the attendance of students.

Therefore, an efficient management system is needed to be designed in order to manage attendance of students effectively. This project entitled Automatic Class Attendance presents the implementation of real-time computing system that uses smart phone in conjunction with radio frequency identification (RFID) technology. RFID is applied to overcome the problem where it is functioning to read data stored in the RFID card. Programmable integrated circuit (PIC) is used to help the RFID reader and other components functioned perfectly by downloading the suitable code into it.

Moreover, the system is perfectly functioned with the help of the data that is recorded automatically in Microsoft Excel which consists of date, time, name, matriculation number and telephone number. The process of taking attendance is completed once the lecturers got a notification from their emails after one button is pressed on the smart phone. The message will be attached with the attendance report in dot xls (.xls) format.

RFID technology is being chosen for this project because RFID is an automated identification and data collection technology where it ensures to be more accurate and gives a precise data entry. RFID is capable to record student attendance automatically with integration of real-time computing system. Besides, RFID combines radio frequency and microchip technologies to create a smart system that can be used to identify, monitor as well as secure. In RFID systems, an item is tagged with a tiny silicon chip with an antenna collectively called a tag. The tag can be encoded with a unique identifier for allowing tagged items to be individually identified by the reader. The scanning process requires reader to scan the tag inside student identification (ID) card, to read the data that stored in it and then send the information to a database. After that, the data stored on the tag is read and saved in Excel file. In this project, tag, reader, and Bluetooth module are important because they are the primary components of an RFID system.

Lastly, a good performance of RFID technology in delivering precise and accurate data about tagged items improves efficiency of the system and brings benefits to its users. This method is more effective to prevent problem in process getting attendance manually.

1.2 Objective of Project

There are three objectives of this project which are:

- a. To develop a real-time computing system using RFID technology.
- b. To design an RFID technology device in helping, monitoring and managing student attendance.
- c. To observe on how RFID technology device able to eliminate time wasted during manual collection of attendance.

1.3 Scope of Project

This project is focused on how an RFID technology device capable to manage a real-time computing system in managing attendance. Basically, there are two major divisions that need to be concentrated in this project which are hardware and software designs.

1.3.1 Hardware Design

In designing the hardware, the components used comprise of cards with different ID tags, RFID reader, Bluetooth module, light emitting diode (LED), power supply, printed circuit board (PCB), PIC and other basic components.

1.3.2 Software Design

For software design, it is focusing on how to develop real-time computing system. Hence, a graphical user interface (GUI) is developed by using Magnet Code platform. Besides, an Excel file is created to record and save information of students coming to the class.

1.4 Problem Statement

The situation of the number of students in lecture room is less than the number of signatures on attendance paper occur a special slot for lecturer to count the number of his or her students manually. Sometimes, it takes the process of counting to two or three times repeatedly that leads to time-wasted instead of the time should be filled with teaching session. For real, the attendance paper needs much time to sign by all students especially for class with lot of student. Moreover, the situation of lecturers forgets to bring along the attendance paper due to rush action leads to the possibilities of not taking the attendance. Thus, a real-time computing system needs to be installed at lecture room to ensure an easy process in taking attendance can be done automatically without wasting time and paper.

1.5 Report Structure

This report for project Automatic Class Attendance is comprised of five chapters which are Introduction, Theoretical Background, System Design and Development, Results and Analysis of Project and Conclusion.

For the first chapter which is Chapter 1, it elaborates about the introduction of the project. In this chapter, the project background, objectives, scope of project, problem statements and report structure are briefly explained. Basically, this chapter covers the overall overview of the project.

Next, for Chapter 2, it presents the literature review which discusses about everything that related to the project. It includes the study on the theory and structure to the project of Automatic Class Attendance like smart card, RFID, Magnet Code software, and much more. In addition, this chapter also contains the review on the previous related projects that have been developed by other person.

In Chapter 3, it explains about the methodology of project development. Project methodology gives details about the whole process in developing the hardware and building the software till the whole project is developed.

In Chapter 4, it presents the results of a system testing that has been conducted. Besides, it also includes analysis about signal strength of Bluetooth and cellular provider. Within this chapter, discussion is made for every results obtained when the system testing and experiments had been conducted.

