

“I am confessed that I have read this report and in my opinion this report was adequate from its scope and quality as a reason for granted in Bachelor Degree -of Electronics Engineering (Computer Engineering).”

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5th. Mei 2006

**PERSONAL COMMUNICATOR: TRAVEL ASSISTANCE**

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This Report Is Submitted In Partial Fulfillment Of Requirements For The Bachelor  
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“I am acknowledging this report was written by my own except the draft and the passages which for each of them have been explained the references.”

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Especially For My Parents, My Lovely Family, My Friends and BENC 2006

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## ABSTRACT

This project is correlation with the Personal Digital Assistance (PDA) where software which called a Travel Assistance was developed. The software that has been developed can be downloaded to the PDA if the icon selected. The developed software is very helpful to the user to find the information when want to make a travel. The mission to the Mars was taken as a sample. The objectives of this project are to display the appropriate date when user want to make an exploration. Moreover, it can be display the appropriate arrival date, return date from Mars to Earth and the date when it can be landing at the Earth. Furthermore, it can show up the additional information such as mission information, gravitations and mechanics, interplanetary trajectories and Mars exploration strategies. From the above objectives, user can know the countdown to make a trajectory. The developed software also has illustrated some information as additional references for user. The software was developed by using the Microsoft Visual Basic. The software that have been built was helpful to search the information which is it was attached by the friendly user-interface.

## ABSTRAK

Projek ini adalah berkaitan dengan alat komunikasi Pembantu Peribadi Berdigital (*Personal Digital Assistance-PDA*) yang mana satu perisian disediakan dengan dinamai Pembantu Pengembaraan. Perisian yang dibina boleh dimuat turun ke PDA apabila ikonnya dipilih oleh pengguna. Perisian yang dibina adalah untuk membantu pengguna mendapatkan maklumat untuk melakukan pengembaraan. Sebagai contoh yang digunakan adalah pengguna boleh mendapatkan maklumat pengembaraan ke Marikh. Objektif utama projek ini adalah untuk memaparkan kepada pengguna tarikh yang terdekat untuk menjalankan pelancaran. Selain itu, ia dapat memaparkan tarikh ketibaan ke tempat dituju, tarikh yang sesuai untuk pengembaraan pulang dan bila ianya akan mendarat di bumi. Berikutan perkara tersebut ia juga memberi maklumat tambahan kepada pengguna seperti maklumat terhadap misi, konsep gravity dan mekanik yang terlibat, pengembaraan antara planet dan strategi pengembaraan ke Marikh. Daripada objektif ini, pengguna boleh memastikan kiraan untuk melakukan pengembaraan. Perisian yang dibina ini turut memaparkan beberapa maklumat sebagai sumber tambahan kepada pengguna. Manakala, perisian ini dibina dengan menggunakan Microsoft Visual Basic. Perisian yang dibina akan memudahkan pengguna dalam mengendalikan maklumat dengan menyediakan antaramuka yang ringkas dan mesra pengguna.

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## LIST OF SHORT FORMS

PDA	-	Personal Digital Assistance
VB	-	Visual Basic
GUI	-	Graphical User Interface
AU	-	Astronomical Unit
PC	-	Personal Communicator

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## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 SYNOPSIS**

In this section, will be representing about the project it is Travel Assistance. Also in this section, will be covered about the literature, the concepts of the project, methodology, the objectives, the specification of the project and draft of the project. Moreover, in this segment will represent the chronology of the project from the beginning until the project finish and will conclude by showing the structure of the final report.

## 1.2 LITERATURE REVIEW AND CONCEPT

This project was about to build up the software which is it can be download to the Personal Digital Assistance (PDA). The software need to be helpful to the user to get the information about the travel. The software that has been built named Travel Assistance.

This software required to show the appropriate date to make a travel. Therefore, the mission to Mars will take as a sample. This software, need to display to the user the date that for mission travel. The date such as the launch date, the arrival date to the Mars, the suitable date for return trip to the Earth, and the suitable date for the rocket will be landing at Earth. This project needs to be displayed the countdown in days from the date that the users have been chosen or today's date and display additional information to the user.

Hence, some investigation and the references were made to setup this project. This investigate is about the orbit system of the Mars and Earth, duration of each planet and some calculation about it. Furthermore, also make some research about the suitable programming languages and software such as MATLAB, Microsoft Visual Studio C++, Microsoft Visual Basic and JAVA Languages. Also, examine all the requirement about the equipment that needs to be using that is PDA.



