THUMB PRINT SECURITY SYSTEM FOR DOOR APPLICATION

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This report is submitted in partial fulfilment of the requirements for award of Bachelor of Electronic Engineering (Industrial Electronics) With Honours

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FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

| Tajuk Projek | : | **THUMB PRINT SECURITY SYSTEM FOR DOOR APPLICATION** |

| Sesi Pengajian | : | **1** | **0** | **/** | **1** | **1** |

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Dedicated to my beloved family especially my father and mother, lecturer, and also to all my friends.

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ABSTRACT

This project is an upgrade version of other project done by other student. Previous project objectives was to open door automatically by using signature. In order to improve the project, the thumb print security is implemented. So that, it cannot be copied by others. This project objective is to develop a security system for door application by using thumb print. The system scan the user's thumb print and the system will process the data and the door will automatically open (unlock). After that, when door is closed, automatically the system will lock the door. The system also will have reset button to clear the memory of finger print data. Advantages of this system is that, it help the user to save time, as the user do not have to use ordinary key to open and lock the door. Just scan their thumb and enter the house. The system, consists of a finger print module, PIC Programmer IC, LCD Display, switch, and magnetic door lock which combine together.

ABSTRAK

Projek ini adalah merupakan naiktaraf dari projek yang telah disiapkan oleh pelajar sebelumnya. Tujuan projek sebelum ini adalah untuk membuka pintu secara automatik dengan menggunakan tanda tangan. Bagi meningkatkan keberkesanan projek, sistem keselamatan imbasan jari dilaksanakan. Oleh itu, ianya tidak boleh ditiru oleh org lain. Tujuan projek ini adalah untuk membangunkan satu sistem keselamatan untuk diaplikasikan dengan pintu dengan menggunakan imbasan jari. Sistem ini mengimbas jari pengguna-pengguna, dan sistem akan proses data seterusnya pintu akan terbuka secara automatik. Selepas itu, setelah pintu ditutup, sistem akan dikunci secara automatik. Sistem ini juga mempunyai suis untuk memadam data imbasan jari yg disimpan. Kelebihan sistem ini adalah, ianya membantu pengguna untuk menjimatkan masa, iaitu sebagai pengguna tidak perlu untuk menggunakan kunci biasa bagi membuka dan mengunci pintu. Hanya imbas jari dan masuk ke dalam rumah. Bagi membolehkan projek ini beroperasi, ianya terdiri daripada Modul Pengimbas Cap Jari, Litar Padu Pemprogram (PIC), paparan LCD, suis, dan kunci pintu magnet yang digabungkan bersama.

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PIC	-	Programmable Integrated Circuit
LED	-	Light Emitting Diode
ADC	-	Analog Digital Converter
LCD	-	Liquid Crystal Display
IC	-	Integrated Circuit
UART	-	Universal asynchronous receiver/transmitter
Eg.	-	Example
ID	-	Identity
ATM	-	Auto Teller Machine
MCU	-	Microcontroller Unit
DC	-	Direct Current
DPI	-	Dots Per Inch
DSP	-	Digital Signal Processing
PC	-	Personal Computer
TTL	-	Transistor-transistor Logic
USB	-	Universal Serial Bus
Tx	-	Transmitter
Rx	-	Receiver
CMOS	-	complementary metal-oxide semiconductor
SPDT	-	Single Pole Double Throw
DPDT	-	Double Pole Double Throw

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CHAPTER I

INTRODUCTION

This chapter explains the introduction of fingerprint and security system for door application, project objectives for this project, problem statement and lastly scope of project.

1.1 Introduction

Door locks a typical security system for house, office and many other building. Without door locks, every our house can be easily entered by thief or burglar. Normally, door lock will have its own key and it is made by its specification design and hardness. Nowadays, keys can easily be copied. Therefore, the need of security system is very high. To choose the best security system, people need to consider the advantage of each type of the security system. Modern technology

makes the security system more easily to be breaking off by using their skills and technologies. This project is to build a prototype of thumb print security systems. Implementation of thumb print to the security system will make it difficult to be copied.

