UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF BIOMETRIC DOOR OPENER WITH APPOINTMENT SYSTEM USING FACE RECOGNITION FOR OFFICE SECURITY

This report is submitted in accordance with the requirement of the University Technical Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industrial Electronics) with Honours.

by

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DECLARATION

I hereby, declared this report entitled Development Biometric Door Opener with Appointment System Using Face Recognition for Office Security 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 Electrical and Electronic Engineering Technology of University Technical Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Industry) with Honours. The member of the supervisory is as follow:

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ABSTRACT

This project is about biometric door opener with appointment system with face recognition for office security. Security become a threat now days. The number of thefts and identity fraud has become a serious issue and takes much time to control and monitor the large amount of visitor daily. To solve these problems, a face recognition system must be established. This system is powered by raspberry pi controller circuit. Raspberry Pi electronic board is operated on battery power supply, wireless internet connectivity, it includes pi camera module, solenoid door lock and LCD display. The LCD will display messages for the visitors and staff. The camera module will turn on when input from visitor or staff triggered based on the selection. The camera will capture the image. The system will recognize the face and if it is registered then it unlocks the door. If the system cannot recognize the face, the door will not open. The visitor must register and set appointment in order to enter the building. The visitor has to set appointment in the system based on the slots given by the admin of the management. All the appointment system registration and setting will controlled in phpMyadmin. The LCD will display the time and date of the visitor's entry. The security system is designed for small scale of office condition with the uses of a Raspberry Pi controller.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This part of the report consists of the project background, problem statement, objective and the scope of the project. The main objective of this project is to tackle the problem that is affirmed in the problem statement.

1.1 Background

The development of Information Technology (IT) has led the rapid change in human lifestyle. Modern advance of electronic and communication technology has made the application of computer, networking and mobile devices to be implemented in our daily life. These changes have catalyzed the development of Internet of Things (IoT) in biometrics data has become popular for automatic personal identification in access control instead of using cards, passwords or pattern. By using special hardware like fingerprint scanner, DNA analyzer, and palm scanner used to collect most of the biometrics details. Contacts between the required hardware needed in order to collect the data. Face recognition does not require any contacts with the hardware. Face is detected significantly by using face detection technique and the entire face recognition is completed without touching with any hardware. It is one of the few biometrics methods that acquires the qualities of both low intrusiveness and high accuracy. Face recognition technology has range of applications in law enforcement and inspections, access control, information

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security, smart cards, others. It has many potential applications such as surveillance, credit cards, password security, etc.

1.2 Problem Statement

The biggest issues faced by most organization is that it takes much time to manage and monitor the large amount of visitor daily. Common visitor management system is by manual log book or visitor pass card. This manual system requires the visitors to register with the person in-charge before they can enter the office or the building. This manual system was applied by most of the organization either in government sector or private sector. Companies which has many visiting, would face this problem, as the obsolete technology is time consuming.

Besides that, the number of theft and identity fraud that happens daily, which are faced by these organization is mind blowing. Old system has been compromised since the development of technology in past 10 years. The major drawbacks in a common door lock are that anyone can open a conventional door lock by duplicating or stealing the key and can duplicate the access card and keypad number lock.

Due to these problems a solution needed to ensure better security system to the organization.

1.3 Objectives

Despite of there are many similar products are available in the market, however there are still a lot of improvement can be done. The objectives of this project are:

1) To study a biometric door opener using face recognition for office security with appointment system.

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2) To develop a product that would make the customer or visitor login system faster and secured via automation.

1.4 Scope of the project

The scope of this project is to develop a security system with the implementation of face recognition algorithm. The person who has been recognized by the system will be allowed to enter the premises without any restriction because, their details will already be saved into the database of the system. On the other hand, the face identity of the regular entries will also be captured and saved in the database of this system. The unidentified entry can set their appointment according to the time slots that have been allocated by the management. The boundary and the coverage of this project is limited for office uses only.

1.5 Expected Result.

From this project development, a biometric door opener with appointment system using face recognition for office security will be a device that control security system of a company or organization. This project will provide fast login system for the visitors to the premises because of the fully automatic visitor's appointment system which is controlled by the visitor. All the login details of the visitors will be saved and secured in the database of the system. It will be very helpful to the management to track their record for future references.

