



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART WIRELESS- VOICE COMMAND ELECTRICAL LAMP CONTROLLING SYSTEM

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Telecommunications) (Hons.)

by

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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's Degree in Electronics Engineering Technology (Telecommunications)(Hons.).The member of the supervisory is as follow:

.....
(MOHD FAUZI AB RAHMAN)

ABSTRAK

Industri Automasi rumah berkembang pesat. Ini adalah kerana keperluan untuk menyediakan sistem sokongan untuk warga tua dan orang kurang upaya, terutama kepada mereka yang tinggal bersendirian. Tambahan pula, penduduk dunia disahkan semakin tua. Pusat-pusat automasi bagi pengiktirafan arahan suara dengan menggunakan modul EasyVR bagi mendaftar perintah suara, sementara itu dengan menggunakan modul komunikasi tanpa wayar berkuasa rendah RF Zigbee yang harga sangat berpatutan. Sistem automasi rumah adalah bertujuan untuk mengawal semua lampu dan peralatan elektrik di rumah atau pejabat hanya menggunakan arahan suara tetapi dalam project ini hanya tertumpu pada kawalan lampu sahaja. Zigbee akan menerima arahan suara dan menghantar data suara untuk pengawal EasyVR kemudian pengawal menukar suara ke dalam format yang diperlukan. Selepas itu data tersebut akan dihantar melalui zigbee kepada zigbee yang lain dan kepada pengawal mikro di mana peranti yang melekat padanya. Lampu tersebut akan berfungsi berdasarkan mesej yang diterima sama ada ON / OFF dan DIM peranti.

ABSTRACT

Home Automation industry is growing rapidly. This is fuelled by the need to provide supporting systems for the elderly and the disabled, especially those who live alone. Coupled with that, the world population is confirmed to be getting older. The automation centres on recognition of voice commands using a EasyVR module to sign a command, meanwhile uses low-power RF ZigBee wireless communication modules which are relatively cheap. The home automation system is intended to control all lights and electrical appliances in a home or office using voice commands but it will focus only on lamp for this project. The zigbee receive the voice and send the voice data to the EasyVR controller then the controller converts the voice into required format. After that, the data is send through the zigbee to the another zigbee and to the micro controller where the devices are attached to it. Based on the received message it either ON/OFF and DIM the devices.

DEDICATION

Especially to my beloved parents, siblings and friends for their eternal support,
encouragement and inspiration throughout journey of my education

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LIST OF ABBREVIATIONS AND SYMBOLS

VR	-	Voice Recognition
IC	-	Integrated
PC	-	Personal Computer
GSM	-	Global system for mobile
DIM	-	Dimmer
RF	-	Radio Frequency
MIC	-	Microphone
WSN	-	Wireless Sensor Nodes
PIC	-	Peripheral Interface Controller
ADC	-	Analog to digital converter
UART	-	Universal asynchronous receiver/ transmitter
AES	-	Advance Encryption Standard
USB	-	Universal Serial Bus
RC	-	Resistor Capacitor
GUI	-	Graphical user interface
IN	-	Input
SD	-	Speaker- Dependent
SI	-	Speaker-Independent
US	-	United States
PCB	-	Printed Circuit Board
LED	-	Light Emitting diode
AC	-	Alternating Current
V	-	Voltage
Hz	-	Hertz
K	-	Kilo
Bps	-	Bit per Second
G	-	Giga
dB	-	Decibal

CHAPTER 1

INTRODUCTION

1.1 Background

Home Automation Control System is not a new system in today's world, it is used to provide amenities for user to control and monitor the appliances and provides a better utilization of electricity. The role important in daily life is electric device on Home Automation. The world been growth and technology become more widely, nowadays all generation are no exception to a new technology such as PC (personal computer), internet, mobile phone and wireless technology that makes it easy for a user to control access the Home Appliances. Some of Home Automation control also be able to monitor by Bluetooth, Android Application and GSM technology.

The Wireless Home Automation System is an integrated system to facilitate elderly and disabled people with an easy to use home automation system that can be fully operated based on voice command. The system is portable and construct in a easy way that is easy to install, configure, run and maintain. Voice recognition is an ability of a computer, computer software program or hardware device to decode the human voice into digitized speech that can be interpreted by the computer or hardware device. Voice recognition is commonly use to operate a device, perform commands or write without having to operate keyboard, mouse or press any buttons.

