



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**IMPLEMENTATION OF A VOICE COMMAND  
RECOGNITION SYSTEM (I-SWITCH) FOR HOME  
APPLIANCES**

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

by

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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 Engineering Technology (Computer System) with Honours. The member of the supervisory is as follow:

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## ABSTRAK

Pengiktirafan ucapan merupakan komponen penting dalam sistem rumah pintar. Jarak antara pembesar suara dan mikrofon dan kekerapan suara pembesar suara adalah parameter penting untuk mengendalikan sistem rumah pintar. Modul Bluetooth Arduino UNO dan HC-05 telah digunakan dalam projek ini. Pengiktirafan ucapan dengan pelbagai jarak digunakan untuk menyiasat ketepatan dan keberkesanan sistem ini. Oleh itu, kami telah memasukkan Modul Bluetooth HC-05 dengan telefon pintar yang memperlihatkan antara muka pengguna yang mudah berbanding bilangan suis yang kompleks yang diletakkan di kawasan yang berbeza di rumah kami. Ini adalah kelebihan untuk pengguna sistem ini mengawal peralatan di rumah dari telefon bimbit canggih adalah lebih berfaedah bagi pelanggan untuk mengawal peralatan rumah di mana sahaja mereka berada pada masa yang sama mematikan perkakas apabila pengguna tidak menggunakan sambungan Bluetooth. Hal ini disebabkan oleh fakta bahawa kebanyakan telefon pintar terbina dalam dengan kebolehan komunikasi jarak jauh, misalnya Bluetooth yang cukup memberi mereka kuasa untuk berkomunikasi dan mengawal peralatan dalam lingkungan mereka. Makalah ini menggabungkan bahagian perkakasan dan pengaturcaraan Arduino Uno, HC-05 Bluetooth Module dan seterusnya aplikasi telefon pintar yang merupakan jalan pintas yang kompeten untuk membangunkan rangka kerja rumah yang dapat mengawal atau memantau keadaan peralatan rumah. Bahagian ini menggambarkan pelan mengenai konfigurasi, pelan dan pelaksanaan Suis Pengiktirafan Suara dengan Sistem Bluetooth.

## ABSTRACT

Speech recognition is an important component in smart home system. The distance between the speaker and microphone and the loudness of the speakers voice are the important parameters to operate the smart home system. Arduino UNO and HC-05 Bluetooth Module were used in this project. Speech recognition with various distances were used to investigate the accuracy and effectiveness of this system. Therefore, we have incorporated the HC-05 Bluetooth Module with the smartphone which presents simple user interface compared to complex number of switches which is placed in different area of our home. This is an advantage for the users of this system controlling the appliances at home from the advanced mobile phone is extra advantageous for clients to control home appliances wherever they are at the same time switch off of the appliance when user is not around using Bluetooth connection. This is due to the fact that most smart phones are built-in with long range communication abilities, for example Bluetooth that pretty much empower them to communicate and control appliances in their range. This paper combines the hardware and programming part of Arduino Uno, HC-05 Bluetooth Module and furthermore smart phone application which are the competent headways to develop a home framework that can control or monitor the state of home appliances. This part portrays the blueprints about the configuration, plan and execution of the Voice Recognition Switch with Bluetooth System.

## **DEDICATION**

To my beloved parents, thanks for the help, concern and understanding while I'm in developing this project.



