



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FINGERPRINT ATTENDANCE WITH GSM MODULE

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree of Engineering Technology (Telecommunications) (Hons.)

By

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DECLARATION

I hereby, declared this report entitled “Fingerprint Attendance with GSM“ is the result 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 of Engineering Technology (Bachelor's in Electronics Engineering Technology (Telecommunications) (Hons.)). The member of the supervisory is as follow:

.....

Mr Win Adiyansyah Indra
(Project Supervisor)

ABSTRAK

Dalam projek ini menyediakan reka bentuk sistem kehadiran pelajar berdasarkan cap jari dengan menggunakan Sistem Global untuk telekomunikasi mudah alih (GSM). Sistem ini merangkumi modul pengenalan cap jari dan modul GSM. Ia boleh berfungsi secara automatik seperti pengenalan maklumat cap jari, pemprosesan, penghantaran tanpa wayar, pemadanan cap jari dan membuat laporan kehadiran. Pengenalan cap jari ini adalah berdasarkan susunan titik pengenalan berdasarkan digunakan dalam pelbagai teknik. Ini terutamanya melibatkan pengekstrakan titik pengenalan daripada imej model cap jari dan pemadanan cap jari berdasarkan jumlah titik pengenalan antara cap jari yang berbeza. Kemudian, maklumat yang diperolehi akan dihantar kepada pensyarah dengan menggunakan modul GSM untuk mengesan pelajar yang menghadiri kelas mereka. Maklumat ini akan di hantar bersama-sama apabila tamat sesi kuliah dalam bentuk Sistem Pesanan Ringkas (SMS). Pensyarah akan menyemak mesej untuk memeriksa kehadiran pelajar mereka.

ABSTRACT

In this project provides the design of fingerprint based student attendance system by using Global System for Mobile telecommunication (GSM). The system is include terminal fingerprint identification module and the GSM module. It can realize automatically such function as information identification of fingerprint, processing, wireless transmission, fingerprint matching and making an attendance report. The fingerprint identification is based on minutiae based algorithms used in various techniques. This mainly involves extraction of minutiae points from the model fingerprint images and fingerprint matching based on the number of minutiae pairings among different fingerprint. Then, the information will send to the lecturers by using GSM module for tracking the student that attend their classes. The information will send together when the class session is finish in form of Short Message Services (SMS). The lecturers will check the message to check their student attendance.

DEDICATION

Special dedication for :

To my beloved mother, Mrs. Fauziah Binti Ismail who always motivating me along the process completing the project.

To my supervisor Mr Win Adiyansyah Indra, thank you very much for all the guidance in this project.

Sincerely from my heart, thank you for the support.

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In the name of Allah, the Most Beneficent and Most Merciful

Firstly, thanks to Allah, the Almighty God, that has given me strength and spirit for me to complete the project.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

GSM	Global Mobile System for Communication
SMS	Short Message Services
UTeM	University Technical Malaysia Melaka
SIM	Subscriber Identity Module
ETSI	European Telecommunication Standard Institute
2G	Second Generation
1G	First Generation
PC	Personal Computer
2-D	Two Dimension
CCD	Charge Coupled Device
CMOS	Complementary Metal-Oxide Semiconductor
TDMA	Time Division Multiple Access
ISDN	Integrated Service Digital Network
BSS	Base Station Subsystem
OSS	Operational Support System
BTS	Base Transceiver Station
BSC	Base Station Controller
MSC	Mobile Switching Center

TCH	Traffic Channels
CCH	Control Channels
GSMSEC	GSM Security
AUC	Authentication Center
IMEI	International Mobile Equipment Identity
EIR	Equipment Identity Register
CBS	Cell Broadcast Services
LAN	Local Area Network
UMTS	Universal Mobile Telecommunication system
LCD	Liquid Crystal Display
DC	Direct Current
CNC	Computer Numerical Control
VLSI	Very Large Scale Integration
CRT	Cathode Beam Tube
CCFL	Cold Cathode Fluorescent Light
EEFL	External Terminal Fluorescent Light
HCFL	Hot Cathode Fluorescent Light
FFL	Flat Fluorescent Light
LED	Light Emitting Diode
BLU	Background Light Units
RISC	Reduced Instruction Set Computing

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter basically presents the overall of this project and the operation of this project. Besides that, this chapter is explains about the background, problem statement, objectives, scope, importance of the project and report organization.

1.1 Background

Normally, universities or colleges students pass the attendance sheet gives by lecturer hand by hand to sign it. I want to improve this method to easier way and more efficient to take the student attendance. There are numerous disadvantages of using this system. The attendance sheet is passed around the class; some students may accidentally or purposely sign for another student's name. Another issue of this attendance record in a hardcopy form is that a lecturer may lose the attendance sheet. There are numerous disadvantages of using such system. As a consequence of that, lecturer cannot trace the student overall attendance record throughout a semester. The magnetic card attendance system is widely used. This attendance system is flexible and practical. But it has also some disadvantages. For example, the card is easy to lost and damage.

