

PERSONAL COMMUNICATOR: PERSONAL MEDICAL ASSISTANCE

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“I hereby declare that the work in this project is my own except for summaries and quotations which have been duly acknowledge.”

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“For my beloved mom and dad”

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ABSTRACT

A Personal Medical Assistant/Care by using Windows Phone is a medical application which consists of user's database and basic medical information. The application is mainly developed for people who try to manage their health conditions efficiently and conveniently due to the easy access function. The purpose of this project is to build a medical application or a medical assistant in a Windows Phone device and help the users to manage their health condition better. The project starts with researches on literature reviews for better understanding to the project. Study on Microsoft Visual Studio is done to develop a better interface design. The C# programming is chosen as the language for visual studio to create a new interface. A graphical user interface (GUI) is an interface where the user can interact with other electronic devices through icons. The software is tested by emulator to check whether there is any error before proceed to next stage. Study is done on the integration of server base with the developed software and finally it is implemented into Windows Phone. The Personal Medical Assistant/Care consists of five functions: Profile, Reminder, Read Pulse, Medicine dictionary and Medical dictionary. The profile is used to store the data of the user where the reminder is used to remind the user regarding the checkup time and date. Read Pulse is used to measure the pulse rate of the user, medicine dictionary and medical dictionary is use to allow the users to check the description of medicine and medical information. Software and hardware skills have been improved throughout the project as it requires much knowledge on C# language and understanding on the hardware devices such as Bluetooth module in order to complete it. This application gives good impact and potentially to be launched as it benefits society nowadays especially people who got sick or illness.

ABSTRAK

Pembantu Perubatan Peribadi atau dikenali sebagai *Personal Medical Assistant* merupakan satu aplikasi perubatan yang mengandungi pangkalan data pengguna serta maklumat perubatan asas. Aplikasi ini dibangunkan supaya pengguna dapat merancang keadaan kesihatan secara cekap disebabkan pengaksesan yang mudah. Projek ini bertujuan untuk membina sebuah aplikasi perubatan atau pembantu perubatan dengan menggunakan *Windows Phone*. Projek ini bermula dengan kajian mengenai ulasan kesusasteraan bagi pemahaman yang lebih baik. Kajian Microsoft Visual Studio juga dilakukan supaya dapat mereka bentuk *interface* yang lebih baik. Bahasa C# telah dipilih sebagai bahasa pengaturcaraan bagi *Visual Studio* yang diguna untuk membina *interface* yang baru. *Graphical user interface (GUI)* merupakan satu *interface* di mana pengguna boleh berinteraksi dengan peranti elektronik yang lain melalui ikon yang tertentu. Perisian ini diuji oleh emulator untuk memeriksa sama ada terdapat apa-apa kesilapan sebelum meneruskan ke peringkat yang seterusnya. Kajian yang seterusnya dilakukan terhadap *server base* atau pelayan asas dan memadan dengan perisian yang dibina dan akhirnya ia dilaksanakan dalam *Windows Phone*. Pembantu Perubatan Peribadi mengandungi 5 fungsi utama: Profil, Peringatan, fungsi pembacaan nadi, kamus ubat-ubatan dan kamus perawatan. Profil digunakan untuk menyimpan data pengguna di samping peringatan digunakan untuk mengingatkan pengguna mengenai masa dan tarikh pemeriksaannya. Fungsi pembacaan nadi digunakan untuk mengukur kadar nadi pengguna, kamus ubat-ubatan dan kamus perawatan digunakan untuk memeriksa maklumat ubat-ubatan serta maklumat perawatan. Kemahiran perisian dan perkakasan telah dipertingkatkan sepanjang projek ini kerana ia memerlukan banyak pengetahuan mengenai bahasa C# serta pemahaman terhadap peranti perkakasan seperti modul *Bluetooth*. Aplikasi ini mendatangkan kesan yang baik dan berpotensi untuk dilancarkan di pasaran kerana ia memberi manfaat yang lumayan kepada masyarakat masa kini terutamanya pesakit.

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CHAPTER I

INTRODUCTION

This chapter discusses about the project introduction, brief overview of the project, problem statements, objectives and scopes of the project as well.

1.1 Project Introduction

This Personal Communicator is a mobile health application which will consist of some user's basic database and common medical information, which are convenient and easy to excess by the user. This project is also named as Personal Medical Assistance/Care. On top of that, this project is mainly develops an application for common users, which consists some functions such as reminder for medical intake schedule and reminder for appointments with healthcare professionals, providing basic medical knowledge and health care information, and this developed user interface can be linked to the smartphone. The developed user interface provided by this project can helps user in managing their own health conditions and raises the awareness of the importance of health care.

1.2 Problem Statements

In this 21st century, most people are busy with their works and studies and this basically will lead them to neglect their own health. Obstacles occur when they are spending excessive time on working or studying, this may prevent them from visiting doctor when they are sick by just taking some medicine from pharmacy or they will forgot the appointment they have made with the doctors. Besides, even if they have consulted with the doctor, they may forgot to take the medicine or not taking the

medicine according to the schedule. As a results, this will lead them to unhealthy lifestyle and they may easily neglect some symptoms of their body during a health crisis because they may not understand the importance of those symptoms. [1][2] This project comes with an idea of medical assistance by providing users some common medical information which is easy to excess when they need and a reminder which aid in reminding users their appointment with health professionals and reminding them to take the medicine according to the schedule.