### **1.3 OBJECTIVES**

Objectives that need to be achieve in this Travel Assistance project is to develop the software that is helpful to the user especially astronauts to find additional information as a references in their travel. Moreover, the software can be download to the PDA. The information that can be display is the appropriate date to make a launch, the arrival date, the return trip date and others. Moreover, it also can be display some additional information.

Besides that, the software needs to display the countdown to reach the appropriate date from the default date that the user chosen. Hence, it also can show up the friendly user interface or GUI. The software that have been using is the Microsoft Visual Basic.

### **1.4 SCOPES OF WORK**

The scopes of work, to build up the software of Travel Assistance for display information such as appropriate date of the traveling task and additional information as references to the user. Also, to present the simulator by the suitable windows of dates, mission to Mars and all the information about the mission to the Mars.



Furthermore, the software of Travel Assistance also will be display the windows about the sequences of Mars planet, the gravity, the calculation of the duration between the Mars and Earth by take the date choose by user as references and also the name the travel will do. This software would allow the user to input the date that they need and the simulation will find out the suitable date to make a travel.

The interface that has been build should be user friendly. Whereas, it is to make sure the user do not have a difficulties to handle it. Accordingly, to setup this kind of interface firstly the storyboard of the project is needed to design.

## **1.5 METHODOLOGY**

This project will be prepared by developed the software for the equipment that is PDA as it not yet has such software called Travel Assistance especially for astronauts. The software has a simulator that will display the information windows about the travel and mission where is mission to Mars will be as sample.

Some references and researches have been doing to the information such as according to the PDA where is examine about the specification, the resolution and the operating system (OS). Accordingly, the researches have been doing by referred to some books which are to determine about the programming

languages, to analysis the calculation about the mission to Mars and outer space. As well, some of tutorial and examples was studied to build up the user interface.

Moreover, the opinion and lessons from others individual also take an action to make sure the objectives of the project will be achieve. Especially about the suitable software need to use and where the maximum information can be determine.

## **1.6 REPORT SUMMARY**

In this segment will be discussed about the project summary. In this report contains of five chapters. Therefore, in chapter one was discuss about the introduction of the project, literature and concepts of the project, the objectives, scopes of work and the methodology of the project.

However, in second chapter was discussed about the literature study and concepts of the project. In this chapter was a detail about the outline of the concepts involved in this project. In third chapter, was discussed about the project methodology. In this chapter, are need to review about the problem solving technique.

Nonetheless, in the fourth chapter was described about the results and project analysis. In this segment were details about what the progress, the sequences of GUI, about the mathematical that need to determined and summary about the programming languages.

Finally, about the chapter five was described about the conclusion of the project, discussion for the project and suggestion that are suitable for the project. This report was end by the structure of the report which is all the information about this project are bind together.

## **CHAPTER II**

### **LITERATURE STUDY**

#### **2.1 INTRODUCTION**

In this section, will be discussing about the theory and concepts that is accordingly to the project in details. Also, it will inform about the perspective and method that have been using in this project. The theory that will be discuss is about the PDA, the mission to Mars, the Earth planet, programming languages and software, and all the calculation that will be using in the project.

## 2.2 OUTLINE

The average distances between the Earth and Mars approximately about 78,300,000 Km that is half ways of the distance from Earth to the sun. This duration is about 200 times to the duration between Earth and moon. According to this difference duration, the transferring that have been implies was different from the method that have been using in the Apollo mission to the moon which is "*Point and Shoot*".

Hence, because of this duration of the Earth and Mars while designing and develop this project some information need to be focus. That is:

**2.2.1 Outer space that will affect the trajectory:** the orbital mechanics of the mission will be influenced the gravitation by the nearby planet bodies. In this case of Earth and Mars mission, the sun will be primarily factors due to mass and closeness compared to the Mars and Earth. Venus is sufficiently near to apply its influence. Almost, many of the trajectories to be considered will lie very close to Venus and hence be greatly influenced by its gravitational field.

**2.2.2 Eccentricity:** according to the Kepler's Law the planets turn round in elliptical orbits in which the sun is at one of its main point (foci). These elliptical orbits are described by their eccentricity. Which is how much different from a circular orbit there are. In this case, the planets Mars has a higher value is 0.093. Based on this facts, we can admit as a first simplification to our model that the planets is move in circular orbits around the sun.