The differences between voice recognition and speech recognition, voice recognition is computer analysis or the human voice especially for the purpose of interpreting words and phrases or identifying an individual voice which is means by used this method mainly for security devices. Speech recognition can recognize and understand spoken words, by digitizing the sound and matching pattern against the stored pattern. This device is largely speaker dependent and can recognize discrete speech (speech with pauses between words) better than the normal (continuous) speech. Their major applications are in assistive technology for helping people in working environment. A typical wireless automation system allows one to control house hold appliances from a centralized control unit which is wireless. These appliances usually have to be specially designed to more compatible with each other. The wireless home automation system is intended to control all lights and electrical appliances in a home or office using voice commands.

This thesis is all about Smart Wireless voice recognition electric lamp controlling system. There only a command for control a lamp which is ON OFF and DIM. The automation centers on recognition of voice commands using a EasyVR module to sign a command, meanwhile uses low-power RF ZigBee wireless communication modules to receive the data. The Zigbee will receive the voice and send the voice data to the EasyVR controller then the controller converts the voice into required format. After that, the data is send through the Zigbee to another Zigbee and the data will be analyzed by EasyVR. The lamp will function based on the received message either ON/OFF and DIM.

1.2 Problem Statement

In our daily life, electrical devices are very important in order to improve the quality of our life but most of them are not friendly for those handicapped user. In addition, it can provide supporting systems for the elderly, especially those who live alone. For that reason, this project is proposed to create a system that can be attached with electrical devices and command them by using our voice. With this system, user can easily operate the devices without touching the operation button.

1.3 Project Objective

The objectives of this study are stated as follows:

1. Firstly, to create a voice print for the work spoken
2. To analyze the performance result of the voice recognition for commanding electrical devices
3. To establish a prototype that integrate all the modules together to produce a wireless voice command electrical lamp controlled system

Elaboration of the above project objective can be discussed in the following sentences. Firstly, to create a voice print for the work spoken. Voice print is a set of measurable characteristics of a human voice that uniquely identifies an individual. Second, to analyze the performance results of the voice recognition for commanding to control light. Finally to establish a prototype that integrates all the modules together to produce a smart wireless voice command electrical lamp controlling system.

1.4 Project Scopes

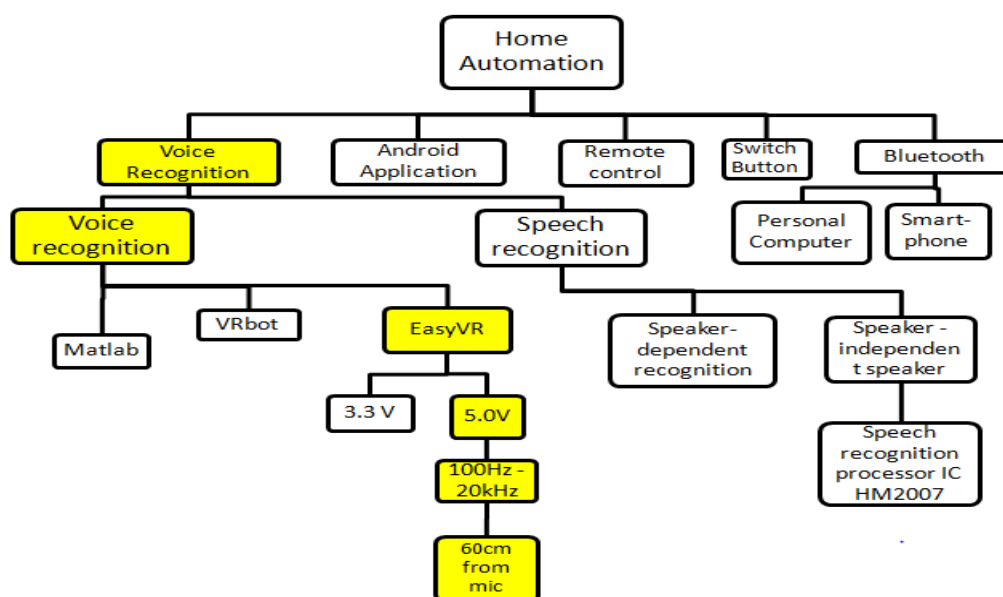


Figure 1.1 K- Chart

In this project Smart Wireless electric device using voice command to control lamp; ON, OFF and DIM will be developed. A prototype that consists of three modules will be integrated; the first module is Zigbee module which is the wireless control and monitor applications. Next is EasyVR module with Arduino module. Arduino module detects audio sounds and recognizes it through the system EasyVR. Instruction given the voice will be send as called voice data to the EasyVR controller which will converts the voice into particular format. After that, the data is send through the Zigbee to another Zigbee and the data will be analyzed by EasyVR. The lamp will function based on the received message both ON/OFF and DIM.

