UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF SMART DOOR LOCK USING MICROCONTROLLER

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours.

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Pada masa kini, isu keselamatan dianggap sebagai topik penting dalam sosial teknologi tinggi ini. Matlamat projek ini adalah untuk mereka bentuk dan membuat kunci pintu pintar yang berdasarkan internet perkara (Internet of Things), menguji fungsi kunci pintu pintar dan menganalisis keberkesanan kunci pintu pintar dari segi keselamatan. Sensor berat digunakan untuk mengesan orang yang berada di hadapan pintu. Pad kekunci dan aplikasi telefon pintar adalah bertujuan untuk mengunci dan membuka pintu. Kamera telah digunakan untuk pengguna memantau keadaan di hadapan pintu apabila diperlukan. Mikrokontroller digunakan untuk mengawal keseluruhan sistem. Pengguna boleh membuka kunci pintu dengan mudah dengan menggunakan aplikasi telefon atau pad kekunci dan mereka akan menerima peringatan jika sistem mengesan akses tanpa kebenaran, maka pengguna dapat membuka kamera dan melihat keadaan di depan pintu. Pintu kunci pintar melakukan yang baik dalam mengurangkan isu keselamatan dengan memberikan peringatan kepada pengguna apabila rasa seseorang pelik di hadapan pintu. Kesimpulannya, kunci pintu pintar yang dibangun berdasarkan internet perkara (IoT) dapat beroperasi secara normal dengan menggunakan aplikasi telefon pintar dan system kunci pintu pintar akan sentiasa menghantar pemberitahu kepada pengguna semasa system mengesan akses tanpa kebenaran untuk meningkatkan keselamatan.

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ABSTRACT

Nowadays, the security issues considered as significant topic specifically in this high technology social. This project aim is to design and develop a smart door lock based on the use of Internet of Things (IoT), test the functionality of the smart door and analyze the effectiveness of smart door lock in term of security which can ensure security as well as lower the cost of implementation. Weight sensor was employed in sense the occurring of people in front of the door. Keypad and smartphone application are purpose to lock and unlock the door. A camera was employed for user to observe the situation in front of the door when needed. A microcontroller was used to control whole system in this project. The user can unlock the door easily by using smartphone application or keypad and they will receive a notification when the system detects unauthorized access, then user can open the camera and observe the situation in front of the door. Smart door lock performing good in reduce the security issues by giving a reminder to user when sense weirdo in front of the door. As a conclusion, the smart door lock that develop based on IoT can operate normally by using smartphone application and the system will always send notification to users when detects unauthorized access to improve the security problems.

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DEDICATION

I dedicate this project wholeheartedly to my family, who have been giving support continuously to me in completing this project. They provide their moral, spiritual and also financial support to me and giving me encouragement from time to time increase my self-confidence. Besides that, I also dedicate my project to my supervisors, Ts. Madiha Binti Zahari and Dr. Mohd Badril Bin Nor Shah, who guided me throughout my whole final year project and give me a better idea with their expertise to improve my project.

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LIST OF ABBREVIATIONS

IoT	Internet of Things
Wi-Fi	Wireless Fidelity
LCD	Liquid Crystal Display
GSM	Global System for Mobile
EEPROM	Electrical-Erasable Programmable Read-Only Memory
RAM	Random Access Memory
ROM	Read-Only Memory

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CHAPTER 1

INTRODUCTION

1.0 Introduction

For every living being, the most needed in their live is safety, this is a basic requirement for every living being. A door is an entrance to every single houses, so that the door is very important in providing a safety environment to a house and the homeowners or users. A smart door lock is designed to overcome the unauthorized access problem which happen more frequently day by day that may cause the house environment unsafe and then led to the homeowner worried about the living environment. Without a safety living environment, the quality of life being threatened. Smart door locking system is not a new concept, but it always playing an important role in security field, with the increasingly advanced technology, these kind of security system need to be improved to become more advance so that the rate of security issues can be reduce. The android based smart door lock which able to perform variety of tasks by using smartphone will give convenient to homeowner in security purpose for their house environment. This is because the using of smartphone is become more common nowadays. With the presence of a smart door lock in house, the homeowner can leave their house worry-free, because they can be alert when weirdo is in front the door of their house, and they can surveillance their house at anytime and anywhere they want by using their smart phone. The smart door lock also gives functionalities for every state of people. So that there is need for this function of smart door lock to reduce the security issues and ease people in future.

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1.1 Project Background

Internet of Things (IoT) is a natural group of related physical articles that are accessible through the web. The security system nowadays need to be improved as the increasingly advanced technology, a door lock will be the important key to increase the security system. So, a door lock system that using Internet of Things (IoT) can give a better result compare to normal door lock system.

Progress with the times, usage of smartphone become a usual to most people. Smartphone allows peoples to communicate with others, record the amazing movement in the life and ease peoples in daily activities, if the smartphone can use to improve the security system, that will fully show the advantage of the smartphone in human life.

A smart door locking system which contain of a load sensor and a camera can be developed to the houses, homeowner can become worry - free about their home security when they are not at their house. This is because this door lock system will remind them when the system sense and detect weirdo presence in front of the door, the homeowner may open their smartphone which connected to the system and observe the situation in front of the door. This is the advantage of IoT and smart phone that bring to peoples.

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1.2 Problem Statement

Currently, a lots of cases about the thief break into the door and the homeowner does not aware about that. Homeowners does not realise that someone is in front of the door for a period of time which try to open the door and break into the door. According concealedcarry.com, there are 3.7 million home burglaries happen annually and 26 percent of the robberies will lead to the violent crimes. This mean that in this situation, if

anyone is in the house when the thief is break into the door, they will be in danger and if nobody in the house, the valuable things in the house will become the targets of the thief. Due to this problem, this project proposed to use the load sensor to sense the presence of people in front the door and install a camera for user to observe the situation in front the door. Besides, some tragedy happens when the homeowner was unable to escape from their house when emergency is happening. An emergency button can be install in case to open the door when somethings happen urgently.

1.3 Objective

In the construction and completion of this project, there are several objectives

i. To design a smart door lock based on the use of Internet of Things (IoT)

ii. To develop a prototype of smart door lock and test the functionality of the door lock

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iii. To analyze the effectiveness of the smart door lock in security issues

1.4 Scope

In this project, a prototype of smart door lock will be developed and control by using smart phone and keypad. In case to increase the security function, a weight sensor and camera will be installed in front of the door for alert user and able user to observe the situation in front of the door.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Smart door lock is a door locking system that can prevent the happen of security issues that becomes more serious nowadays. A smart door lock is control by using smartphone, besides using a smartphone, the door can also unlock by entering the correct password or push the button that installed in the house. Smart door lock will also use the weight sensor to sense the presence of person that in front of the door and a camera will install in front of the door for observation uses.

In this chapter, is study on the previous works related to the smart door lock and the components that used in the works. Comparison between the components that needed in the project is based on the features and functions of the project. By referring the previous related works, can summaries about the projects, the components used in the projects, the functionalities of the projects and the weakness of the projects so that can know deeper about the projects and make some improvement to the project to makes the smart door lock system more advance.

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2.1 Related Works

Before start to build the hardware and choosing the components, some research need to be done to know more about the components needed in the project. The research of previous related works that done by other authors can learn more about the project