In focusing on home security, the main application is door. To build it more secure, plenty of system was designed and implemented. Every system was implemented based on the same objectives and problems statement. From increasing of crime problems, the security system with high-technology is build to prevent these problem. The system built is Fingerprint Security System for Door Application. This system is friendly-user and easy to use, just install the system and it will be ready to use. This system is easier to install, low-cost maintenance, long lasting duration and efficient solution.

This project consists of Fingerprint Reader, UART Converter, LCD Display, PIC16F877A microcontroller, Electromagnetic Lock (EML) and door. The Fingerprint Reader will scan the thumb print and the data will be processed and compared with the memorized data in PIC. Either match or not, the data will transfer by UART Converter to the PIC. Form coding that has been programmed, PIC will read the data transferred and LCD will display 'Successful' or 'Access Denied'. The buzzer will sound 'beep' if 'Access Denied'. After that, the EML will unlock or lock the door if user's data match or not. The overall operations will be controlled by PIC. The data in PIC has been stored to receive or transfer the data from fingerprint module.
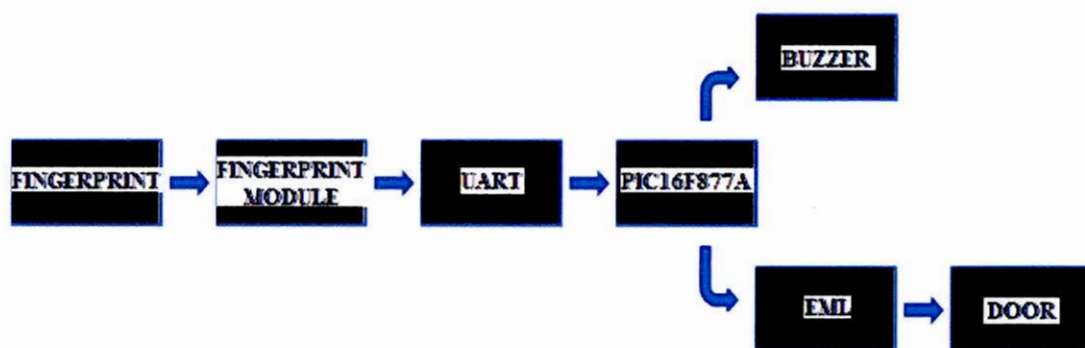
Figure 1.1: Block Diagram of Project

1.2   Problem Statement

This project is motivated from few reasons and listed below:

- The conventional key can easily be copied by thief.

  Home security is the most important thing that need to give. Nowdays, every owner must install the security system that can use to guard every home from theif. However, not all take this as an important because the too confidence can secure their house properly. They still use the conventional key to lock the door, but it still can be copied by theif. An experted used the 'master key' to open doors or padlocks. This technique is usually used and easy to learn. So that, this project is solution to get more security and efficiently.

- Careless by owners that hold the key, eg. Unlock the door after left.

  Owner has responsibility to take care of their own property such as a house. The important things are the 'KEY'. Without the key, owner or somebody else can't enter the house. So, if owner careless and can't hold the key correctly it will go to be a case such as robbery or property lost. One more thing, owner left house without locking the door.

- Less security system

  Most importantly for houses is security system. Owners still not mention about this security system, they still used old method (conventional key). So, the crime was increased highly and hesitation. This security system will definitely improve the old system.

1.3 Objectives

The objectives of this project are:

- To design and develop a security system that use fingerprint biometrics.

- To create and simulate the circuit using Proteus software.

- To develop the hardware of the system.

1.4 Scope of Project

The scope of work in this project is stated as given:

- To gain knowledge on programming concept that can operate the whole system.

