

Online Interior Design for Malay Traditional House

by

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Dissertation submitted in partial fulfilment of
the requirements for the
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(Information Technology)

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CERTIFICATION OF APPROVAL

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Approved by,

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UNIVERSITI TEKNOLOGI PETRONAS

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June 2006

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

(NURUL AISYAH RAMLAN)

ABSTRACT

'Online Interior Design' focused on Malay Traditional House in Malaysia. The project is an online system in which user can access and view the system as well as perform some functions provided by the system via Internet. The project is for Interior Design Company in Malaysia that designs the interior of Malay House Traditional or any other house that wants Malay Traditional House concept. The main focus of the project is how user can interact with the system to design and decorate the internal house virtually. The objective of the project is to enable user to interact with virtual house by manipulating the object, navigating the environment and selecting the object they want in order to decorate the environment of the house. Since there has many type of houses in Malaysia such as Pahang Traditional House or Malacca Traditional House, the scope of the project is focusing on Malay Traditional House generally, not specifically like Pahang Traditionally House. The general Malay Traditional House is designed based on Malay Traditional House architecture which include 'anjung', 'serambi', 'rumah ibu' or 'kitchen'. Virtual Reality Modeling Language (VRML) is used to design object of the virtual house assisted by the imported 3D objects. VRML's Scene Description Language and, VRML Script Node methods are combined together to allow interaction between user and the virtual house besides allowing user to manipulate the objects. The project methodology used is System Development Life Cycle (SDLC) that showed how the project is designed and developed as well as the flow of the process. The project is to vary the taste of people in decorating their house and it also can be applied to all type of houses that want to have Malay Traditional House interior design.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Nowadays, we can find many software products for interior design in the market. These products are widely used in all over the world since we can find many websites to offer the software products. Most of the interior design software products are for modern house such as bungalow, terrace, apartment or condominium. The software products that people can buy are such as Cadsoft Envisioner and Outline 3D. The products help user to decorate or renovate their internal house. Besides, it helps interior designer to fulfill the requirements of their clients by referring the sample of the software.

As we can see, there are many virtual houses or buildings on the Internet that we can easily get or download. The virtual buildings are such as double-storey houses, shop lots, museum, theater, lecture halls or schools. Most of the virtual buildings needed to be downloaded before it can be viewed since the file size is too big and there are not compatible to be viewed via Internet Browser. Other than that, the rendering time is too slow since there are too many objects in the virtual environment. This can be solved if a suitable programming language is used to create the objects and view clearly on the Internet browser.

There has lack of Virtual Malay Traditional House on Internet. This is because there has lack of effort of Malaysian to create Virtual Malay Traditional since the architecture is complicated and people nowadays is not interested towards Malay Traditional House.

Other than that, people prefer to choose modern house to Malay Traditional House since it meets most of people's needs and wants.

The interior design of Malay Traditional House is quite unique because of the architecture, structure and texture. The uniqueness of the house shows the different among the other traditional houses all over the world. There still have some people that would like to have the interior design of their house, restaurant or even office based on Malay Traditional concept.

Interior design based on Malay Traditional House concept can be one of the user choices in order to decorate their house. Interior design software for Malay Traditional House is possible to implement since it can give variation of choices to user in order to decorate their house. The best to implement the interactive Virtual Malay Traditional House if it can be viewed via Internet and user can easily walkthrough the environment and manipulate the objects in the building.

1.2 PROBLEM STATEMENT

There has lack of effort to develop Virtual Malay Traditional House since it is not famous in virtual reality field. Other than that, the architecture is complicated and difficult to design in virtual world.

Other than that, as we can see, there has quite a few Malay Traditional House website that we can find on Internet. Since there has lack of website of Malay Traditional House on Internet, our Malay Traditional House is not famous among people from all over the world.

Most of the software of interior design is for urban or modern house such as bungalow, terrace house, condominium or apartment. So, we can conclude that most the software for online design on the internet is suitable for client that wants to decorate their modern house. The problem here, if there has a person that wants to decorate their Malay

traditional house or renovate their house based on Malay Traditional concept, how can they find the software product?

Furthermore, even though there has much software available on Internet for user as well as architect or interior designer, but lack of website that offers user to give feedback once user browse through the environment to give any comments to the interior designer.

