



Faculty of Electrical and Electronic Engineering Technology



**DEVELOPMENT OF VOICE-ACTIVATED ORDERING USING
ANDROID APPLICATION FOR RESTAURANT**

LOI MING ONN

Bachelor of Computer Engineering Technology (Computer Systems) with Honours

2021

**DEVELOPMENT OF VOICE-ACTIVATED ORDERING USING ANDROID
APPLICATION FOR RESTAURANT**

LOI MING ONN

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Computer Engineering Technology (Computer Systems) with Honours**



Facultv of Electrical and Electronic Engineering Technology

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(TANDATANGAN PENULIS)

Alamat Tetap: 4-3-20 BLOK 4 JALAN 1/1B
TAMAN INTAN BAIDURI 52100
KUALA LUMPUR MALAYSIA



(COP DAN TANDATANGAN PENYELIA)

DR. ADAM WONG YOON KHANG

Pensyarah Kanan
Jabatan Teknologi Kejuruteraan Elektronik dan Komputer
Fakulti Teknologi Kejuruteraan Elektrik & Elektronik
Universiti Teknikal Malaysia Melaka (UTeM)

Tarikh: 28/2/2022

Tarikh: 3/3/2022

DECLARATION


I declare that this project report entitled “Development Of Voice-Activated Ordering Using Android Application For Restaurant” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : 
Student Name : LOI MING ONN
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APPROVAL

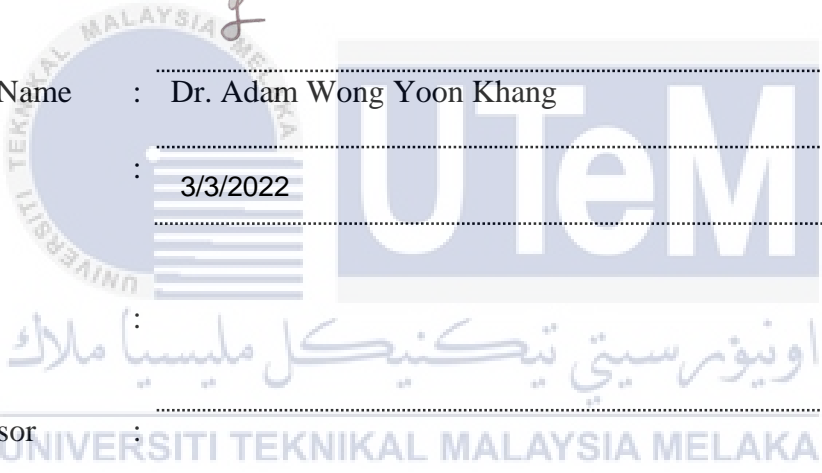
I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Engineering Technology (Computer Systems) with Honours.

Signature : 

Supervisor Name : Dr. Adam Wong Yoon Khang

Date : 3/3/2022

Signature : 

Co-Supervisor : 

Name (if any)

Date : _____

DEDICATION

To my dear Mother, Father, family, friends and lecturer:

I dedicate the research project to you all for several reasons.

As my parents and my family, all of you are the main part of my life. Each moment, each decision, each situation and each result and subsequent, I have never been abandoned and even borne together with you all. I can't proceed further without you, my mother, father and my dear family.

For my friends, who accepted me as a company to them in these year of university life, who supported and trusted me in up and down, no matter what happens you all always lean a hand to me, I am truly grateful.

To all the lecturers that involved in my years of degree, everyone of you have supported me throughout the journey, any words of wisdom are contributed and shared by you all will be remembered, and motivates me to be better, especially in conducting this research.

Once again, very thanks to everyone I listed here, as they are the people who supported me and contributed the most to build up this invaluable research project and contribute to the society in the future.

ABSTRACT

Lifestyle today is very challenging nowadays and thus saving time is one of the most important factor for every industry field, especially food and beverage service which mainly from restaurant. A crowded restaurant with a long queue to take order has cause problem to many customers as they wanted to have easier and faster way to make their order without waiting too long. Customer who just need simple and fast checkout order have difficulties to repeat browsing the menu as they needed to take longer time and increase their waiting time. The main objective of this research is to develop a simple and user-friendly system application for menu ordering system that can improve the customer usage by also implementing voice-recognition technology as a possible method for these targeted customers. The system will be also adding in a basic database to apply two-way communication between the system and data input by the users for data collection. The work scope of this project includes system design that will made by free prototyping and designing tools. The application of the menu ordering system will be also developed with AndroidOS platform with Extensible Markup Language (XML) and JAVA programming language. Then the voice-recognition technology which also using Google Speech-to-Text (STT) and its function is implemented and combined into the application. An data collection of result will be analysed based on the accuracy for the voice-recognition method and comparison of time taken between these the common traditional manual method versus voice ordering method. The methodology is involving free assisting tool such as StarUML Draw.io, Adobe XD that are used to illustrate the workflow, system cycle and also the Graphical User Interface (GUI) of the application. Then the the application is programmed and structure with the Android Studio that based on AndroidOS system's native users that use other devices than computer. There is significant consistency on the comparison for the results, where its percentage accuracy between preliminary result and expected result only 10% difference, 1.9seconds of weighted mean in manual ordering and 3 seconds for voice-ordering method, given that some of addition of extra features and improvement. Overall, the methodology has succeed in giving out the main required result from data collection and analysis and showing the potential of improvement on quality of menu ordering system is exist by implementing voice recognition method into it and improve restaurant operation.