2.2.3 **Orbital plane:** the same method can be said with respect to the preference of the orbital plane of both the orbits of Mars and Venus with respect to the plane of the Earthly orbit. Due to the reduced value of the angle of preference of these planes that they lay on the same plane as the Earthly orbit.

2.2.4 **Relative angular speeds of the Earth and Mars:** the Mars year is approximately twice as long as the Earthly year. Here, means that Mars angular speed is half of the Earth. The relative angular speeds of the Earth and Mars are important factors to be taken into account in the determination of the trajectory. When launching, ideally Earth should be much behind in the orbit to allow the spacecraft starting with the Earth's orbital velocity to catch up with the slower Mars. When returning from Mars, Earth should be behind it to be able to catch the Mars bound spacecraft in the inner orbit.

## 2.3 DETERMINE THE TRAJECTORY MISSION

By using the mechanics orbital, mission to Mars will get to arrange. It is important to make sure how will the spacecraft need to be launch and how long the time needed to completed the trajectory.

The orbital of Mars and Earth was ellipse and in the same orbital plane with the sun as a foci. The Earth radius,  $r_1$  is approximately 149,600,000 Km it also known as *Astronomical Units* (AU). This will make a standard of the distance calculation in the solar system. Anyhow, in the orbital system the years in Earth will take as a reference. An example, for Earth,  $r_1 = 1\text{AU}$  and orbit  $T_1 = 1\text{ Years}$  and Mars,  $r_2 = 1.523691\text{ AU}$ ,  $T_2 = 1.8822\text{ Years}$

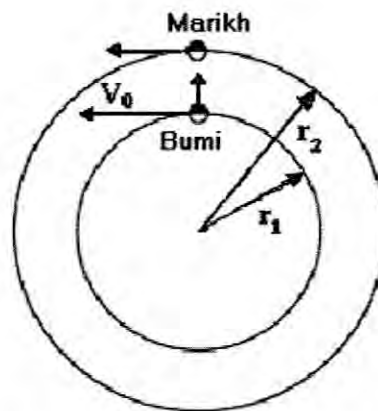


Figure 2.1: Earth and Mars in the nearly distance

Others said that the easier method to make a mission to Mars is waiting until Earth and Mars in closely duration and then launch the spacecraft to Mars or the main ideally is “Point and Shoot”. This is same with the idea stated by H.G.Wells in their book “*War of the World*”. However, this method does not practical.

Some statements are needed to explain about this case:

2.3.1 The Earths gravitational that will effects the way to make a launch from Earth bend. To avoid this factor, the calculation of the gravitational can be ignoring which the spacecraft is long distance from Earth.

2.3.2 When the spacecraft in the Earth orbital, it can move with Earth round the sun by velocity,  $V_0$  about 30 Km/s. This velocity faster than the velocity need to arrive Mars. If spacecraft will shoot while the Mars are nearly,  $V_0$  is horizontal from target. Thus, it will move to the different direction. So, Mars will change place after the spacecraft launch.

2.3.3 Entire solar system is influence by the sun gravitational. By refer to the Kepler's Law; all objects that is orbital will move in ellipse way and in the end do not find the target.

Therefore, the method "*Point and Shoot*" not practical is proven. The best way is by search the suitable orbital to bring the spacecraft form Earth to Mars. The launching can be made by consider the spacecraft and Mars will be met at the same location at the Mars orbital.

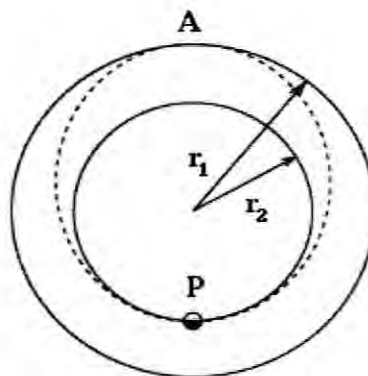


Figure 2.2: Hohmann Transfer Orbit

The direction of the spacecraft move when enter the Mars orbital also can be take as a factor to arrange the suitable velocity between the spacecraft and Mars to landing. For that, the Hohmann Transfer Orbit was introduced on 1925 by Wolfgang Hohmann which is engineer from German. The orbital is ellipse with the point of perihelion, P (point nearly to the sun) at Earth orbital and aphelion, A point (point far from the sun) at Mars orbital.