According to Marshall Allen, medical errors contribute a high percentage of death in America because of people lack of medical knowledge. [3] In daily life, people are normally intake more than one type of medicines when they are ill, and sometimes they tend to forget what is the medicine eat for, what they usually will do are intake whatever medicines that doctor gives them without knowing what is the content of the medicines. Hence, in this modern world people do need to actively involve themselves in managing their own health conditions but in order to achieve this, they need to access to a wide range of information and tools to aid them in understanding the medical knowledge.

The major problems people facing now is most of the health care applications provided in the market are mostly target for healthcare professionals such as doctor, pharmacies, medical students, physiotherapists and etc. [4] These applications are usually very complicated, and will designed with a lot of medical terminology which is difficult to understand by non-health professionals. As a results, there will be a very tiring and time consuming process for people to understand those medical information by searching through online, books or magazines. Moreover, there are variety of medical information provided online which make it difficult for user to differentiate which sources provided in the online world are reliable. Hence, this project will provide a platform for user to know more for the medical knowledge. A medicine dictionary and medical dictionary will be designed with some basic description which is easy to understand by the user.

1.3 Brief Overview of the Project

Mobile revolution in this 21st century has bring a large opportunities for the development of mobile health applications. Nowadays mobile phone can exchanges large amount of personal information. These information able to personalised in order to meet different individual preferences. It also has the ability to link data from a centre database to mobile phone, allowing the development of medical support for users via mobile phone application. This project will develops a user interface which providing user's bio data, reminder, medical history, and sensor for heart rate measurement. Lastly, it will be integrated to the smart phones.

In order to build this project, firstly it is important to design a user interface for the medical information and some user's basic information. This interface is design by using Microsoft Visual Studio software and the design interface is then integrated into a mobile phone, where mobile phone that this project choose to integrate is Windows Phone. This project is a Windows based operating system and it target audience is for common users which serve them some basic medical information helps in their healthy lifestyle management, and delivering care in a more efficient and effective way.

1.4 Objectives

The objectives of this project are to build an application in Windows Phone device regarding the medical based software by using programming on C#. The database which acts as a server is linked with the application developed.

This project basically includes software and hardware, which students could learned on methods on linking both the software and hardware. In fact, the project is aimed to allow the students to gain knowledge and skills in designing and programming platforms. However, there are few things that must take note whereby the work schedule for the developing whole project and the risks that might happen during the developing process.

This project consists of objectives that are stated as follow:

1. To study C# programming for software developing. The knowledge and ideas on how the medical assistant is developed must be planned before starting to implement on Windows Phone.
2. To understand the functionality and specifications of Windows Phone. The specifications and functions of Windows Phone play an important role as there is linking between the Windows Phone hardware to the software programming.
3. To collect information of medicine and medical help for the database which act as a server. The database should be inserted into the section such as medical and medicine dictionary where the user can understand the basic information from the source which is linked.
4. To develop a Personal Medical Assistant software for common user based on database.
5. To integrate the software into the Windows Phone and create an application based on server base. The Windows Phone is considered working well when it is able to link with the server.

1.5 Scope of Work

The scope of work for this projects is to develop a personal communicator or a personal medical assistant software that can guide the user to understand and able to operate the tasks:

1. To ensure the users can handle their own medical data information or details for accessing and monitoring clinical report purposes.

2. To make sure that the users would not forget for medical appointments or medical intake by the guide of the reminder developed. The reminder acts as an alarm which tells the users when and what for medicine intake and their appointment with healthcare professionals.
3. A medical library is built so that the users would get some basic knowledge for the medicine they consume or some basic description for the diseases. This could be a reference for users when they are sick or ill.
4. To build a simple device which users can measure and read their heart rates on the Windows Phone.

The tools below are needed to achieve the scope of this project:

1. Software: Microsoft Visual Studio

To link between the Windows Phone and the software programming for operations, the software above is needed. For the design of user interfaces, Microsoft Visual Studio is the one which is used. The interface designed in C# programming can be implemented on the Windows Phone once it is completely developed.

2. Software and Tools: Arduino IDE Software, Arduino Pulse Sensor, Bluetooth Module HC-05

This software is required to build a simple device that can measure and read the heart rates of the users. An Arduino pulse sensor is used to read the user's heart rates while a Bluetooth module HC-05 is used to transmit the data to Windows Phone.

3. Hardware: Windows Phone device

A Windows Phone device is needed as it is used to show the operations of designed application. The application developed must be compatible with the device and could be used for every common users.

4. Hardcopy: Knowledge regarding the basic medicine and medical information

Information regarding the medical helps or medicine should be understand well before finding the database for the server. Therefore, references such as journal, articles and books are much needed for the knowledge to understand the user's needs and the requirements for the software which is going to develop. Knowledge on storing the database is also a vital one as it acts as an important messages to the users.

