



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ANDROID-BASED HOME DOOR AUTOMATION SYSTEM USING BLUETOOTH

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

by

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automotive) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Automasi Pintu Rumah Berasaskan Android adalah sistem perisian untuk mengawal pintu rumah dengan menggunakan aplikasi dalam telefon bimbit. Komunikasi jarak jauh adalah fokus kepada kajian dan pembangunan ini dan teknologi melibatkan peranti Bluetooth. Sebab utama projek dibangunkan kerana untuk memudahkan orang yang sukar untuk mengendalikan perkakas rumah terutama pintu rumah. Keadaan ini menjadikan halangan untuk golongan kurang upaya. Tiga objektif utama projek ini adalah untuk merekabentuk, membangun dan menganalisis sistem aplikasi android dengan menggunakan sambungan Bluetooth untuk automasi pintu rumah. Input sistem akan menjadi antara muka aplikasi android yang datang dari mana-mana telefon bimbit dipasang dengan aplikasi ini. Kaedah yang dilaksanakan pada projek dengan meneliti teknologi terbaik untuk komunikasi jarak pendek dan kos adalah sangat terhad bahawa semua orang boleh membeli dan memohon kepada rumah sendiri. Jika tidak, proses kaedah bermula dari aplikasi Android yang dijalankan untuk memproses dan terakhir pada perkakasan. Keputusan dihasilkan berdasarkan hasil jangkaan awal dan proses berjalan lancar. Untuk kesimpulannya, tiga objektif utama dicapai dari reka bentuk, membangun dan menganalisis Sistem Automasi Pintu Rumah Berasaskan Android Menggunakan Bluetooth.

ABSTRACT

Android-Based Home Door Automation was a software system to control home door by using applications in mobile phone. A short range communication is a focusing into this research and development and the technology involve was a Bluetooth device. The main reason project was developed because of disable people quite difficult to handle the home appliance especially the home door. This situation was make a barrier to disable people. The three main objective of this project is to design, develop and to analyze a system of the android application by using Bluetooth connection for home door automation. The input of the system Android application interface that come from the any mobile phone was installed with this application. Method that implement on project by researching the best technology for a short range communication and the cost is very limited that everyone can purchase and apply for their house. Otherwise, the method process start from the Android application run to process and final at the hardware. Result was produce based on the early expectation result and the process goes successful run. For the conclusion, the three main objective was achieve from develop and analyze the Android-Based Home Door Automation System Using Bluetooth.

DEDICATION

Special dedication to my beloved parents,

***EN. MOHD ROSLI BINSELAMAT
PN. MAZNAH BINTI SENAN***

To my beloved friends as my backbone

***Abdul Hadi Bin Saleh, Syafiq Ai'Mullah Bin Sabaruddin, Muhammad Muthannah
Bin Jumadil, Mohamad Izzat Bin Kamal Izani, Hafzah Auni Binti Azahar, Nur
Shamimi Binti Othman***

Also my siblings, and my beautiful supervisor

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CHAPTER 1

INTRODUCTION

1.0 Background of the Project

Today, smart phone is the one of the primary tools for consumer in daily life in entire the world. The growth of smart phone rise year to year as known as the World Wide Web (WWW) was established in 1993 and totally changing the world technology to connect entire world. With this technology that give big impact were the smart phone user can connected or communicate with other device with using some of technology such as Bluetooth, Wi-Fi, and Internet. Device are quickly becoming an essential part of our day-to-day life, and countless road fighters already carry a cell phone and laptop computer with them. For both device no any capable to data communication interface or if they do the edge requires the cable connection such as cable Local Area Network (LAN).

