UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ACCESS DOOR LOCK VIA ANDROID PHONE

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Telecommunications) Honours

by

MOHAMAD SHAFIK BIN OTHMAN LUDIN
B071210211
901204-02-5743

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **ACCESS DOOR LOCK VIA ANDROID PHONE**

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I hereby, declared this report entitled “Access Door Lock via Android Phone” 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 Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Telecommunications) (Hons.). The member of the supervisory is as follow:

…….

(SITI ASMA BINTI CHE AZIZ)

ABSTRACT

Nowadays, the smartphone has developed widely in line with the growing technology determined by the availability of software for various purposes. This application has been used in various fields including security, medical and health care fields. The smartphone is also an important tool for daily life that comes with a variety of abilities has attracted the interest of the public. The smartphone is also available with digital capabilities and high level of communication such as Bluetooth and USB. For safety reasons, the Access Door Lock via Android Phone designed as an alternative to replace traditional keys in line with development of technology today and specially created for home security door keys that limits the users to access the system. In reducing complexity, IOIO board is used as a microcontroller unit that functions to process data received from Android application. This enables communication between a smartphone with IOIO board via wireless communication. This allows the magnetic door locks are accessible when receiving instructions from the Android application by passing a password.

Further, the methods and strategies used is the important thing in this project. Where it has three steps to do this project including planning, design and implementing. Methods used to find and collect information about the software and hardware that will be used in the process to complete the project. The main hardware is IOIO board that has a PIC microcontroller which acts as a bridge between applications on Android devices. This project requires a system to allow the Android application door control. Software to be used in the construction of this Android application is Eclipse IDE (integrated development environment), and the JDK (Java Development Kit). The project Access Door Lock via Android Phone has achieved the objectives successfully.

ABSTRAK

Hari ini, Telefon pintar telah berkembang dengan meluas seiring dengan teknologi yang semakin meningkat ditentukan dengan kesediaan perisian untuk pelbagai tujuan. Aplikasi ini telah digunakan dalam pelbagai bidang termasuk kawalan keselamatan,bidang perubatan dan penjagaan kesihatan.Telefon pintar juga merupakan peranti penting untuk kehidupan harian yang hadir dengan pelbagai kebolehan telah menarik minat orang ramai. Telefon pintar juga tersedia dengan keupayaan digital dan komunikasi tahap tinggi seperti blueetooth dan USB. Bagi tujuan keselamatan, akses kekunci pintu melalui telefon pintar Android direka sebagai alternatif menggantikan kunci tradisional seiring dengan pembangunan teknologi sekarang dan dicipta khas untuk keselamatan kekunci pintu rumah yang menghadkan pengguna untuk akses sistem ini. Dalam mengurangkan kerumitan, papan IOIO digunakan sebagai unit pengawal mikro yang berfungsi untuk mengolah data yang diterima daripada aplikasi Android .Dimana, komunikasi antara telefon pintar dengan papan IOIO melalui komunikasi tanpa wayar. Ini memboleh kekunci pintu magnetik diakses apabila menerima arahan daripada aplikasi Android dengan melepasi kata laluan.

Di samping itu, kaedah dan strategi yang digunakan adalah perkara yang penting dalam projek ini. Dimana ia mempunyai tiga langkah untuk melakukan projek ini termasuk perancangan, reka bentuk dan pelaksanaan projek. Perkakasan utama adalah papan IOIO yang mempunyai pengawal mikro PIC yang bertindak sebagai penyambung antara aplikasi pada peranti Android. Perisian yang digunakan dalam pembinaan aplikasi Android adalah Eclipse IDE (Integrated Development Environment), dan JDK (Java Development Kit). Projek “Access Door Lock” melalui aplikasi Android telah mencapai objektif dengan jayanya.

DEDICATIONS

To my beloved father, Othman Ludin bin Hussein and my mother Ropinah binti Saad

ACKNOWLEDGMENTS

All the praise to all mighty ALLAH, for bestowing I with courage, knowledge, health and wisdom to carry out this project. I are greatly indebted to my parents, without their endless financial, moral support, patience and prayers the very idea for this was impossible. I would like to pay our humble gratitude to my project supervisor Madam Siti Asma binti Che Aziz. His encouragement was the main source and strength to stimulate me to complete the project. I also grateful to a member who supported me in writing and incanted me to strive towards my goal.