CHAPTER II

LITERATURE REVIEW

This chapter discusses about the basic concept of Windows Phone development and researched medical application which supports the implementation of personal medical assistant.

2.1 Brief History of Windows Phone (WP)

The Window Phone (WP) is a mobile operating system which is developed by Microsoft. At the early stage, Window Mobile was first developed at 2004 but the development progress was moving slowly and causes some of the projects failed. Window Mobile group is reorganized at the year of 2008 by Microsoft to design a new mobile operating system. This lead to the beginning of Windows Phone and the first product, Window Phone 7 was released on the year 2010. On February 2011, Microsoft and Nokia announced the partnership between their two companies and this led to the competition among the 3 operating systems, the Android, iOS, and now Windows Phone. [5] Windows Phone would become the primary smart phone operating system for Nokia and the first product with the partnership was Nokia Lumia 800 and Nokia Lumia 710, which run on Windows Phone 7.5 "Mango". The development of Windows Phone includes Windows Phone 7, Windows Phone 8, Windows Phone 8.1 and Windows phone 10 (2010-2015).



Figure 2.1: Windows Mobile 6.5.5

Windows Mobile is a family of Mobile operating system developed by Microsoft for smartphones and Pocket PCs. [6] In 1996, Windows CE was released and the first Windows Mobile appeared as PocketPC 2000 in the year of 2000 and followed by PocketPC 2002 in the year of 2002. A Pocket PC is known as a Windows Mobile Classic Device where the hardware specification is almost similar to smartphones or Personal Digital Assistant (PDA). It was then renamed to Windows Mobile in year 2003 and another new product was introduced as Windows Mobile 2003 which is similar version as the desktop. By 2007, Windows Mobile has become the most popular smartphone software in US, but the popularity does not last for a long period. Android and iOS was introduced by the year 2010, causing competitive races among the operating systems. At the same year, Microsoft launched Windows Phone to supersede Windows Mobile and the last Windows Mobile product was Windows Mobile 6.5.5. In between the Pocket PC and Windows Mobile 6.5.5, there are some products developed, which includes Windows Mobile 2003, Windows Mobile 2003 SE, Windows Mobile 5, Windows Mobile 6 and Windows Mobile 6.1. Microsoft

focused on the development of Windows Phone after the replacement of Windows Mobile.

There are few versions of Windows Mobile hardware devices, for instance the Windows Mobile Professional which run on smartphones with touch screen, Windows Mobile Standard runs on mobile phone with touch screen, and Windows Mobile Classic which runs on a personal digital assistant or Pocket PCs. The early stage of Pocket PC only runs on the either with or without mobile phone. However, the evolution grew with the appearance of the smartphone devices. Smartphones is another kind of hardware platform which runs on the Windows Mobile after the Pocket PC. Throughout the development of Windows Mobile, there are only smartphones with no touch screen. However, the touch screen function existed on the Pocket PC starting from Windows Mobile 6.

In October 2010, the first Windows Phone was launched and it was Windows Phone 7. Unlike Windows Mobile, the Windows Phone is aimed on the consumer market rather than the enterprise market. [7]



Figure 2.2: Windows Phone 7

Windows Phone 7 was first released worldwide on October 21, 2010 after the fall of Windows Mobile. At the early stage, there are 10 launch devices for Windows Phone 7, which made by HTC, Dell, LG and Samsung. By the year 2011, Windows Phone 7 updated the revision to Windows Phone 7's Mango, led to the additional manufacturers like Acer, Fujitsu for cooperation. The growth of Windows Phone 7 is ended on January 2013, where Windows Phone 8 is released and it was succeeded by Windows Phone 8.



Figure 2.3: Windows Phone 8 Start Screen

On October 29, 2012, Windows Phone 8, a new generation of operating system was released and it replaces the old Windows CE- based architecture with the new Windows NT kernel, sharing many components from Windows 8. The new operating system allowed the application to be switched between the 2 platforms, the Windows and Windows Phone. However, Windows Phone 7 is not allowed to update to Windows Phone 8 due to hardware limitation. [8]

An updated operating system has been implemented on April 2, 2014, the Windows Phone 8.1. There are some specifications added in the new OS, The main added feature is the Cortana, which is a voice assistant system similar to Google Now or Siri. A user can give command towards Cortana to assists on the operations like helping to send text, make calls or take note. It can also acts as a searching machine which is similar to Bing search feature. [9]



Figure 2.4: Windows 10 Mobile

On January 21, 2015, an OS which runs on ARM architecture was introduced to the world- Windows 10 Mobile. The newly released operating system makes use of the concept of linking all the devices. For example, when an application is deleted from the Windows 10 Mobile smartphone, the application will also be deleted from your computer or tablet which runs on the same operating system. The browser for Windows 10 Mobile is also changed to a more productive and promised one, named Microsoft Edge. Besides that, the Microsoft Office application like Microsoft Word, Excel, and Power Point is included in the new Window 10 Mobile. Furthermore, a brand new feature which allowed Android or iOS application to be used in Windows 10 Mobile, with a minimal modification on a specific tools designed. However, the Windows 10 Mobile allowed Windows Phone 8 to be updated to its version. [10]