From the problem statements that has been analyzed and identified during the investigations and studies of the project, the title of the project then can be identified as well as the solutions to come out with the exact project title.

1.3 OBJECTIVES

The objective of project is to create an online service for Interior Design Company in Malaysia that provides 'Online Interior Design for Malay Traditional House'. The website contains the design of several houses that have been requested by the clients from the company earlier. The design of the Malay Traditional House is done by the architect of the company. Once the design of the house has been developed, the architect will upload the model of the house on the website of the company and the clients can access the company website to view and walk through their desired house from their office or house.

1.3.1 To allow user to manipulate and select object as well as navigate the environment of the virtual reality application

The user would manage to modify the interior design of their house while walking through the whole house. The application will allow embedding annotations and proposed design changes in the three dimensional design models under discussion. If the client dissatisfy with the architecture of the house, the user will leave notes to interior designer. If clients want to change the interior

design of the house, the clients can modify as they intend to, for instance; if client want to change the color of the wall from brown to yellow, the application will provide color selection to client to change the color of the wall.

1.3.2 To enable interior designer and client to interact with each other in different place and different time

The website will allow the client and interior designer to interact to each other though they are in different place and time. This will reduce the time consuming for both interior designer as well as client. To ensure that this website is fully used by interior designer and the clients, they must always access the company website so that any message sends to interior designer and modifications by interior designer are always to be updated and to be noticed.

1.3.3 To give description of Malay Traditional House to other people by navigating the environment of virtual reality application

The other objective of the project is to introduce Malay Traditional House architecture to people by navigating and walking through the environment. They will also know the structure of the house. It helps people to visualize Malay Traditional House rather than see images and photographs. This objective is for foreign people that want to know the architecture of the houses in Malaysia.

1.3.4 To provide sense of presence to user by increasing the realism of the house environment

The goal of project that needs to be achieved for the project is to provide the sense of presence to user such as interior designer and client by giving the real environment of the house in the virtual reality environment. This goal is very important to achieve to ensure that users manage to feel that they are really at the real house by walking through the virtual house application. Besides, this is to

ensure that users feel more comfortable and ease to understand as well as interact with the environment. Other than that, the sense of presence is important because it will increase the realism of the virtual environment. The realism of the virtual reality application is aided by the scale of object, colors and textures in the virtual house.

1.3.5 To offer client beforehand experience before they experience to walk through their real house.

The other objective that can be identified is to offer beforehand experience before they experience to be in their real house. This is to ensure the that user is really satisfy with the design of the house as well as the interior house so that it can become as the requirements on how to design and build the desired house by users. In the other hand, it can reduce the risk and cost if the interior designer does not meet the customers requirements besides time consuming.

1.4 SCOPE OF STUDY

There are varieties of Malay Traditional House that we can find in Malaysia such as Pahang Traditional House, Perak Traditional House as well as Kedah Traditional House. Since there have too many Malay Traditional House that we can find in Malaysia. The scope is narrowed down by focusing on general Malay Traditional House. The general Malay Traditional House should has 'anjung', 'serambi gantung', 'rumah ibu', 'selang', 'rumah tengah' and 'dapur'.

Other than that, this is for Malaysia Interior Design Company. It means that the project is for interior design of the house, not the design and the architecture of the house since people that want to build a house cannot design a house based on their passions unless they are guided by the architect of the house so that, the architect manage to advice on how to have a good design of house and the requirements need to design a house.

The scope is focused on the interior of the house. This means that user may select the options on how to decorate the house based on the selection that are provided once client walk through the house and try to modify the interior house as they want.

CHAPTER 2

LITERATURE REVIEW

2.1 MALAY TRADITIONAL HOUSE ARCHITECTURE

The traditional Malay house is one of the richest components of Malaysia's cultural heritage. The traditional Malay House is designed and created by the villagers themselves and it manifests the creative and aesthetic skills of the Malays. Malay is rich with its culture and art and it influences the architecture of their house. Other than that, it is a near-perfect house form which is appropriate to local climatic conditions and expresses the way of their way of life of its inhabitants. The traditional Malay house is well-designed to suit the warm and humid Malaysian climate and for the multifunctional use of space. The traditional Malay house is influenced by various factors like climate, lifestyle, the owner's economic status, the surroundings, available building materials and various myths and taboos. Its design is also flexible as it caters to the widely different needs of the users and it has an addition system which allows the house to be extended to meet the growing needs of each family (Malay House).