  In gaining the knowledge, the overview of programming concept will implement by doing research and practically too. To create a programming were relate with system functionality.

- The fingerprint is use to unlock the door. The fingerprint programming will be use.

  This project uses a fingerprint module that which will lock and unlock the door. The fingerprint will be programme and interface with PIC microcontroller. The programming bases on the command/replies via fingerprint module through the TX/RX with PIC.

- Design a real-time fingerprint door security application.

  The system will be design by look at the real time applications nowadays. Applications of this system will be design to make it friendly-user. The system will be use and program anytime and anywhere. This system is easy to use in real operation.

- Testing the project (hardware and software interface).

  The system will be testing in lab to get the best result that can be fully functioning. Interface between software and hardware through TX/RX.

- Modeling project after all simulation and examination.

  The modeling was implemented after the simulation and examination is done.

1.4.1   Software

a) Proteus 7.5

Proteus PCB design combines the ISIS schematic capture and ARES PCB layout programs to provide a powerful, integrated and easy to use suite of tools for professional PCB Design. All Proteus PCB design products include an integrated shape based autorouter and a basic SPICE simulation capability as standard. More advanced routing modes are included in Proteus PCB Design Level 2 and higher whilst simulation capabilities can be enhanced by purchasing the Advanced Simulation option and/or micro-controller simulation capabilities.

b) C Programming

The C programming language is a popular and widely used programming language for creating computer programs. Programmers around the world embrace C because it gives maximum control and efficiency to the programmer. C is an imperative (procedural) systems implementation language. It was designed to be compiled using a relatively straightforward compiler, to provide low-level access to memory, to provide language constructs that map efficiently to machine instructions, and to require minimal run-time support. C was therefore useful for many applications that had formerly been coded in assembly language.

Despite its low-level capabilities, the language was designed to encourage cross-platform programming. A standards-compliant and portably written C program can be compiled for a very wide variety of computer platforms and operating systems with few changes to its source code. The language has become available on a very wide range of platforms, from embedded microcontrollers to supercomputers.

1.4.2 Hardware

For hardware, the main component is Fingerprint Module. This module already built-in the converter circuit. So, the programming is easy to make. This converter are convert analog signal from thumb print image to digital signal (by bit). After that, it will transfer the bit via TX/RX to PIC that used. Then, PIC will process the bit transferred to matching with bits in memory. If matched, it will process to the next step in programming that already programmed. Other hardware is LCD display, which will display process of system. This process display from programming that declares into PIC. PIC will connect to the LCD display by using port in programming. The data will be transferred by this port. After that, the EML (electromagnetic lock) is used to lock the door. This EML is powered by 12V to function it properly (more stick).

1.5   Structure of Report

Generally, this thesis consists of five chapters. The five chapters are Introduction, Literature Review, Project Methodology, Results and Discussion and end with Conclusion and Suggestion. In first chapter, the report is about the overview of the whole project and what is the benefit of this project. This chapter will also discuss the objectives of doing this project.

Second chapter mainly discusses the literature review that is related to this study. It consists of an overview of recognizes process, the significance of developing the system and a historical review about the evolvement of the process. Typical sensors (fingerprint) used in this process are also discussed.

Third chapter explains how this project will be carried out or the methodology of the project. The ways and procedures in which this project is conducted will be described. This chapter also will enlighten the critical task and the flow of this project. What is researched and what needs to be done is explained in this chapter.

Fourth chapter focused on the result and discussion of this project. The result from the simulation and circuit construction is stated. Moreover, the results rational also will be explained. The reasons and setbacks that cause the project to be halted are discussed in this chapter. The expected results will also be mentioned in this chapter.

Last chapter is the final chapter in this thesis. This chapter contains the conclusions and recommendations for this project. The conclusion is the final overview of this project. In other words, the conclusion is the summary of what has been done throughout this project. After the project is done, recommendations are made for any expansions or upgrades that might be done in the future.