UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Thumbprint Automatic Attendance System & Door Access by using GSM

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

By

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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 Electronics Engineering Technology (Telecommunication) with Honours. The member of the supervisory is as follow:

MADAM AZIEAN BINTI MOHD AZIEAN

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ABSTRAK

Projek ini adalah untuk membina sistem kawalan menggunakan sensor cap jari. Tujuan projek ini untuk mewujudkan dan membangunkan sistem yang mengawal keselamatan syarikat dan sistem kehadiran. Mikrokontroller Arduino Uno untuk perkakasan digunakan untuk mengawal operasi keseluruhan untuk input dan output sistem. Peranti input termasuk sensor cap jari dan butang tekan dan perisian Persekitaran Pembangunan Bersepadu (IDE) digunakan untuk menulis arahan program. Kemudian, semua arahan sistem akan dipaparkan pada Paparan Liquid Crystal (LCD). Projek ini adalah mengenai akses pintu dengan sistem kehadiran. Jika pengguna yang dibenarkan mengimbas cap ibu jari pada sensor cap jari, kunci magnet menolak pintu terbuka dan pemberitahuan SMS akan dihantar kepada pentadbir dengan menggunakan sistem Global untuk komunikasi mudah alih (GSM). Selain itu, pentadbir boleh memantau sistem kehadiran dari data Arduino untuk memeriksa masa dan tarikh pengguna yang diberi kuasa tetapi jika pengguna yang tidak dibenarkan cuba masuk ke dalam syarikat, penggera akan dihidupkan dan admin akan menerima pemberitahuan SMS bahawa , ada pengguna yang tidak sah mengimbas imej cap jari. Selain itu, kajian projek berkaitan berdasarkan penyelidikan menengah seperti jurnal, buku dan laman web. Kemudian, metodologi aliran projek ini adalah jadual seperti pembangunan sistem, ujian lapangan dan membina perkakasan. Akhir sekali, projek ini boleh dilaksanakan di banyak tempat seperti rumah, syarikat, kelas, dan balai bomba.

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ABSTRACT

This project is to build a controlling system using a fingerprint sensor. The purpose of this project to create and develop the system that controlling the security of the company and attendance system. The microcontroller Arduino Uno for the hardware is used to control the overall operating for input and output of the system. The input devices include fingerprint sensor and push button and the Integrated Development Environment (IDE) software is used to write the program instruction. Then, all the instruction of the system will be display on the Liquid Crystal Display (LCD). This project is about the door access with the attendance system. If the authorized user scans the thumbprint on the fingerprint sensor, the magnetic lock pushes the door open and the SMS notification will be sending to the admin by using Global system for mobile communication (GSM). Besides, an admin can monitor the attendance system from the Arduino data to checking the time and date of authorized user but if the unauthorized user trying to break in into company, the alarm will be turn on and the admin will receive the SMS notification state that, there is unauthorized users can the fingerprint image. Furthermore, the study of related project based on secondary research such as journal, book and websites. Then, the methodology of this project flow is schedule such as system development, field testing and build up hardware. Lastly, this project can be implemented at many places such as home, companies, class, and fire station.

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DEDICATION

To my beloved parents,

(Asir Bin Wail and Nor Hayati Binti Mt Nor Kamal)

My beloved family,

(Noor Suraya Binti Asir, Muhammad Afiezul Bin Asir, Muhammad Amierul Hafizi Bin Asir, Nor Farahaien Binti Asir, Nor Farah Haziera Binti Asir, Muhammad Amierul Syafiq Bin Asir, and Muhammad Amierul Haykal Bin Asir)

My Supervisor,

(Madam Aziean Binti Mohd Azize)

My lectures,

And all my beloved friends

(Mohamad Shahir Bin Mohd Shapiee, Nur Atiqah Binti Mansor, Nur Aisyah Binti Paiman, Nik Nazihah Binti Nik Azami)

Thanks for their encouragement and support.

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Alhamdulillah, thank you Allah because of His blessing. Finally, I have complete and finish my final year project with successfully.