The traditional Malay house is a timber house raised on stilts. It is a post-and-lintel structure with wooden or bamboo walls and a thatched roof. Windows of the house are plentiful, lining the walls and providing good ventilation and views for the house. The quality openness is also reflected by the large open interior spaces with minimal partitions. The roof of the Malay house dominates the low walls and the open stilted bottom of the house. The juxtaposition of the roofs with different sizes and at different orientations creates an interesting visual form. The house is efficiently designed to suit the local climatic requirements using various ventilation and solar-control devices and

low-thermal-capacity building materials. Other than being well adapted to the environment, the house has also evolved a prefabricated building system which is flexible and varied to suit the needs of the users. There are various traditional houses and hybrid Malay houseform can be identified in Peninsular Malaysia. They are classified mainly by their roof shapes. The basic houseform are such as *bumbung panjang*, *bumbung lima*, *bumbung perak* and *bumbung limas*. (The Houseform).

Basically, the traditional Malay House can be divided into the front and back portions which are centred around the *rumah ibu* (the core house) and the *dapur*(kitchen) respectively. The entrance of most traditional Malay houses, stairs lead up to a covered porch called *anjung* (veranda). The porch acts as a good transition space between the public and the private domains. The *anjung* acts as an important focal point for the entrance since unfamiliar visitors and guests are entertained here. From the entrance, one enters into *serambi gantung* (hanging verandah). The low windows in the *serambi gantung* allow for good ventilation and good views to the exterior. *Rumah ibu* (the core area) is the largest area in the house where most activities are conducted in this area. This area is the highest floor level in the house. *Selung* is located between *rumah ibu* and the kitchen and it is the entrance of the kitchen. Kitchen is situated at the back of the house and it is on the lowest floor level. Modern kitchen in new Malay houses are dropped to the ground level where floors are cemented.