1.5 Project Significance

The importance of this project is to support the need to provide supporting systems for the elderly and disabled, especially those who live alone. This voice recognition will assign an individual voice to avoid potential interference from any parties that should not be. The method is used Smart Wireless Voice Command electrical lamp controlled system, which is compatible and easy to monitor by disabilities. Differences from other method that recognized voice learning process in step by step. As disabilities people they may not understand the procedure and will make them more confuse.

1.6 Thesis Outlines

The Smart Wireless-Voice Command Electrical Lamp Controlling System tool final thesis is a combination of 5 chapters that contains and elaborates specific topic such as Introduction, Literature Review, research Methodology, Result, Discussion, Conclusion and Further Development that can be applied in this project.

Chapter 1 basically is an introduction of the project. In this chapter, the main idea regarding background and objectives of the project will be discussed. The full design and basic concept of the project will be focused in this chapter. The overview

of the entire project also will be discussed in this chapter to show proper development of the project.

Chapter 2 is about the literature review and the methodologies for the development of the Smart Wireless-Voice Command Electrical Lamp Controlling System tool. This includes the future project development that can be added in this project.

Chapter 3 will discuss about the design of this project development. In this chapter, it will explain how to create voice recognition by using an EasyVR module and the process of wireless by using a low RF Zigbee module.

Chapter 4 will be discussing on the performance and evaluation result of the software and hardware outcomes.

Chapter 5 will conclude and summarize the main points with regard to the project. Recommendations to further improve the projects also will be highlighted and discussed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, the basic knowledge and fundamental concept in creating the voice recognition will be discussed. Firstly the theory of voice recognition will be introduced. Next some literature with regard to recent projects that have similarity will also be discussed.

2.2 Speech Recognition Type

In common, these voice recognition concepts have two types which are speaker-dependent recognition and speaker-independent recognition. In Speaker-dependent systems, speech command will be qualified by individual or single person that who will be using the systems of voice recognition in a way similar with voice recognition. The user must train to the software by speaking to it, the computer will analyze the voice and word that spoken by the persons. This system capable of achieving a high command count and recovered than 95 percent accuracy of word recognition. The drawback to this approach is that the systems only can response accurately to the individual, thus only suit for application that required high security such as using speech command to login a personal computer (Kadir, 2010)

Speaker-independent speech recognition system could provide anyone's voice there are no such of training is involved. There no need to collect speaker- specific data to train the system, but collect data from a variety of speakers to consistently model many different speakers (X.D.Huang, 2012). In others words, this systems required to recognize the command in variety of intonation. This type of system is highly needed by the industrial area in order to let different employee operate the same systems.

2.3 Literature Review of Current Existing Projects

This part discuss and review a variety kind of that based on Wireless Voice Recognition controlling system that are carried out. Each project use different kind of methods in creating their project.

2.3.1 Wireless Speed Control with Voice for Wheelchair Application

This project is done by Zamre Bin Abd Ghani from Universiti Teknologi Malaysia (UTM), Skudai, Malaysia in his final year project (FYP) in MAY 2007. The project is focusing on the use of basic voice for controlling functions of the wheelchair control system which includes forward - backward directions movements, left - right turn and wheelchair stop function as well as collision avoidance function. The function and the corresponding digital command words are pre-stored in the voice recognition memory locations. The pre-stored process is done in a mode called training mode. Overall of this project can be illustrated as in Figure 2.1. (Zamre, 2007).