During this project process to complete my project objective. A lot of study research from the journal, websites, and Book, past journal and thesis writing. With the guidance and support from the surrounding peoples around me, I finally able to complete the project due to the time given for two semesters. Here, I want to give a lot credit to those who help me to finish my project with successful and achieve the target in my final year project.

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LIST OF ABBEVIATIONS, SYMBOLS AND NOMENCLATURE

GSM	-	Global system for mobile communication
LCD	-	Liquid Crystal Display
SMS	-	Short message service
ID	-	Identify document
RFID	-	Radio frequency identification
IDE	-	Arduino Integrated environment
PWM	-	Pulse Width Modulation
FTDI	-	Future Technology Devices International
2G	-	Second generation
U. S	-	United State
GPRS	-	General Packet Radio Service
DCS	-	Digital cellular system
TCP/IP	-	Transmission Control Protocol/ Internet Protocol
TTL	-	Time to live
DSP	-	Digital signal processor
UART	-	Universal Asynchronous Receiver/Transmitter
LED	-	Light-emitting Diode
CRT	-	Cathode ray tube
PCB	-	Printed circuit board

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter will cover the introduction of the project, background study, the problem statement, and the project objective, the scope of work, the project significance and the summary of this project. Besides, it also covers the limitation of the project to prevent it from the future problem. Furthermore, background study is about the overall process happen starting with scan the thumb to reader until the SMS notification for Admin mobile phone. However, problem statement and project objective are about the problem happened and how to solve the problem and achieve the objective. Moreover, the scope focuses on the limitation of the project required such as hardware component and software.

2.0 Background

This project is about Thumbprint automatic attendance system and access door by using GSM is to ensure the safety of the company through locked door and attendance information that are saved to the database.

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This function of thumbprint automatic attendance system and door access is to detect the unauthorized user from breaking into the company when nobody in there, it is to secure the important data information from unauthorized user and employee attendance system such as name, Identification number, date and time. Once the thumbprint image of the pattern employee's thumbprint is verified and if the thumbprint is matched to the register data that is saved in the database, the door will automatically have unlocked and if the thumbprint sensor of thumbprint device detects the pattern of thumb is not registered in the database, the buzzer will automatically turn on and the system will send notification to the admin through SMS notification by using GSM. The admin will get the simultaneous update the time of the unauthorized user accessed to the restricted area of the company.

Besides, it's also noted the presence of employees who passing a door. So that, the time and ID number of presence will store on database and send the information to the admin mobile phone. In thumbprint application for company, microcontroller Arduino UNO ATmega328 is used to control the overall operation system of this project. Arduino Microcontroller are used to control the device by receiving the input signal and processing input signals and then sending the output signal. It also controls the operation of Liquid Crystal Display (LCD) when to display the command of the operation, thumbprint sensor to capture the pattern of the thumb, electromagnetic lock and buzzer.

Furthermore, this project also uses Global system for mobile communication (GSM) for data transmission system to a mobile phone through SMS notification. It will send the data information of tracking the employee and employee's attendance such as name, ID number, date and the time door was open to the admin or manager to secure the data and company from unauthorized user. This product can be used whether for companies, house, market office, classes or library, restaurant to secure the security of their place with the efficient way using Thumbprint Automatic attendance system and Door access by using GSM.

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1.2 Problem statement

Nowadays, security and attendance problem are the main threat that happened at the company. Security problem happened when unauthorized user trying to break into the company and the data of company could be access. The company is insecure to protect their data and require more attention from guard to monitor the company. Besides, the attendance problem happened when manual attendance was mainly used. A few of employee manipulate the data time arrival. Most of all, the boss is not aware if the employee is absent from work or not because there will be other worker write the attendance for their friend. In addition, radio frequency identification (RFID) card also already used for the company but there are still happen a few problems such as missing the card, the chip of the tag is easily broken and need to always change the card, forget to bring to office and another employee can help to scan the card. Therefore, a system with a better solution should be developed to solve this problem.