I have interesting to develop the Fingerprint Attendance with Global System for Mobile Communication (GSM) Module for my project. This project is using fingerprint

device that can verify the identity of the user or biometric method. Fingerprint authentication is one of the most popular authentication systems in this world. The GSM is developed to make use of same type of subscriber units or mobile phone terminals throughout the world. The GSM has a unique feature in communication system. That is Short Message Service (SMS).

The operation of this project is when the student came to class, the student need to put their thumbs to the finger print module. Then, the finger print will analyze the identity of the thumb and send the information to lecturer mobile phone. Automatically, the lecturer knows that student is attends his/her class. But, the students must register their fingerprint for their identifications. Each person has different identifications. This is because the system of the finger is different for each person. This biometric is the best way to identify the identity of someone. (Kumar 2015)

I hope this project is success and can be used to lecturers to take the attendance of student in efficient way. It can help to save the time to take the attendance one by one. The students also cannot take advantages to sign to another student in attendance sheet. It can decrease the number of student absent to the class in day. Lastly, I hope, this project will apply in our attendance system in UTeM.

1.2 Problem Statement

This day, lecturers in universities or college take their class attendance by using attendance by passing it one by one of the students. This method has some of disadvantages. The lecturers can apply it to their class to take the student attendance automatically without using any paper by using this project. This project is easy use in any class and anywhere.

The disadvantage of using the attendance list is the student can sign for their friends. The lecturers cannot check detail every person in the class. Sometimes, the lecturers forget to bring the attendance sheet to the class. So, he or she cannot mark the

student who do absent on that day. Furthermore, the lecturers also need to change the attendance sheet a few times in a semester. This is because the attendance sheets need to bring to every class session. Then, it will damage when passing by one student to another.

The using of fingerprint module is because to identify every identification of students. Everyone has their own identification by using the biometric method. Same as the fingerprint, all peoples in this word has different pattern of the fingerprint. So this is can recognize every student that attends the class and use the fingerprint module.

GSM is the simple communication that can send the message through the Short Message Services (SMS). There are a few advantages of using GSM, such as less signal deterioration inside the buildings, ability to use repeaters and the talk time is generally higher in GSM due to pulse nature of transmission.

1.3 Objective

- To develop the fingerprint system to register the user.
- To create a systematic attendance system using fingerprint and GSM
- To investigate the performance of the fingerprint module and GSM module

1.4 Scope

Nowadays, almost teachers and lecturers need to check the attendances of the student. By using this device, Fingerprint Attendance System with GSM, it will help us to take the attendances. By this device, it saves our time to check person by person. We only need to attach our thumbs to the fingerprint device. My work scope is focus to the university and institutions.

I choose fingerprint device because it has many advantages such as very high accuracy, the most economical biometric personal computer user identification technique. It is one of the safest biometric authentication methods widely used. It is very easy to use. Only small storage space required for the biometric template, the database memory required to reducing the size and it is standardized.

GSM is the Global System for Mobile Communications. It is called 2G or Second Generation technology. This developed to make use of same subscriber units or mobile phone terminals throughout the world. The unique feature of GSM and it not found in older analog systems, is the Short Message Service (SMS). Messages are transfers in a store-and-forward fashion. A message can be sent to another subscriber to the service, and an acknowledgement of receipt is given to the sender known as point-to-point SMS. The SMS can also be used in a cell-broadcast mode, sending messages such as traffic or news updates. Messages can also be stored in the Subscriber Identity Module (SIM) card for later retrieval. (Verma & Gupta 2013)

1.5 Important of Project

Nowadays, the technology is moving forward faster. All system must work automatically. Same as the attendance system also must work in automatically. By this project, the attendance can handle automatically and easier way. This project also can overcome all the disadvantages of using attendance sheet or using identification card. This way is very efficient because the student cannot take attendance for another student. This project may help lecturers to make the attendance system more systematic.

1.6 Project Organization

a) Chapter 1 : Introduction

This chapter is consist of project background, problem statement, objectives, scope and important of this project.

b) Chapter 2 : Literature Review

This chapter is cover about the literature review or any citation of information that related to this project. In this chapter, researches from the journals or books are very important as references

c) Chapter 3 : Methodology

In this chapter is explains clearly the steps or methods to complete this project. All the component or module that use in this project must be clearly explain. The flow chart and data is included in this chapter

d) Chapter 4 : Result Expectation

This chapter will cover about all the result of the Fingerprint Attendance with GSM.

e) Chapter 5 : Conclusion

For this chapter is concluded overall what happen in this project from start until end of the project.