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## CHAPTER 1

### INTRODUCTION

#### 1.0 Introduction

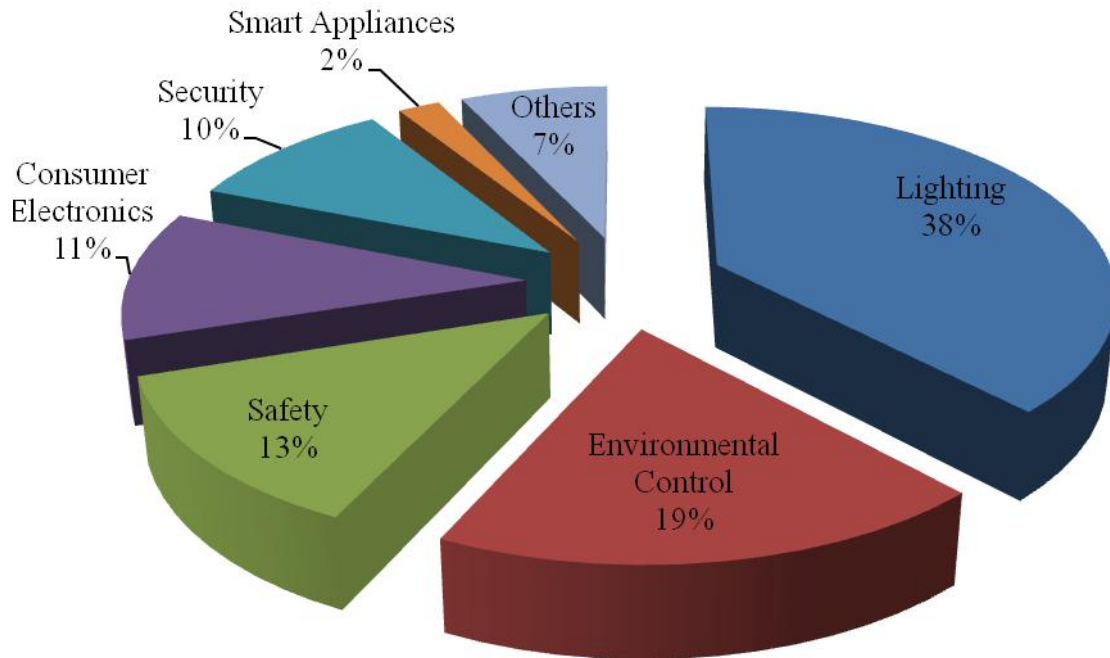
Home automation is a private expansion of structure automation. It is automation of the home, housework or family unit movement. Home automation may incorporate unified control of lighting, HVAC (heating, ventilation and air conditioning), machines, security locks of entryways and entryways and different frameworks, to give improved accommodation, comfort, vitality effectiveness and security. Home automation for the older and impaired can give expanded personal satisfaction to people who may some way or another require guardians or institutional consideration. (Ambient Intelligence and Future Trends,2012)

Smart Home can possibly be one of the biggest tech reception upsets that have been found in decades as the 'Internet of Things' innovation is installed in a consistently expanding cluster of family unit item classifications.

While security emerges as one classification with expansive intrigue, our exploration demonstrates that clients additionally have solid enthusiasm for a decent variety of Smart Home item classes, from nuts and bolts, for example, vitality and lighting to delighters, for example, diversion. With value emerging as the top obstruction to appropriation, advertisers need to concentrate on promoting that exhibits that their item tackles an issue, yet additionally that it conveys enthusiastic intrigue. (Smart Home Technology Greater Impact Wearable Cloud,2015)

While early Smart Home frameworks would in general be remain solitary arrangements, concentrating on way of life needs, for example, lighting and amusement, current forms for the most part include vitality the board and are available by means of the internet. Inside 10 years as we move towards the 'Internet of Things', we hope to see the development of the 'Omnipresent home', where refined 'Surrounding insightful' frameworks find out about clients' conduct and ways of life, and empower the house to anticipate and react to every one of the inhabitants' needs and exercises. Internet network and the landing of standard, multifunctional components present an open door that is being seized by telecoms and service organizations which are currently offering a scope of 'Connected Home' arrangements.

Lighting controls are the fundamental application for these frameworks, with ecological controls second biggest, as clients have been progressively stressed over their vitality bills and the need to diminish utilization of vitality. Homes offering helped living are a significant market in the Netherlands with monetary help from the Government. (European connected and Smart Home market overview,2015)



**Figure 1.1 : Pie chart showing the applications of speech recognition system**

A service propelled free@home a year ago to make it simpler for installers to offer home robotization, bringing the preferences empowered by the Internet of Things, Services and People into individuals' homes. The framework makes it straightforward by means of smart gadget or a PC to deal with various capacities to make the home condition of buyers decision. Presently, by including voice control, home computerization turns out to be much less difficult.

Clients can program the framework to pick the names of rooms and territories. The framework can be set with the goal that clients get an affirmation that an order has been actuated. Furthermore, clients can ask the framework inquiries about the status of the capacities.