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CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter provides a detail description about what have been published on some topics by scholars and researchers. The fundamental reason for composing this writing audit is to obtain learning and thoughts that have been set up about face acknowledgment in real-time that will be focused on Biometric Door Opener with Appointment System Using Face Recognition for Office Security. The review also highlights the strengths and weakness of the existing works and also the evolution of door lock system from keypad to biometric system. Besides that, there are a number of resources on the topic of Face Recognition system that have been widely published. This information has been collected from different resources such as published documentation, white paper and journals in the web site. It provides an overview of literature review as well as basic concept on how face recognition security is carried out by using various methods.

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2.1 Introduction of Face Recognition Based Door Lock Security with appointment system.

2.1.1 Evolution of Door Lock Security System

The industrial revolution was a clock time of fast development and innovative headway. The numerous growth and upgrades inside the security system just ignition lock innovation. At that point, progressions in computerized and PC innovation carried with it numerous new conceivable outcomes and enhancements in entry locking model. In addition, the consistently development needs of security, protection, and safety in current society have brought about new doorway lock advancements that incorporate the idea of customary lock model with computerized innovations. The evolution of access control systems forms password pins and access card readers to highly protected electronic devices such as bio metric access control.

2.1.1.1 Keypad and Accesses Card Door Lock System.

Figure 2.1 Keypad password and RFID door lock.

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The older security door lock system is using keypad password and access card to control the mechanism knob. It requires user to remember the password and keep the access card all the time without lost it. The cons of this system are for the older age and younger user it is not easy for them to memorize the combination of password and also it is easy for hackers to crack the system and duplicate the access card with the current technology. RFID card is another security system has been produced to identify user identity. It just like a key but in card form and also it can unlock the door within second. RFID combination also can be easily duplicated with the current technology.

2.1.1.2 Biometric Based Door Lock System.

The palm scanner technology is the next stage for fingerprint impression acknowledgement. It works by capturing the image of palmtop. Firstly, the system capture or scan an image of the palmtop then it processes on that image by partitioning it and finally recognize the person. Therefore, the error percentage can be reduced in biometric security methods and it will overcome the problems faced by fingerprint recognition. This biometric impression technique is very functional in bank lockers. But unique finger impression affirmation the vein identifier and iris scanner give best and exact result thusly, in the bank security system, microcontroller unendingly watches the Vein Detector and Iris Scanner through keypad confirmed codes. The remote movement indicator will be dynamic amid night, if any discovery recognized in its yield, the controller sense it and turn on the caution sound. As of late, the fast based important segment investigation approach is proposed for the face acknowledgment and face recognition process.

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Figure 2.2 Fingerprint door lock.

Fingerprint is also widely used as a way to identify a person identity. That why it is also had been used for security door lock. Everyone has their own unique fingerprint except some disabled person and very small group of people in this world they do not have fingerprint. Nevertheless, there are still a bigger group of people could not be identified by fingerprint sensor. This is because they have a poor quality of fingerprint cause by their age, occupation and the other factors. The main reason why biometrics fingerprint door lock not widely used at household is because the high price tag.

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2.1.2 Comparison of evolution in door lock security system

Table 2.1: Comparison table of evolution in door lock security system

Security system	Security level	Cost	Devices required	Social sufficiency
Password	Low	Low	Keypad	High
Facial recognition	Medium	Medium	Camera	High
Fingerprint	Medium	Medium	Scanner	High
Palmtop	Medium	High	Scanner	Low
Iris scanner	High	High	Camera and scanner	Low

2.2 Review of Related Works.

In this session, all the related work regarding face recognition door lock system and some visitor management system based on face recognition was reviewed in detail and explained in detail.

2.2.1 Face Recognition for Security Efficiency in Managing and Monitoring Visitors of an Organization.

Based on the author, this paper talking about on a framework that ready to oversee and screen the guests of an association utilizing face acknowledgment as a verification strategy (Behzad Shoarian Satari, 2015). After the validation and

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