CHAPTER 2

LITERATURE RIVIEW

2.0 Introduction

In this chapter, I will list out all the possible out coming about the literature review that I have been studied before and understand every each of the details in the fingerprint attendance with Global System for Mobile (GSM). Before I go further about this project, I need to understand completely about the system of the fingerprint and the GSM that use in this project. This is very important to review the basic concept of the systems working out there in the real world so I list out the expectation and the specifications of the fingerprint and GSM.

This report is apprehensive with fingerprint and the GSM module. Fingerprint is the device that can detect the identity of someone by using the biometric method. There are several types of biometric method that can used to identify the identity such as face recognition, hand geometric, retina scan, iris scan, voice analysis. I choose to apply the fingerprint method in my project because the fingerprint very high accuracy, most economical biometric Personal Computer (PC) user authentication technique, one of the most developed biometrics, easy to use and it small storage space required for the biometric template so it reducing the size of database memory required.

The Global System for Mobile Communication or GSM is a standard developed by European Telecommunication Standard Institute (ETSI) to describe the protocol for the second generation (2G) digital cellular networks used by mobile phone. The 2G networks developed as a replacement for the analog cellular networks and the GSM

standard originally describe digital circuit-switched networks that optimized for full duplex voice telephony. The duplex in communication system is a point to point system consists of two connected parties or device that can communicate with one another in both directions. It has three types of duplex, there are simplex, half duplex and full duplex. Simplex communication is communication channel that send information in one direction only at a time. The half-duplex is two paths or channels that can communicate each other but not simultaneously. The direction of the communication is one at a time. The full duplex system is two channel or path that both parties can communicate with each other simultaneously. It is two directions and two ways channel. The advantages of the GSM are less signal deterioration inside building, ability to use repeaters, talk time is generally higher in GSM phones due to the pulse nature of transmission and the availability of subscriber identity module allows users to switch network and handsets at will, aside from a subsidy lock.(Kumar 2015)

By using these two major modules that use in this project, I can develop more systematic attendance system that can apply in our university. The advantages by using this system and discussed in this report. To make this project we must register the fingerprint each of the student to identify their biometric. The fingerprint module will identify it and tag each student finger print with their name. Then, when student use it, their name will send to the lecturer by using the GSM module.

2.1 Biometrics

Biometrics makes the utilization of organic terms that arrangement with information factually. It confirms a man's uniqueness by investigating his physical elements or practices such as face, fingerprint, voice, signature, keystroke rhythms. The systems record information from the client and analyze it every time the client is used it. A biometric system is a system that actualizes biometric acknowledgment calculations. A run of the million biometric systems comprises of detecting, highlight extraction, and coordinating modules.(City 2015)

There are two sorts of biometric strategies there are Physiological Based Technique and Behavior Based Technique. The Physiological Based Techniques incorporate facial examination, fingerprint of fingerprint, hand geometry, retinal investigation, DNA and measure the physiological attributes of a man and Behavior Based Techniques incorporate signature, keystroke, voice, smell, sweat pores investigation and measure behavioral qualities. Biometric acknowledgment systems taking into account the above techniques can work in two modes. To start with is recognizable proof mode, where the system distinguishes a man looking a substantial information base of enlisted for a match and second is confirmation mode where the system checks a man's personality from his before selected example. (Mudholkar et al. 2012)

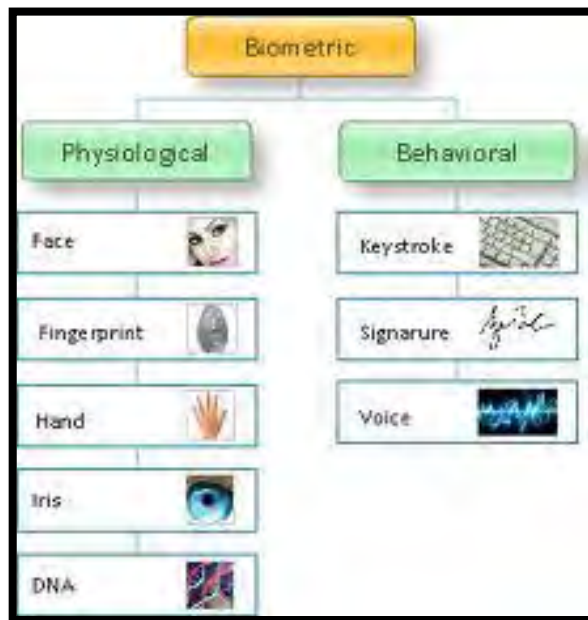


Figure 2.1 Category of Biometrics

2.2 Fingerprint

Fingerprint based recognizable proof is a standout amongst the most demonstrated strategy to distinguish the biometric of somebody. Biometric is a potential contender to supplant the secret word based confirmation. It is allude to the programmed identity of a man on his or her physiological or behavioral qualities. This technique is the favorable circumstances over customary strategy that approach utilizing a physical key or get to card and by utilizing secret word. The execution of biometric check systems exceptionally relies on upon the peculiarity of the biometric qualities. (Tao et al. 2012).