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LIST OF SYMBOLS AND ABBREVIATIONS

USB	=	Universal Serial Bus
PIC	=	Programmable Integrated Circuit
RFID	=	Radio Frequency Identification
LCD	=	Liquid Crystal Display
ID	=	Identity
LED	=	Light Emitting Diode
OTG	=	On The Go
UART	=	Universal Asynchronous receiver transmitter
SPI	=	Serial Peripheral Interface
PWM	=	Pulse Width Modulation
BDP	=	Bachelor Degree Project
SDK	=	Software Development Kit
IDE	=	Integrated Development Environment
JDK	=	Java Development Kit
RSSI	=	Receiving Signal Strength Indicator
ADC	=	Analogue Digital Converter
DC	=	Direct Current
PC	=	Personal Computer
API	=	Application Program Interface

CHAPTER 1
INTRODUCTION

1.0 Introduction

This chapter will explain briefly about the project Access Door Lock via Android Phone. Besides that, this chapter covers Background, Problem Statement, Objective, Scope and Project Significance.

1.1 Background Project

In the last several years, Android smartphones have become more powerful and have been designed to be used as pocket-sized personal computers. The most mobile phones are a 'smart phone', which offers more advanced capabilities in connectivity issues than regular cell phones. Android application has a lot of improvement in terms of its application to allow users to perform daily activities.

Thus, this project one of the projects that can solve the problems facing user today. This project aims to design an android application that serves as a switch for accessing home door. Android application will serve to enable the door can be opened by entering a password. The user can control this switch after entering the correct password by using only the Bluetooth connection without WIFI. This project is one of the applications of Bluetooth technology.

1.2 Problem Statement

Now days, people are tired of carrying around old-fashioned metal keys that heavy and bulky. People like to carry thing light, simple and useful. Besides that, getting stuck out in the rain without keys was the motivation for this project. The use of Bluetooth technology in smart phone today is not just for transfer of data and files only. With the Bluetooth application it is much more convenient to open door or gates via an app that already build in smartphone and get inside without getting drenched in the downpour. It also has built with security password needed to unlock the door with this app and triggered to open. With the security password it can easily to avoid from strangers.

This project is designed to use an inexpensive Android phone that connects via Bluetooth to an IOIO board and a relay switch to operate. Rather than using an Arduino connected to a computer for data processing and control. The IOIO board will serve the same function as an Arduino but without the size, bulk, and energy requirement.

1.3 The Objectives of the Research

The objectives of this project are:

1. To design an android application that is able to access door to be connected to IOIO board with security password
2. To develop of android application and the performance of IOIO board.
3. To provide a controlling android device for door switches via smart phone by using Bluetooth connection.
4. To test and evaluate the signal strength between a prototype with Android smartphones via Bluetooth connection.

1.4 Scope of Project

The scope of this project is to be applicable with the objective to be achieved. The project developed is to help people to control their home door, ON/OFF switch will be created by using android application. It also provided password security system. This project is divided into two parts: hardware and software development. Hardware device consisting of IOIO board as a main component and the software is to design an android application using Java language by used Eclipse. The IOIO board connects to the phone via Android Bluetooth device or via USB debugging pathway. This pathway can be used to send and receive signals to and from the IOIO on board PIC processor.

On the other hand, in other word the limitations of this project are:

- Bluetooth connection with smartphone device range about 10-100 meters depending on the Bluetooth device class.
- This application can be used on smart phones only (support android application) not cellular phones.
- Manually install application in android smartphone, this application not available in android market such as Google Play.

1.5 Project Significance

The project of Access Door Lock via Android Phone was created to provide security to homeowners. In addition, the project also inspired to develop technology in this era. Where, electronic gadgets become leading in the development of electronics. This leads to project Access Door Lock via Android Phone are created for the use of smart phones that available with a variety of facilities to make it easier for users to apply. This project has an application built in smartphone that is used to give instructions to lock and unlock the door. In addition, the project also has security features that the username and password is entered not more than three times if the password incorrectly. The system is easy to use and applicable to any place, including an office or business premises.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This chapter discusses in detail about Access Door Lock via Android Phone and theory related to the devices used in the construction of this project. This chapter also describes and summarizes the previous journal before, authentication method and hardware overview of the project.