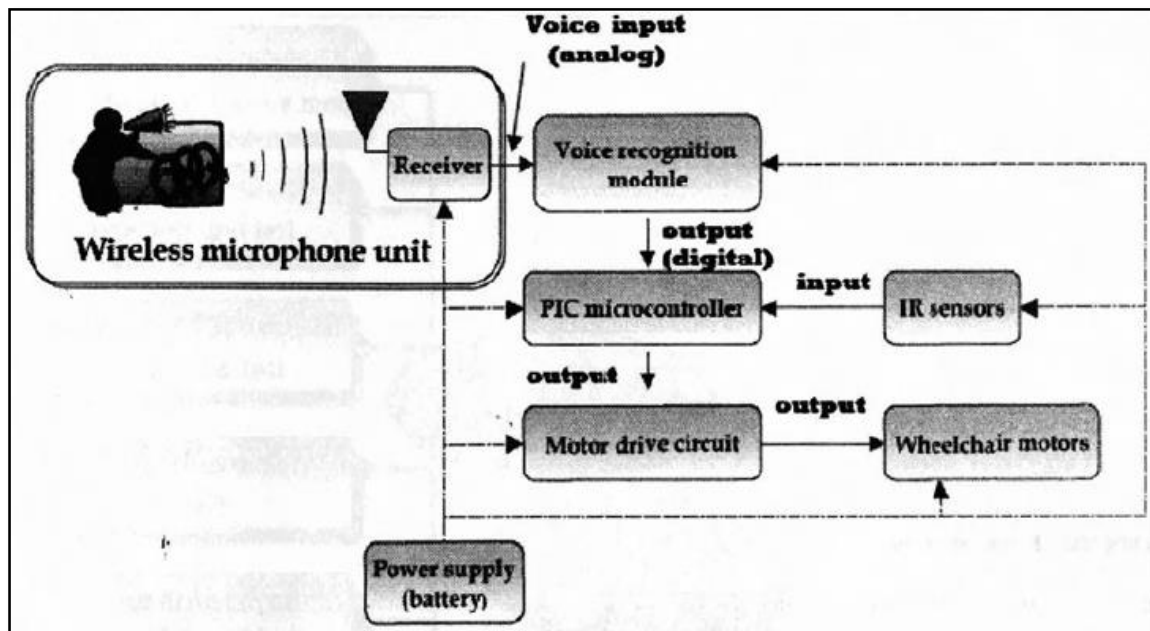


Figure 2.1: Wheelchair control system block diagram

According to Figure 2.1 the project control system can be divided into five different blocks that as follows:

1. Wireless microphone unit
2. Voice recognition module
3. Main control system block
4. Wheelchair/motor interface and sensor input block
5. Power Supply Block

This project uses a speech recognition processor IC HM2007 as a voice recognition module. In other study this processor is talented of working for speaker-independent voice recognition (Prathyusha, Roy, & Shaik, 2013). Figure 2.2 shows a speech recognition circuit which is in this circuit need to apply a +5V power source that presented by a voltage regular IC LM7805 and provide 9V input voltage from battery. The circuit is not suitable for power supply below then 5V, as the recognition process disrupt and produces errors (Zamre, 2007).

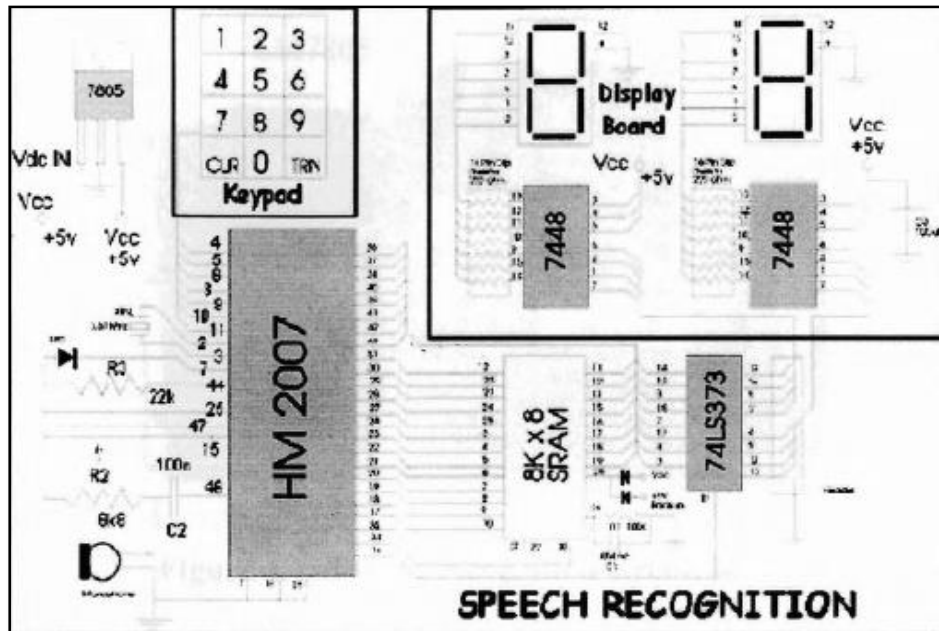


Figure 2.2: Speech Recognition Circuit

2.3.2 Wireless Sensor Node (WSN) utilizing Xbee

This research is done by Ym yusoff, Husna Zainol Abidin, Ruhani Ab. Rahman and Faieza Hanum Yahaya from Universiti Teknologi Mara. The research is about PIC based wireless sensor network utilizing Xbee technology that show analysis of wireless sensor node used in the high-end applications such as weapons sensor ship and biomedical applications. The research shows the performance that expressed by of Wireless Sensor Nodes (WSN) models, which is developed using PIC (Ym_, Husna, Ruhaini, & Faieza, 2010).

A wireless network consists of spatially distributed independent sensor to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants. The development of wireless sensor network was motivated by the military applications such as battlefield surveillance. Nowadays it is also used in many industrial and civilian application areas, including industrial process monitoring and control, machine health monitoring, environment and habitat monitoring, health care application, home automation and traffic control. Figure 2.3 shows a wireless sensor network (F.L.Lewis, 2004).