The best solution is to remove a cable connection and use the short-range wireless links to enable on-demand connectivity between devices. In 1998, five major companies was formed a group (Ericson, Nokia, IBM, Toshiba, and Intel) was produce a license-free technology for global wireless connectivity in our market (BHAGWAT, 2001). And the solution was Bluetooth, a technology renamed after a 10th-century. The Bluetooth specification inside in version 1.1, call a radio frequency wireless communication interface and relate with set of communication protocols. To support low-cost, single chip used and

power-efficiency of the current technology link speed, communication range, and power transmitter level for Bluetooth was chosen and the true specification of the Bluetooth was released in February 2001 that consist of two part which is core and profile. For the first attempt, Bluetooth with single-chip radio that can run in the frequency 2.4GHZ ISM (industrial, scientific, and medical) RF band (BHAGWAT, 2001).

1.1 Background of the Study

This study focus on the significant of communication in short range data transfer in Android-based home door automation system using Bluetooth. The common home door is using a manual lock and open the door by itself. Bluetooth is act like a pairing on the device and system to receive command and run the system. Bluetooth in industrial is still new and still growth years after year.

In 1993, the engineer of the wireless communication at Ericsson named Jaap Haartsen was appointed to develop a short range communication for mobile phones to enable new existing functionality. By 1994 Bluetooth was going to serious development internally at Ericsson. Nokia and Intel had a similarity thinker to go further with this technology to develop short range communication (Piyare, Bluetooth based home automation system using cell phone, 2011).

Basically home security system are system to detect intrusion. The generation of mankind needed to protect on their own personal item and they could not stay awake with a weapon to do the job themselves. Then the engineer had develop some of technology to replace the weapon and stay awake to save the own item. The technology include with the manual home door lock itself and flow by the system to give notification to owner to be

aware with theft. Some system can run with the internet what it call is Internet of Thing (Iot) where at anywhere and has an internet connection the system can be monitor with a mobile device. And in this report want to study about the short range communication which is Bluetooth to monitor the Android-based home door automation security system.

1.2 Objective of the study

The main objective to this report are:

- a) To design a system using Bluetooth connection for home door automation.
- b) To develop Android application for home door automation system.
- c) To analyze the performance of the Bluetooth system with Android apps.

In every research to be make the main purpose for the study is about the objective to be focused. This objective to make sure in journey of the researchers is not deflected to wrong main purpose of needed in our research. Other reason the objective were develop to make a target achievement in the future result or expected what was happen. With no objective it quite difficult to done our research.

The objective on this study consist of three element which is design, develop and analysis. The three objective is enough to story and explain the whole part for this report. To design a system using Bluetooth connection for home door automation is a first objective to be focusing in the whole report. The system was start with the android application that connected to Bluetooth module to the system. Android application is a place to take an action what should person want to system to be.

After design is accomplish to develop android application for home door automation system. This android app is function to complete the system software from

smart phone device to hardware system. With this app also user can simply use the system with only one clicking to the button interface. And the last objective to analyze the performance of the Bluetooth system with android apps. After the whole process has been done the analysis to make sure the system can run smoothly with no any debugs that can attenuate the process.

1.3 Problem Statement

In daily life many of thing is quite difficult to be done better especially for the disable people. It more difficult for them to handle the home appliance such as a main door. When day going to the night the crime is more openly then the first step to prevent it by lock all the main door to entering the home from theft happen. But, the group of disable people take a time to lock all the door inside on their home. To make on this job easier the system android based home door automation system using Bluetooth can simplify the problem difficult to lock or lock with just a smartphone device with a Bluetooth connection to the system. Other than that, this person do not need to move from their bed to wake up to lock or unlock home door.

1.4 Scope of the Study

The project that serves the needs of people with physical disabilities people. It use the Bluetooth connection technology to produce communication for both smartphone and controlled board. By joining the circuit with a relay board and combined or connect to the Arduino controller board it can be controlled by a Bluetooth available to provide remote

access from tablet or smartphone. Android application inside smartphone place to control the lock or unlock to assist disable people gain control of their living area.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction Bluetooth Technology

Bluetooth technology was a common used in our smartphone, today almost at all smartphone has this technology. One of the function is to transmit and receive the data from other source in a short range radius. The frequency for Bluetooth technology is around 2.4 KHz and it in a range of ultra-high frequency and it is use a short-wavelength. For this research about the android-Based home door automation system using Bluetooth. Android is a platform to give a command or instruction what actual physical happen after give a command.