The exchange processor inside the voice control framework utilizes calculations to perceive the client's expectation and the unique situation. The client shouldn't be prepared as the discourse model adjusts dependent on the words

customized into the free@home framework (name of floors in the home, rooms and capacities being controlled). The framework accumulates the information from the specific circumstance, yet in addition from a huge voice library. Besides, should the order not be sufficiently finished, the framework will approach the client for more data.

The home robotization arrangement is sold under the Busch Jaeger brand in Germany, Holland and Austria and under the service brand in every single other market the world over. (Unveils Intelligent Voice Activated Smart Home System, 2015)

In Malaysia, this type of advanced smart home system is not implicated in houses or it's very rare to see it. Therefore, a preliminary speech activated smart home system was chosen as Final Year Project.

## **1.1 Background**

The utilization of speech recognition innovation is turning into a suitable way to control the earth. As the advancement of speech initiated innovation increments and the expense of the related equipment and software diminishes, the utilization of speech controlled gadgets will be ordinary. Applications for speech recognition of innovation are various and incorporate the control of machines, purchaser hardware, toys, and instruments. Items and administrations utilizing speech recognition are growing quickly and are constantly connected to new markets.

The utilization of speech recognition is perfect wherever the hands or the eyes are occupied. Speech directions are a fast, sans hands approach to control electrical gadgets. The risks related with strolling into a dim room, or the bothers of intruding on

errands so as to turn on apparatuses or lights, are lightened by the usage of speech recognition innovation.

Speech recognition innovation has been being developed for over 25 years bringing about an assortment of equipment and software apparatuses for PCs. In a regular application, a speech recognition circuit board and perfect software programs are embedded into a PC.

These extra projects, which work ceaselessly out of sight of the PC's working framework, are intended to acknowledge verbally expressed words and either execute the verbally expressed order or convert the words into content. Likewise, it is impossible that fabricates will add all out PC frameworks to control apparatuses, for example, clothes washers or electronic items, for example, sound systems. PC controlled frameworks that use speech recognition have been utilized to control the apparatuses and hardware all through a house or building, nonetheless, these frameworks are costly, confused, and require custom establishment.

The speech recognition gadget works in a consistent listening mode which enables it to effectively tune in for sounds consistently. In a perfect world, the gadget is situated in a position that is uncovered and not taken cover behind an item, for example, a household item. An uncovered area permits an implicit mouthpiece to get un-suppressed sounds and speech in vicinity to the gadget in this way expanding the reaction exactness. The favored divider switch encapsulation is ordinarily put in a helpful area inside a room.

Consequently, the amplifier will be at an ideal dimension to acknowledge a speaker's directions, especially in conditions in which the speaker is situated. This is

especially helpful where the earth is boisterous, or where the client is impaired or has low versatility.

The voice-activated gadget is continuously tuning in for an adequate speech direction insofar as power from the utility fundamental is accessible. Consequently the gadget is always handling foundation commotions and building up a surrounding clamor level. The encompassing clamor level is a normal decibel dimension of the sounds in the recurrence scope of speech that are recognized by the gadget. For instance, a foundation commotion dimension of a 50 decibel (dB) cooling unit makes the gadget set up an encompassing clamor dimension of 50 dB. Recognized sounds underneath that dimension are overlooked, and all together for the gadget to follow up on a direction word, the client must express over that dB level. Building up an encompassing commotion level empowers the gadget to be utilized in boisterous condition.

After accepting a sign in the recurrence scope of speech that is more intense than the surrounding level, the gadget decides if the sign is a legitimate order word. A legitimate order word is an individual from either a lot of pre-modified speaker autonomous words, or a lot of client customized speaker subordinate words. These arrangements of order words compare to two methods of activity referred to in the workmanship as "speaker independent" and "speaker dependent" task.

The main method of activity is a speaker free mode. In this mode the gadget can be utilized by different speakers and does not need to be prepared to perceive singular voices. Accordingly, the gadget is pre-modified to react to an enormous assortment of speech examples, emphases and articulations of the objective direction word. This method of activity for the most part has a lower number of substantial direction words than speaker subordinate frameworks that require more memory to store