Figure 2.2 Fingerprint scanner

2.2.1 Fingerprint Identification

(a) Principles

Fingerprint impression highlights incorporate general component and minutia feature. Two fingerprints regularly have the same general elements and the minutia components are indistinguishable. Fingerprint impression general elements are those that can be seen by the bare eye. General components are

ordered five sorts: left circle, right circle, whorl, tented curve and curve as indicated by general ridgeline and valley-line forming fingerprints focus mode.(Yoon & Jain 2013)

While minutia feature allude to miniaturized scale hub characters which are additionally classified five sorts: ending, bifurcation, lip-rounding, double bifurcations and bridge as shown in below. Fingerprint recognizable proof is the procedure to contrast caught fingerprint includes and put away finger impression formats and judge whether both are from the same finger.(Zhou & Lu 2010)

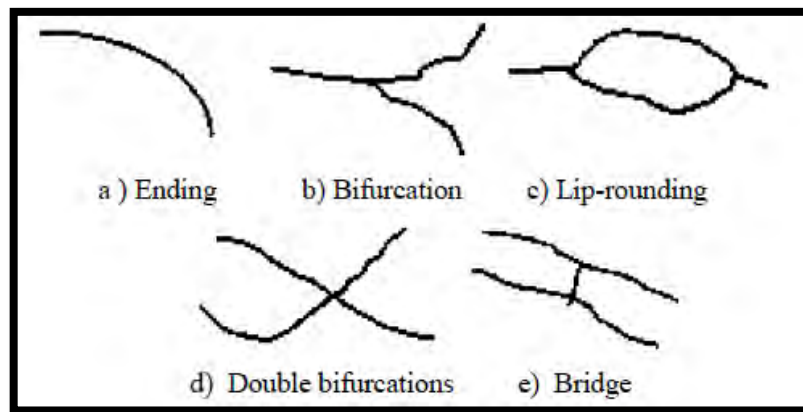


Figure 2.3 Category of minutia fingerprints feature(Zhou & Lu 2010)

(b) Process

The procedure of fingerprint impression distinguishing proof incorporates fingerprint image capturing, preprocessing, feature extracting and lastly feature matching, as shown in Figure 2.4. For extensive fingerprint impression recognizable proof systems, for example, police surveillance system, the progression of identity is typically taking after ordering as indicated by unique finger impression general components, contrasting agreeing with finger impression minutia highlights, at last, finding relating finger impression format in fingerprints database. In any case, for little fingerprint distinguishing proof

systems, for example, employee participation system, fingerprints are specifically contrasted concurring with minutia features.

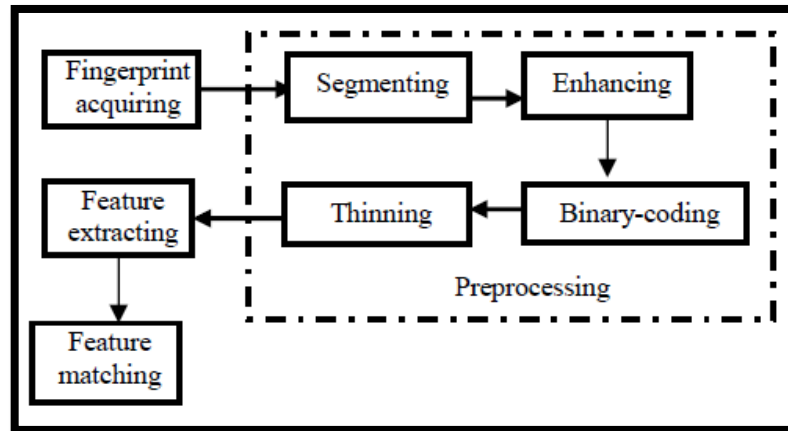


Figure 2.4 Process of fingerprint identification

(i) Fingerprint image capturing

The function of the fingerprint picture catching is to get digital fingerprint picture. Conventional capturing method is finger-squeezed technique. Digital fingerprint pictures are acquired through video vidicon and picture getting card to manage the two dimension (2-D) fingerprints got by squeezing the finger impression. Such technique is so tedious, entangled and not effortlessly acknowledged that it isn't pertinent to automatic fingerprint impression distinguishing proof system. In any case, cutting edge automatic fingerprint recognizable proof systems automatic input method. It embraces constant internet catching to get advanced fingerprint pictures, which is one of the key systems to acknowledge automatic recognizable proof. At present, most programmed information devices apply optical information procurement systems whose systemic setup is appeared in figure below.