ABSTRAK

Kehidupan kini yang sangat bercabar telah menjadikan penjimatan masa salah satu faktor penting bagi setiap bidang industri, terutamanya dalam industri makanan dan minuman yang berkaitan dengan pengurusan restoran. Restoran yang terlebih pelanggan telah memberikan masalah kepada golongan pelanggan yang ingin dapatkan pesanan secara mudah dan cepat tanpa menunggu lama. Golongan pelanggan tersebut juga berasa sukar untuk membuat pesanan dengan menu yang berulang-ulang dan masa diambil untuk memesan juga meningkat. Tujuan utama kajian ini adalah untuk mengembangkan aplikasi sistem pemesanan menu restoran yang mudah dan mesra pengguna dengan mengimplementasi dan menggabungkan teknologi pengecaman suara sebagai salah satu cara pemesanan. Sistem aplikasi ini juga mengandungi fungsi pangkalan data yang mampu dijadikan sebagai cara komunikasi dua hala antara sistem dengan data pesanan daripada pelanggan. Skop projek kajian ini mengandungi reka bentuk sistem yang akan dikembangkan dengan peralatan perisian reka dan prototaip yang percuma. Aplikasi ini juga akan dikembangkan dan dibina dengan platform sistem operasi AndroidOS dengan XML dan JAVA sebagai bahasa pengaturcaraan. Pembentukan carta aliran pelan projek dan sistem serta muka pengantaraan pengguna grafik (GUI) juga dibentuk dengan peralatan yang percuma seperti StarUML, Draw.io dan juga Adobe XD. Penglibatan teknologi pengecaman suara dalam aplikasi adalah “Speech-to-Text” daripada Google dan fungsinya akan digabungkan ke dalam aplikasi. Pengumpulan data daripada hasil kajian akan dianalisis berdasarkan ketepatan daripada menggunakan fungsi pengecaman suara dan perbandingan antara masa diguna untuk membuat pesanan dengan cara secara manual atau penggunaan fungsi pengecaman suara. Hasil kajian penyelidikan mencapai prestasi yang stabil antara keputusan awal dan keputusan akhir dalam segi ketepatan fungsi pengecaman suara dalam pemesanan dengan perbezaan sebanyak 10%, selain itu, masa diambil untuk pemesanan secara manual juga mempunyai 1.9 saat sahaja dan pemesanan secara pengecaman suara hanya berbeza sebanyak 3 saat berbanding antara keputusan awal dan keputusan akhir kerana perkembangan dan pertambahan fungsi-fungsi baru dalam applikasi. Hasil kajian ini telah menunjukkan potensi dalam peningkatan kualiti pemesanan menu juga wujud dengan pelaksanaan konsep penggunaan cara pengecaman suara dalam sistem pemesanan di restoran hari ni.

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I give my greatest appreciation to my parents and family, who supported me for everything, guided me and be with me throughout the process of finishing the project. Their support on my journey to complete this project task are the key of my success on the research project.

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LIST OF SYMBOLS

s	-	seconds
%	-	percentage



LIST OF ABBREVIATIONS

STT	-	Speech-to-Text
XML	-	Extensible Markup Language
GUI	-	Graphical User Interface
SHD	-	Smart Home Device



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LIST OF FORMULA

Percentage Accuracy, P	-	$percentage, p = \frac{frequency (Accurate), f}{Number of Trial, n} \times 100$
Weighted Mean	-	$Weighted Mean, \sum \bar{x} = \frac{Time Taken to Order, X}{Number of Trial, N}$



CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will describe the introduction of the topic, Development of Simple Two-Way Communication Android Application Systems for Restaurant with Add-on Voice-Recognition Function and databases. The whole chapter will be covering problem statements, objectives, and the work scope of the project. The whole project goal can be achieved by finding every kind of solutions to solve all the problem stated in this report and completing the objectives that are planned on this project report.

1.2 Project Background

Lifestyle today has a huge advancement, in especially between cities which are always crowded, and busy. As cities are always meant and mentioned to be a busy place, especially for the society advancement that had led everyone who lived in city being time conscious, where every single unit of time have to be fully utilised just not to get wasted for nothing achieved. Thus, it affects every kind of industry field that has to be always improving and evolving in terms of efficiency, productivity and quality.