Home door automation the physical should be function after get the instruction. But Arduino as a hardware to process all data programmed and process what will be happen on next step. Then the medium to exchange the data is Bluetooth module it is a main module to receive the data signal from smartphone. Main purpose for this project is to transform from old home door automation common used is using key with this technology it make easier to lock and open by using only smartphone that connect with Bluetooth. Then disable people is a main reason why this technology must be used in their daily life because disable people quite difficult to move not to mention to open the door lock.

2.1 Related Work

On this sub chapter discuss about the related work in reality field. Bluetooth was used in any technology device such as mobile phone or laptop. Some of that technology implemented in the highly security system such as door lock. The more explanation was discuss the sub topic after this.

2.1.0 High Security Door Lock System by Using Android Mobile with Bluetooth

The main purpose for the author develop our technology is to make disable people life easier. According to the disable people, have a partial movement to control almost home appliance even to lock or unlock the door. It is because normally switched are placed at a high location then quit difficult for those who have a problem on their leg need to use a wheelchair. Researchers found that RF Identification (RFID) is a one of technology to lock and unlock the door using different mechanism with RF signal as a smart key door with wireless security system. The old technology was still used such as Global System for Mobile Communication (GSM) to control home door automation where message Service Text Messaging (SMS) as an instrument to switch the system using mobile phone (kannappan, 2017) .

Then Bluetooth is become most popular among the device such as mobile phone because of the system is simple, low cost, and safe for wireless connection to the home automation system. Therefore, by using android device to manipulate magnetic automation door with Bluetooth as a wireless connection protocol. And

android device, Graphic User Interface (GUI) is an application for the control door automation through Bluetooth protocol. Graphic User Interface (GUI) is a place to conduct the instruction from user than the most importance is to make disable people easy to use a system which use only a less effort.

2.2 Bluetooth

Bluetooth is a technology that very simple to be used and on cost it is cheap. The frequency was used by Bluetooth is 2.4GHz is quit big in a technology device. But the range of Bluetooth is much closed that cannot go far from the device.

2.2.0 Bluetooth Technology

Bluetooth is a one of technology to exchange the data with a short range distance. This technology was being chosen because of their capability and easy to use without any complicated connection then frequency available 2.4 GHz and radius to exchange the data almost 100 meters with speed up to 3Mbps (Naresh, 2013). Sriskanthan state that Bluetooth device can operate with no licensed required, frequency that generally available of 2.4 GHz that can exchange the data within in range of 10 meters and also can be expandable to 100 meters by increasing transmitted power and at the speed of 1 Mbps (Sriskanthan, 2002). From both statement means that Bluetooth range can be operate in between 10 to 100 meters with speed 1 to 3 Mbps depends on the power use to transmit the data. To send a data with a long distance, power from the beginning must be higher to eliminate the data loses due to environment effected.

2.2.1 History of Bluetooth

A world become a wireless technology to replace the cable connection between hand phones and other portable devices. Bluetooth is a one of best technology to be use future because of low cost, low power, and short-range radio technologies to communicate with devices. It can clean up desk considerably, making wires between workstation, mouse, laptop computer and many other devices. In 1994, Bluetooth system was developed by Ericsson Mobile Communication to make a replacement to the cables connecting for hand phones and for the accessories. The Bluetooth system is named after a tenth-century Danish Viking King, Harald Blatand, who united and controlled Norway and Denmark. The first Bluetooth devices hit market around 1999.



Figure 2.1 Bluetooth logo

Special Interest Group (SIG) is an organizer that control and responsible for further development of the Bluetooth standard. Some of the company that involve in this organization is Sony Ericsson, Intel, IBM, Toshiba, Nokia, Microsoft and Motorola. The composition of the Bluetooth SIG is one of the main strength of the Bluetooth technology. The both software and hardware to be mixture is a supplier participating in the further development of the Bluetooth technology to ensure that Bluetooth products are available to end users. Microsoft is a one organization that