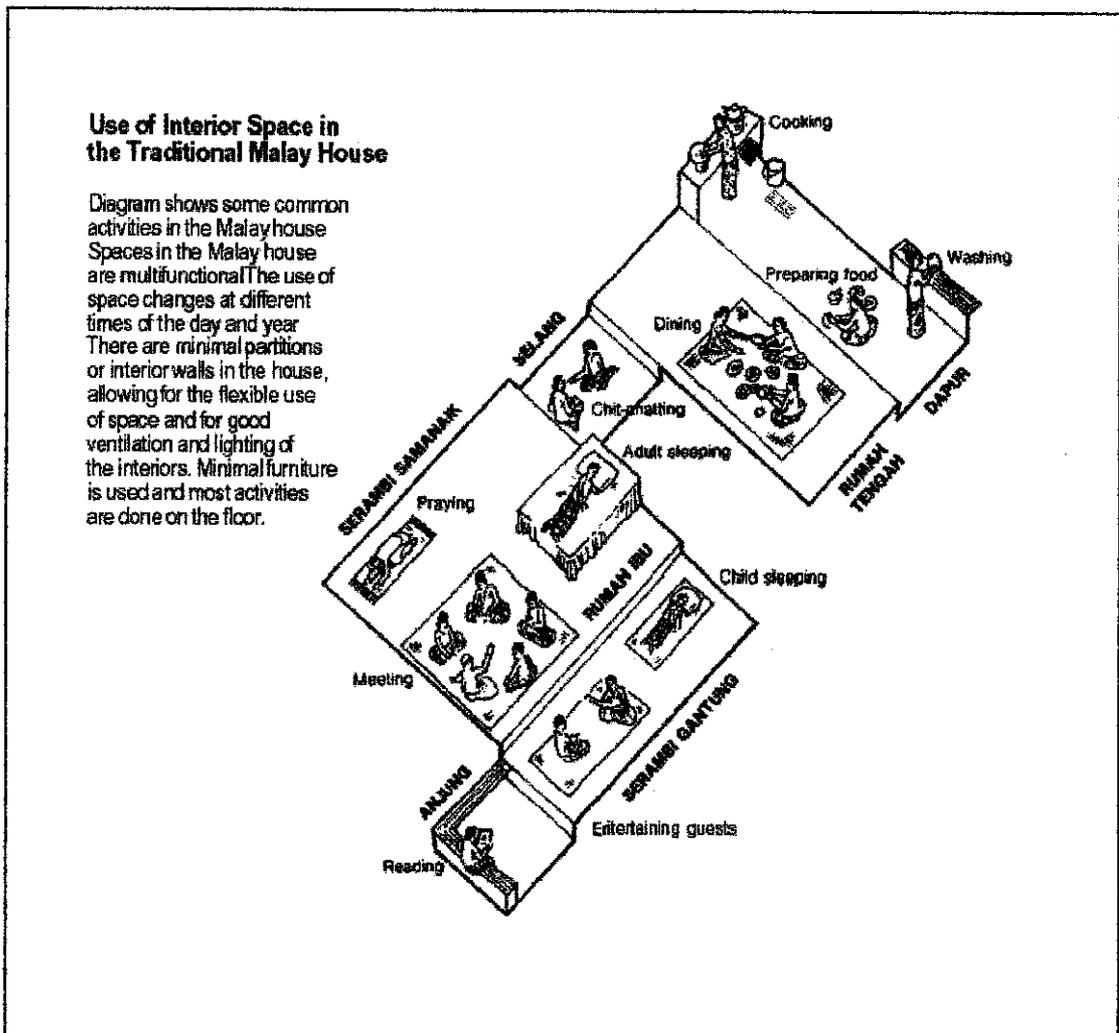


Figure 2.0: Design and layout of traditional Malay House

Figure 2.0 (Design Layout of traditional Malay House) shows the layout and design of traditional Malay house. The compound of the traditional Malay house is difficult to differentiate since the house compounds are often open and unfenced, making private spaces ill-defined and merging with private spaces. The house compound in the village is meticulously well-kept with the compound well swept and planted with vegetables and fruit trees, especially coconut tree and bananas tree. The wells and toilets are usually located in the compound spaced apart and kept away from the house.

The well-shaded compounds are favorite places for play and social interaction and there are also people used it as working areas. Another semi-private space commonly used for work is the open bottom of the stilted Malay house. It is used to store paddy, fuel

(firewood, coconut fronds), building material, bicycles and even car (if the space is big enough).