2.1 Burglary Case in Malaysia

As one developing country to a developed country, Malaysia is exposed to a variety of challenges and one of the most worrying communities is crime. In recent years, refer to Figure 2.2(a), reported index crime nationwide 2006 until 2009, the rising crime rate and recorded a total of 746 reports in 2006. The increase of 767 reports occurred in 2007 and remained stable in 2008. There was a decline that occurred in 2009 (PDRM, n.d.).

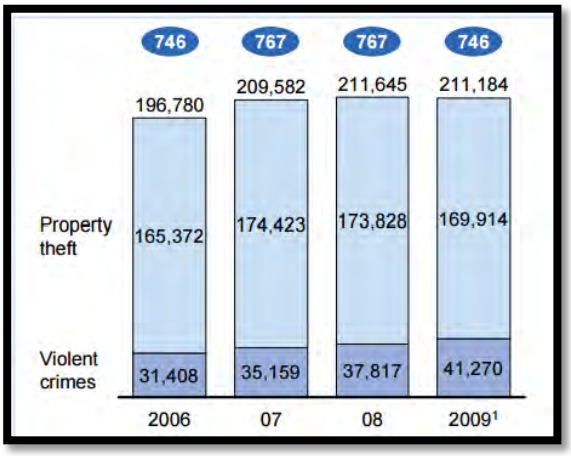

Figure 2.2(a): Reported index crime nationwide, 2006-2009

There are 14 types of crimes in Malaysia, which has been referred to the Crime Index. Crime index is divided into two which are property theft and violent crime. Based on the figure 2.2(b), property of theft contributed to 82% of the total crimes reported. According to the breakdown of reported crimes by crime type index from PDRM sources, Malaysia, 2008 show the house break-ins collectively contribute to approximately 17% of report property theft crimes, (Figure 2.2(c)). Therefore, house break- in problems highlighted in order to reduce or prevent these problems continues to occur (PDRM, n.d.).

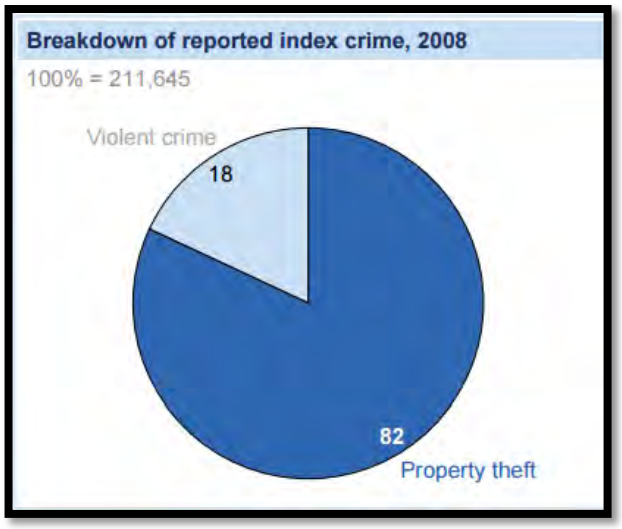

Figure 2.2(b): Breakdown of reported index crime, 2008

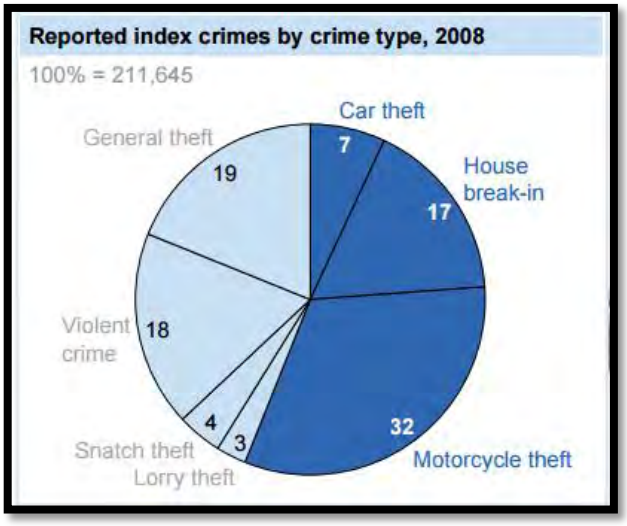

Figure 2.2(c): Reported index by crime type, 2008

2.2 Journal Related

a) Smart Living using Bluetooth based Android Smartphone

According to (Ming Yan and Hao Shi, 2013), the main goal of this project is designed to change people's daily lives. The project is implemented with Bluetooth technology of smart phones which is one of the wireless connections. Wherein, the data will be transmitted via short-range wireless. From there, able to control the operation of appliances in the home such as lights, fans and television. This android application is built using the Java language. And smart phones become remote to control home appliances with a simple, fast and efficient.

