UNIVERSAL REMOTE CONTROL FOR HOME APPLIANCE WITH SMARTPHONE

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"I hereby declare that this report is the result of my own work expect for quotes as cited in the references."

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Dedicated to my beloved family especially my parent, lecturers and all of my friends

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ABSTRAK

Kini, setiap perkakas rumah menyediakan alat kawalan jauh sendiri dan kebanyakannya alat kawalan jauh menggunakan medium inframerah untuk menghantar isyarat. Setiap jauh hanya boleh mengawal hanya satu jenis perkakas dan biasanya terdapat pelbagai jenis alat kawalan jauh di dalam rumah. Dengan adanya pelbagai jenis kawalan jauh, ia mewujudkan masalah pembaziran ruang dan masalah buat pengguna untuk memcari kawalan jauh yang betul. Kawalan jauh normal semasa tidak memberikan pandangan yang jelas untuk pengguna dalam persekitaran yang gelap. Kawalan jauh universal yang dapat mengawal peralatan rumah dengan menggunakan telefon pintar dalam kawasan liputan tanpa wayar melalui media tanpa wayar harus dihasilkan, bagi menyelesaikan masalah-masalah yang dibentangkan. Skop yang terdapat dalam projek ini adalah aplikasi telefon pintar, konfigurasi Wi-Fi, dan unit pemancar IR. Unit pemancar IR yang digunakan untuk memproses data yang diterima dari telefon pintar dan menjana isyarat arahan bagi IR LED untuk menghantar isyarat. Wi-Fi konfigurasi adalah penetapan yang membolehkan komunikasi antara telefon pintar dan IR unit pemancar. Aplikasi telefon pintar menyediakan penetapan Wi-Fi dan dua susun atur jauh bagi pengguna untuk mengawal dan menyambung kepada unit pemancar IR melalui media tanpa wayar. Projek ini adalah gabungan pelbagai jenis kawalan jauh dan ia memperbaiki beberapa ciri-ciri seperti telefon pintar sebagai pengawal dengan menyambung telefon pintar dan perkakasan melalui media tanpa wayar. Projek ini menyediakan pengguna untuk mengawal lebih jauh sekurang-kurangnya 60 meter. Objektif projek ini telah tercapai.

ABSTRACT

Nowadays, each appliance provides its own remote control and the remote mostly using infrared medium to transmit signal. Each remote just can control for the only type of appliance and normally there are various types of remote in the house. With the various type of remote that provided, it creates problems of wasting space and make user hunting for the right remote. The current normal remote does not provide a clear view for user in dark surrounding. To solve the problems that state above, a universal remote control has to design which able to control home appliances using smart phone within the wireless coverage area via wireless medium. The scope consists in this project are smartphone apps, Wi-Fi configuration, and IR transmitter unit. IR transmitter unit used to process the received data from smartphone and generate command signal for IR LED to transmit. Wi-Fi configuration is a setting that allows communication between smartphone and IR transmitter unit. Smartphone apps provides Wi-Fi setting and two remote layout for user to control and connect to IR transmitter unit via wireless medium. This project is the combination of various types of remote control and it improve some features such as smart phone as controller with connect the smart phone and hardware via wireless medium. This project provides user to control over a long distance at least 60 meters. The objectives of the project have been achieved.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABREVIATION

OS	-	Operating System
IR	-	Infrared
UART	-	Universal Asynchronous Receiver/Transmitter
RF	-	Radio Frequency
PCB	-	Printed circuit board
DVD	-	Digital Video Disc
TV	-	Television
LED	-	Light emitting diode
Wi-Fi	-	Wireless Fidelity
PIC	-	Peripheral Interface Control
IP	-	Internet Protocol
TCP	-	Transmission Control Protocol
UDP	-	User Datagram Protocol
ISM	-	Industrial, Scientific, & Medical radio frequency band
XML	-	Extensible Markup Language
RAD	-	Rapid Application Development
IDE	-	Integrated Development Environment
MS	-	MicroSoft
UI	-	User Interface
SPI	-	Serial Peripheral Interface
IDE	-	Integrated Development Environment

XML	-	Extensible Markup Language
RAD	-	Rapid Application Development
APK	-	Android application package file

LIST OF APPENDIX

CHAPTER I

INTRODUCTION

1.1 Overview

The infrared remote control has the performance of the high signal to noise ratio, reliable transmission of information, and untouchable, strong anti-interference, low power and cost. Therefore infrared remote control is widely used in home appliances. More or less, it also as the highlight on sale. Nowadays, each appliance provides its own remote control and the number of appliance provides multi services or complex function increases. So, user has to familiar with the operations and the different features of many remote controls. Besides that, formats of infrared remote control protocol used are different between the different companies' production, the consequence from this is that an infrared remote control device must be fit for the home appliances. As a result, combine all of these remote control become the only controller called as universal remote control is a convenience way for user to operate.