1.3 Objective

There are a few purposes needs to be achieve from the completion of this project to solve a problem that happened in the company such as attendance system and door access. The main purpose of this project is:

(i) To study how the thumbprint automatic attendance system & door access by using GSM.

(ii) To design the employee's attendance and door access based on thumbprint.

(iii) To analyze the effectiveness of thumbprint to magnetic lock detection.

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1.4 Scope

First, this project is use microcontroller Arduino UNO ATmega328 system because Microcontroller system is a single chip computer that can be used in control application. The function of microcontroller ATmega328 is to control all the operation. Then, the circuit of Thumbprint automatic attendance system & door access was designed by using Proteus software**.** This circuit will show how the thumbprint functioning to unlock the door when authorized user' thumb is verified. Besides, the Arduino integrated development environment (IDE) compiler as an application to control the operation. The system program was creating to shows how the thumbprint sensor capture the pattern image and electromagnetic lock function and how the attendance sending the SMS notification to the admin by using GSM module.

Secondly, by using Global system for mobile communication (GSM) module, the connection is makes from the Thumbprint device to the mobile phone. This GSM function as a connection for phone to transmit and receive the data. The data attendance has been stored in thumbprint will transfer to the admin phone in SMS notification by using GSM.

Thirdly, the thumbprint automatic attendance system and door access has their limitation to prevention as there is a chance of unauthorized person hacked the technology by placing a fake fingerprint. So, the process entering wrong thumbprint identification will make the buzzer start turning on. When the buzzer starts turn on, this will inform the admin to take further action to prevent unauthorized user from access to the restricted area. Besides, thumbprint modules are sensitive and must be carefully used. It can easily break the LCD thumbprint sensor. Lastly, this project is a new product that introduces the thumbprint for attendance and door access. It is innovation from two different projects that is automatic attendance system and door access system. So, it provides two function of one project.

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1.5 Project significant

This project will give the most benefit for commercialization as a security and attendance product. The system could be implemented within an optimum price with an extreme security function to any organization or company. Usually, to control overall company attendance and security is complicated. They could develop and implement this project to provide better product performance to protect the security of the company. With this product, attendance will be more accuracy and the security will be securing the restricted area.

1.6 Summary

The summary of this project will discuss the overall chapter from chapter one until chapter five. Chapter 1 is an introduction for this project. Second is chapter 2 about literature review of the past a few years, list of hardware and software. Third is chapter 3 about the methodology of the project such as flow chart. Forth is about chapter 4 that is result of this project. Lastly, chapter 5 is a recommendation of this project.

1.6.1 Chapter 1

In this chapter are covered about background of the overall operation, the problem statement that that happened before this. Besides, it is to achieve the aim of the objective to solve the problem statement. Furthermore, the scope of work is limitation of project to prevent it from the future problem, and the project significance to the future.

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1.6.2 Chapter 2

This chapter will be cover for the literature review. The study of Thumbprint Automatic Attendance System and Door Access by using GSM is to gather the information by research based on related journal. Based on research, the information is gathered in terms of introduction, history of the door access system, types of attendance system, types of biometric, list of hardware, list of software, project concept of this project and ten related journals to complete the project. Lastly, the research based on secondary resource such as book, journal and website that are licensed.

1.6.3 Chapter 3

This chapter based on methodology. Methodology is a procedure of schedules that are required to be following to complete the thumbprint automatic attendance system and door access project. It also detailed report of study to achieve the aim objective of this project. Besides, it also explains the procedure of current development of the project.

1.6.4 Chapter 4

This chapter focuses on result and the findings of the study, the result form the project is present in state of tables, figures and graphs. It will discuss briefly on this chapter based on observation from project findings.

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1.6.5 Chapter 5

This chapter will summarize the outcomes of this project. Besides, it will discuss on several recommendations for the future improvement and development for the company. Besides, it also discusses the conclusion of this project. It is based on hardware description and software implementation.

1.7 Conclusion

This chapter will discuss the overall project problem statement, objective to be achieve, scope of this project to have the limitation and to prevent it. Besides, it also states the function of overall chapter from chapter 1 until chapter 5.

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