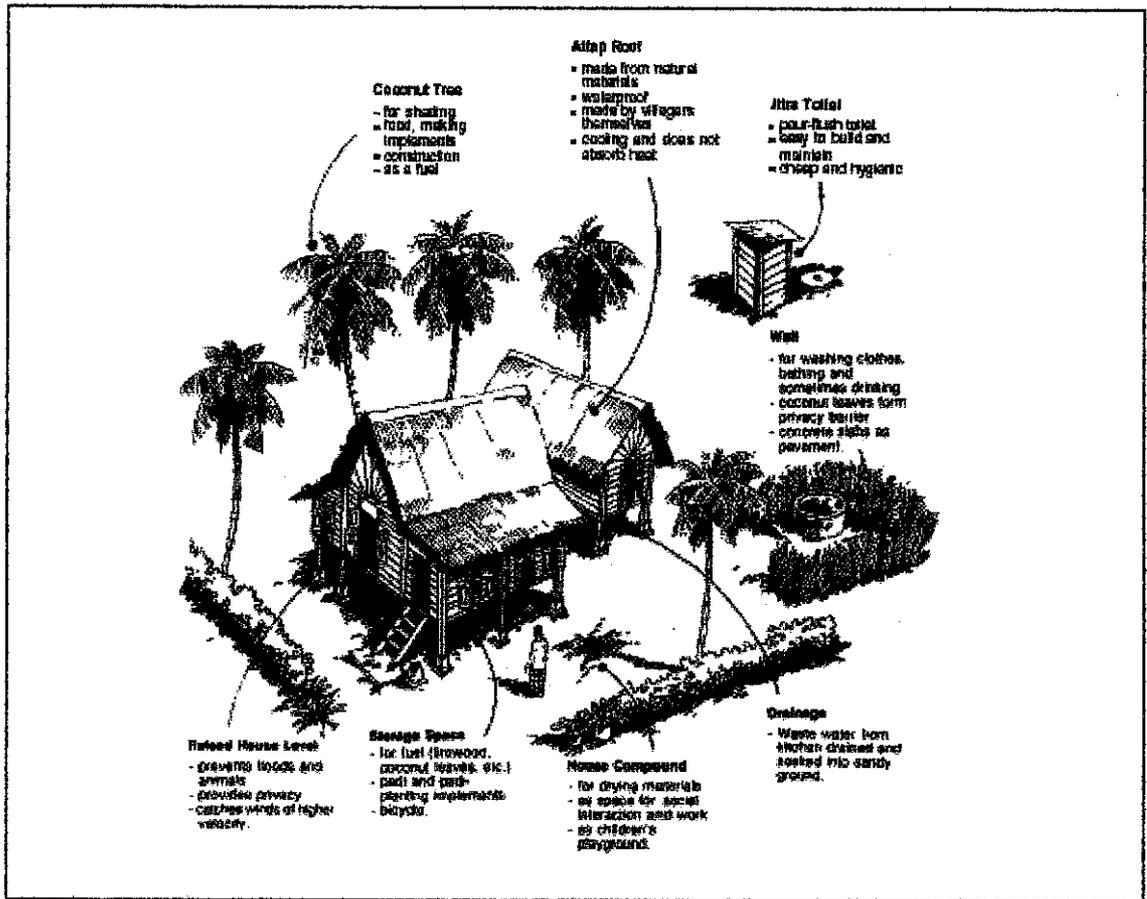


Figure 2.1: The External Environment of Malay Traditional House

Figure 2.1 (The External Environment of Malay Traditional House) illustrates the layout of the external environment of the traditional Malay house. The figure shows the compound of the Malay house where the toilet and well situated, the storage space, the raised house level, drainage, the coconut trees and the house compound where people used to dry materials, as space for social interaction and work as well as the playground of the children to play football, hide and seek and many more.

There are many traditional Malay houses that we can find in Malaysia. The traditional Malay house are such as traditional Kedah house, traditional Pahang house, traditional

Malacca house, Minangkabau house and many more. See Appendix A to illustrate a few of traditional Malay houses.

2.2 WEB-BASED VIRTUAL REALITY USING VRML

The project for 'Online Traditional Home Design' is a web-based Virtual Reality via VRML. VRML can be defined as Virtual Reality Modeling language that is a new edition to the World Wide Web (WWW) (Beier, Klaues-Peter). VRML is a protocol for creating navigable, hyperlinked 3D spaces on the Web and in other words, the images of objects you can spin around or a scene you can spin around the center point of view, zoom in or out and it serves as links like image maps (VRML). Eweek.com defined VRML as a 3D graphics language used on the web. In addition, after downloading a VRML page, the contents can be viewed rotated and manipulated and the VRML viewer is launched from within the Web browser. In order to view a VRML file, VRML viewer or browser is needed in which can be plug-in for the web browser.

The first version of VRML (VRML 1.0) was developed by a consortium of computer graphics professionals and became available on the World Wide Web in 1995. It quickly gained broad support and, after redefining the language, the specifications for VRML 2.0 followed in 1996. This version, with a few minor differences, became an international standard (ISO/IEC 14772) in 1997 under the name VRML97.

VRML is used as one of the language in the project since it is extremely cost effective since the required hardware (networked computer) exists all over the world and the viewing software (VRML plug-in) is available to everyone since it is an open source where people can download it freely from internet (Beier, Klaues-Peter).

Figure 2.2 illustrates in a simplified form the items and properties that can be defined in a VRML file the standard use via a Web browser, as well as the possible utilization of a VRML application in various immersive viewing systems.