b) Ubiquitous Smart Home System Using Android Application

(Kumar, 2014), this project is a low-cost smart home system, which uses Android to communicate with the web server. Where it provides communication with the micro web server that has more than switching function. The smart home system using a variety of sensors including temperature sensors, humidity sensors, motion detectors, smoke detectors and gas that have been included in the system. In addition, it also controls the light switch device and the power plug. Smart home application can perform operations such as switch function, automatic environmental control and intrusion detection. This is where the email will be sent and the siren goes the occurrence of when there is intrusion detection. Other than that, Arduino Ethernet to limit the use of personal computer users to reduce overall system costs to a minimum. All of these applications can also be controlled using voice command has been programmed.

c) Bluetooth Based Device Automation System Using Cell phone

According to (Nupur K. Sonawane,Payal D.Waghchavare,Kajal A.Patel, 2014), this project uses the Arduino BT (AT Mega238) which the implementation of low-cost using a mobile phone based automation systems. In addition, this project using current technology to benefit society. Home appliances connected to an input or output ports at Arduino BT interfaces via a relay. This project uses Bluetooth devices to communicate with Arduino BT board phone. Besides that it can be control by using web server. In addition, this project allows the mobile phone to be monitoring and controlling appliances at home with variety of network through Bluetooth or Web server.

d) Remote Monitoring and Controlling System Based on ZigBee Networks

(Soyoung Hwang and Donghui Yu, 2012), this project is very diverse which uses Zigbee. Zigbee has been one technology that can be used for the home network. This is because the ZigBee specification for a suite of network, security and application software layers using small, low power and low data rate communication. In addition, this project uses a smartphone as a remote monitoring and control system using Zigbee network. This project uses a system of web servers and smart phones to control and monitor home.

e) RFID based security system

(K.Srinivasa Ravi, G.H.Varun, T.Vamsi, P.Pratyusha, 2013), this project uses RFID technology is one of a family of automatic identification and data capture. In addition, this project can provide security in offices, companies, households and others. This system provides information on persons authorized and unauthorized persons. The main components involved in the system are RFID Transponder and RFID readers. The system is functioning when the card is touched on RFID module and it will read the data in the card and display on the LCD display. Data on the card will be compared with data in the program memory to display on the LCD either match or mismatch. The door can only be opened if the data matches with the data card are programmed. If cards do not match an alert will sound.

2.3 Authentication Methods

2.3.1 Password System

This system is one of the latest technologies in order to secure control of the door. It is the result of a combination of digital electronic and mechanical. Where the data programmed into the microcontroller is in a numerical code to link the keypad to enable control door. (Arpita Mishra,Siddhart Sharma,Sachin Dubery,S.K.Dubey, 2014)This system requires the user to enter a password via keypad, which has been provided before the doors opened. Before accessing the system, the user must first assign a password and confirm the password has been entered correctly by refer a first password entered. If the password entered is incorrect, it will not allow the door to be opened until the password is correct. LCD will display the information.

Figure 2.3.1: Password System

This system is one system where it does not use a key to access the house. Among the advantages of this system is that the host has its own password without being noticed by any person except authorized family. This shows that the system has security features. This is because the password is secure from a stranger.

2.3.2 RFID System

This safety system is a system that uses the tag as permission to access the home known as the RFID system. (K.Srinivasa Ravi, G.H.Varun, T.Vamsi, P.Pratyusha, 2013) RFID tag contains a transponder built with a combination of radio receiver and transmitter which will transmit the identification information to a close. In addition, the RFID tag contains a memory chip that store product codes and the information can be read and detected by the RFID reader. There are two types of RFID tags, which are passive and active. A passive RFID tag does not have a source of supply which is activated by a radio frequency by scanning the RFID reader. Passive tags can make deliveries only ID numbers. Compared to active RFID tags have their own power source and can store more data and at longer distances.

Figure 2.3.2: RFID System

RFID reader is a device that connects between tag data with software companies that need information. The reader communicates with a tag that has ID corresponding thereto through an antenna attached to detect and transmit data to the computer for processing. LED indicates to the user to know whether the door is locked or not.