To interact with various devices or home appliances, the devices that have the greatest chance of successful become universal remote control is Smart Phone. Smart Phone is an emerging mobile phone technology that supports Java program execution and provides wireless connectivity. The Smart Phone can act as a universal remote control for interaction with embedded systems located in its proximity. To support proximity-aware interactions, both the Smart Phone and the embedded systems with which the user interacts must have short-range wireless communication capabilities.[1]

1.2 Objective

The main objectives of this project are:

- To design and develop a prototype of universal remote control which can control home electronic appliances using smart phone via wireless medium.
- To develop a prototype of remote control which can control the device from anywhere in the house.

1.3 Problem Statement

Nowadays, infrared remote control is widely used in home appliances. At present, each appliance will provide its own remote control. Difference manufacture will apply different format of infrared protocols into their infrared remote control. As a result, an infrared remote control only can control the model and brand of device (but some can apply more models of the same brand). In a house, there are many home appliances like television, DVD player, Astro player, air-condition and so on. Meaning that, there should has more than one remote in the house. With those remote controls, it will create some problem to user. First, users have to hunt for the right remote control to operate the home appliance. It will take time to hunt for the remote control. Second, with the many remote controls, it will make table look

messy and wasting space to put all these remote controls. Sometime the remote control cannot send the signal to the device, mostly user will think it caused by low batteries of the remote control and normally user will change the batteries. However, it may cause by the loss connection of the batteries or others small problem are not relate to battery. So it will be resource wastage. Difference manufactures design the different pattern of remote control, the battery used also different. Some of them use double A batteries, and some of them use triple A batteries. It will confuse the user which type of battery to buy. At last, in dark surrounding of environment, it will make the user hard to find the right button of the remote control

1.4 Scope of Work

This project consists of software and hardware. The scope can separate into three parts and there are design of smart phone application, wireless configuration and Infrared transmitter unit. Smart phone application in this project will focus on Android operation system. It is because Android OS is one of reason the large smart phone usage in phone market and the important reason is Android OS is open source. This application will provide two models of home appliances from different manufacturer for user to choose the device that want to control.

In order control the home appliance, the remote control command has to figure out. Encode the remote control command is also one of the important part of this project. After encode the remote command, the command have to program into PIC.

This app will connect with IR transmitter unit through wireless module that store in the IR transmitter unit. The signal will transmits through wireless transmission medium. In order to let hardware able to communicate through wireless, wireless network has to set up to allow the wireless connection. IR transmitter unit is used to process the signal from smart phone and send to the home appliances that want to control through infrared transmission medium.

5. In dark surrounding, user able to see the control button clearly with the screen light.

1.6 Report Outline

For this project, the smart phone application used to send signal to infrared transmitter unit through wireless module. Wireless module is the hardware that communicates between smart phone and infrared transmitter unit using wireless medium. Microcontroller is used as controller for wireless module and process the received signal from smart phone and send signal to output (infrared LED). This project makes the smart phone as controller mean everyone has their personal controller instead of a remote control that have to share each other. Meaning that, the problem hunting for remote control will solve. This project provides user a simple way to control any home appliances with their smart phone. The smart of the project is can control different electronics appliances from anywhere in the house. Other than that in dark surrounding, user able to see the button to control clearly by the screen that provide in smart phone.

CHAPTER II

LITERATURE REVIEW

In order to produce a working remote control, a basic understanding of the technology behind such devices must first be ensured. More specifically, this understanding concerns communication between remote controls and their respective equipment, as well as the electronic components that make it all work.

This chapter describe about the different format of infrared signal from different manufacture, how remote controls utilize microcontrollers, infrared LED for universal remote control, programming language that used in different software and other additional information which is related to this project. Since the product communicate with a smartphone via wireless medium, so wireless network and Wi-Fi module will be described.