In this project, food and beverage industry is targeted, where it focuses are on one of the society's daily needs, which is restaurant performances on how much efficiency they can achieved for their menu ordering system. In a summary of the main research topic, restaurants' efficiency has to be improved, especially towards services and convenience, where customer can have the best, easiest and fastest way to make

their order collected by the ordering system. Comparing the traditional way which normal workers who in charged of taking orders from customers that uses pen and paper to jot down all the info, By developing a simple mobile application for the customers, the whole operation performance for the restaurant can be possible to improved, and customers will have better impression and satisfaction on the services provided.

For mobile application, there are a lot of menu ordering applications available today, from various branding of restaurants, and presented in different way. For example, we have large franchise company like McDonald's and KFC where they started to use self-ordering kiosk to pick up orders from customers. Or we have food ordering application like Pizza Hut or Domino's where we can order by online. To seek an opportunity of improvement something is possible to be added on and make the application more interesting, which would be one of the demanding feature that everyone would like to use on other application nowadays which is involvement of voice-recognition technology.

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Overall, the mobile application should contain a simple, easy-to-understand Graphical User Interface (GUI), a voice recognition or assisting method, a functionable and usable application system, a notification system and finally a backend database that will be used for two-way communication functions between customers and the restaurant operators. By having these requirements implemented inside the application, it is estimated that the ordering system of a restaurant can be improved and more efficient in shorter time taken.

1.3 Problem Statement

In order for a research project to have directions how to determine its objectives for conducting it. Problem statements are musts in order for us to find what are the flaws still existing in current available system and what improvement, modification we can improvised.

For a restaurant's ordering system, in customers' perspective, convenience is the key problem that I found out in their concern. Customers in restaurant today lack of convenience for making an order when the restaurant is in high peak session that fully filled with a lot of other customers. Making manual order by physically from the staffs are not going to fulfil every customer. There are also certain category of customers who just wanted to have an alternative method like using voice to order that considered as their preferred method makes most of the existing ordering systems just not able for them to use on. Based on [1], the traditional, manual ordering system that done by staffs will cause some human errors such as giving wrong information of bill, unreadable handwriting by waiter who just clip down everything in a instant and wrong sequences of order that will cause dissatisfaction towards restaurant.

Besides, as the background mentioned about how busy an urban area, or a large city can be, time is their very important factor especially for customers such as workers that have limited time to spend for getting their meal up are forced to take a long queue, just to ordering their food at the counter or a kiosk machine. The time taken made by the system is worse providing that every customer also have to browse through the whole menu which is annoying to loyal or busy customers who just wanted to have their meal ordered as easiest and fastest as possible, where we categorised them as

“express customers”. Slow ordering system would affect the restaurant reputation, productivity and most importantly, customers’ satisfaction towards the services. As the journal made by [2] mentioned, customers often must wait for the waiter when it comes to ordering food, and it will make them anxious about the services and feel exhausted by just waiting and wasting time.

Moreover, in restaurant perspective, what happens when or if a restaurant become famous but still uses a service without technology, such as making order using pens and papers using manpower as what [3] stated, it would be a trouble for a basic restaurant as the amount of manpower is always limited when the whole restaurant is filled with customers. The whole team is short of waiters to take order one by one by running to each customer one by one just to take down each orders. Waiters will eventually not catching up the orders in this short bursting time and it will affecting the whole operation for the restaurant.

1.4 Objectives

There are several objectives that I wanted to achieve throughout this research project, these are the points of goal for my objectives to be achieved to complete my research purpose:

- To study about a system application design with the consideration of restaurant operation and improvement of menu ordering procedure.
- To develop an application that contains at least basic and useful functions for restaurant usage and involving voice-recognition technology.
- To analyse the possibility of two-way communication and order data collection with the help of database management system.

- To observe the accuracy result of voice ordering method and compare it with traditional manual ordering method for effectiveness.

1.5 Scope of Project

The project scope targeted in this research will be related to all the objectives stated in this report. They are listed below:

- System is planned to be designed with the aid of free prototyping and Graphical User Interface designing tools.
- The application of the menu ordering system will be built in AndroidOS platform with XML and JAVA programming language.
- Application will be combined with voice-recognition technology which is Google Speech-to-Text (STT) function.
- The result is expected to be analysed based on the accuracy of the voice-recognition function, and the time taken to order with different method, and hence to find the achievement and improvement towards menu ordering.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

The literature review section will be explaining and focusing about every idea, inspiration, provided information and helpful tips from various article made by all experts around the world that might be contributed to complete the project. In this study, every literature review that I picked out of my list of studied literatures will briefly cover the main contents they used for their project, the topics involved, advantages, disadvantages and comparison between previous researches. Other than that, useful information that might to be totally related such as analysis data and hardware's experience that used by other research. By analysing each of the related article found out throughout the project timeline, it will certainly contribute a lot of information for me to building up my research project's progression. Few literature and research resources that provided the most beneficial information for reviews on their strength and weaknesses so a comparison can be made among them and thus providing a better study, guidance and information to continue on research.

2.2 Voice-Recognition /Voice-Assistance /Voice-Activation Technology

Voice-recognition technology has been a very interesting field for every industry to migrate into their business and field. There are many researches made in previous time by various researchers and composed by authors around the world regarding the topic.