In Chapter 5, it summarizes the overall process of this project. In addition, a conclusion is made by explaining the achievement of project objectives. It is ended with recommendations for this project for future work.

Last but not least, this report is ended with appendices in order to attach the project planning table and circuit connection. It is followed by references to cite the persons that their works have been referred in order to complete the report as well as the project itself.

CHAPTER 2

THEORETICAL BACKGROUND

2.0 Introduction

In this chapter, it presents the literature review which discusses about everything that related to the project. It includes the study on the theory and structure of the project. The history of RFID technology also been summarized to provide several important facts about RFID itself. Furthermore, this chapter also covers about the components and equipments that will be used in designing both hardware and software for the project.

2.1 History of RFID

In the process of project development, literature reviews are conducted to understand the theory, methods and technologies associated with systems that have been developed. Background research on the organization and comparative studies of existing systems are also done to give more understanding about the system requirements before the system was developed. Several researches are conducted towards the previous projects that related to Automatic Class Attendance.

Based on the research studies, the history of RFID is covered where the technology is traced back to World War II. In 1935, a Scottish physicist, Sir Robert Alexander Watson-Watt discovered a radar to warn of approaching planes while they were still miles away. This radar has been used by The Germans, Japanese, Americans and British. At that moment, there was no way in identifying which planes belonged to the enemy and which pilots returned to their countries from a mission.

Thus, RFID research and discovery began in earnest in the 1970s. RFID is commonly used to transmit and receive information without wires. RFID consists of two main parts which are RFID readers and tags which both communicate through a distance using radio waves. There are lots of advantages using RFID system which included the price, size, processing speed, memory capacity and its capability.

The pure memory-based RFID chip without a co-processor is cheap, and its footprint is small and usually used in car immobilizer applications where the integrated circuit (IC) has to fit in a tiny glass tube buried in the key.

Advances in radar and radio frequency (RF) communications systems continued year by year. Scientists and academics in the United States, Europe and Japan did research and presented papers explaining how RF energy could be used to identify objects remotely. Companies began commercializing anti-theft systems that used radio waves to determine whether an item had been paid for or not. Electronic article surveillance tags, which are still used in packaging today, have a 1-bit tag. The bit is either on or off. If someone pays for the item, the bit is turned off, and a person can leave the store. But if the person does not pay and tries to walk out of the store, readers at the door detect the tag and sound an alarm.

Based on Aditi, S. T. et al (2014), they covered that for the first RFID patent, Mario W. Cardullo was the one who received an active United States RFID tag patent with rewritable memory on 23 January, 1973. In the same year, Charles Walton, a Californian entrepreneur, received a patent for a passive transponder that used to unlock a door without a key. A card with an embedded transponder communicated a signal to a reader near the door. Once the reader detected a valid identity number stored within the RFID tag, the reader unlocked the door. He licensed the technology to Schlage Lock of San Francisco which is a lock maker company and other companies too [1].

Later, companies developed a low frequency system that used 125 kHz frequency that featured with smaller transponders. Low frequency transponders were put in cards and used to control the access to buildings. Over the time, companies moved up to another level where from low frequency to high frequency around 13.56 MHz which it was unregulated and rarely used in most parts of the world. This frequency offered greater range and faster data transfer rates. In Europe, companies began using this high frequency system to track reusable containers and other assets.

For today, 13.56 MHz RFID systems are used for accessing control, payment systems and contactless smart cards. Besides, this system is also used as an anti-theft device in vehicles. A reader in the steering column reads the passive RFID tag in the plastic housing around the key. If the ID number does not match, the car won't be started because it has been programmed by the system. This system is commercialized because it ensures and provides security to the owners of vehicles.

In the early 1990s, IBM engineers developed and patented an ultra-high frequency (UHF) RFID system. UHF offered longer read range (up to 20 feet under good conditions) and faster data transfer. IBM did some early pilots with Wal-Mart, but never commercialized this technology. When it ran into financial trouble in the mid-1990s, IBM sold its patents to Intermec, a bar code systems provider. Intermec RFID systems have been installed in numerous different applications, from warehouse tracking to farming. But the technology was expensive at the time due to the low volume of sales and the lack of open, international standards.