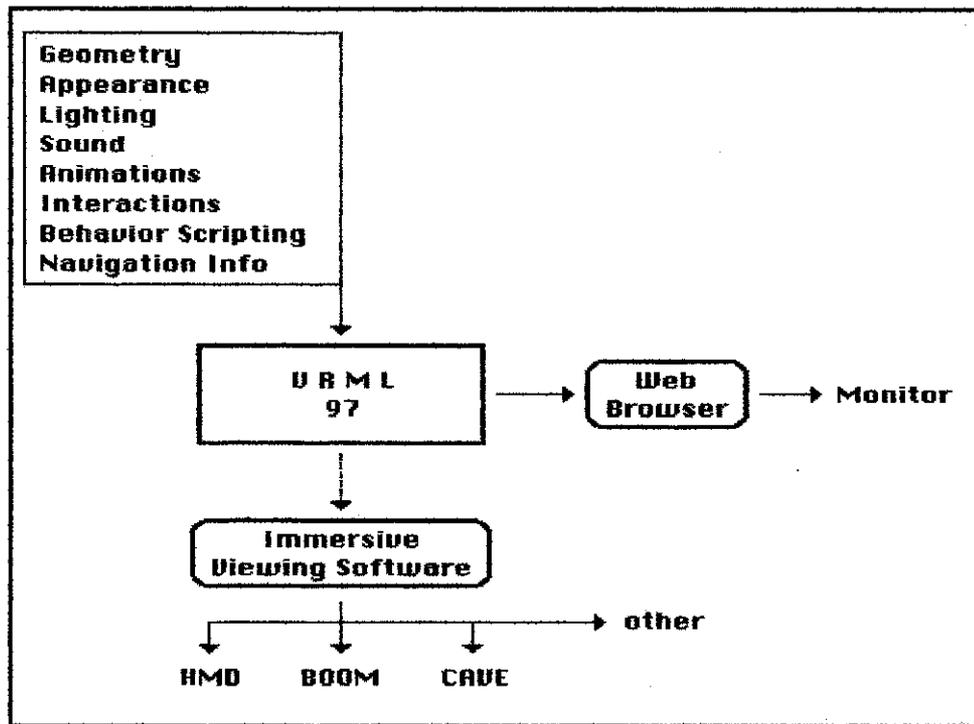


Figure 2.2: Definition and use of VRML file

Attempts and problem

It is quite hard to apply Virtual Reality in environmental design. There are many attempts were made on how to apply VR in environmental design limitations of hardware performance, and the need for physical constraints. In order to create a virtual reality environment simulation we should consider the elements of a Virtual Application including navigation, immersion and interactivity. Construction of the virtual environment passes through three main phases; there are modeling, rendering and real time interactive presentation using system effectors (Mahmoud, A.H.).

2.3 VIRTUAL REALITY ON INTERNET

Nowadays, virtual reality becomes one of the important applications in web browsing since the increasing of connection speed whereby it may improve Internet performance and as a result, there has more virtual reality web-based applications are available. More complex graphics and multi-media can now be transmitted over the internet relatively

quickly in real time and with little delay. The prevalence of broadband connections in homes and business means faster transmission of data to a wider audience using the Internet.

The above statement can be proved where we can access from certain website that provides virtual reality environment on the internet. For instance, Teaching Virtual Reality using Internet Distance Delivery is a teaching session over the internet that can be a very effective distance-delivery method in many subject areas. This methodology makes a virtual classroom become a reality. Other than that, the virtual reality is used in learning process whereby there has a website that provides a web-based multimedia Virtual Reality Environment for E-Learning (Multimedia). Virtual reality is embedded on the website to support the materials of learning on Internet for students. In addition, virtual reality also has an important role in voice communication. Virtual Reality (VR) Environments such as Active Worlds, Cybernet Worlds, and Chat in 3D Worlds allow users to communicate through text-chat (ActiveWorlds 2003, Cybernet Worlds 2003, Chat in 3D Worlds 2002) (Communication).

Virtual reality on internet is used widely for people. Technology of virtual reality and the Internet continue to integrate, as the online culture is now the fastest growing demographic on the planet. The standard virtual reality format on the web is VRML (Virtual Reality Modeling Language) or (Virtual Reality Markup Language) created by "Silicon Graphics Inc". VRML is universally accessible, hyper-linked, is becoming common place on the World Wide Web. It is a file format for describing 3D interactive 3 dimensional virtual environments. It is capable of representing static and animated objects and it can have hyperlinks to other media such as sound, movies and images (VRML).

2.4 VIRTUAL REALITY IN INTERIOR DESIGN

The Web browsing on Internet nowadays enables people in different time and different places to access or browse through three-dimensional models of buildings and places in a collaborative design discussion. We can see that there are many software have been designed, created or developed for interior design in order to help interior designer in doing their tasks as an interior designer or to the customer of the interior designer, whereby the architecture of the house has been first created or designed by the architect of a company and then, the customer may decorate their desired house by choosing the selections that has been provided on the application of virtual reality of their house. This is to ease interior design in order to fulfill customer wants and needs. Other than that, the software will be able to help customer on how to visualize their requirements to the interior design of their house.

A realistic virtual reality space will supply an excellent solution for interior design and marketing (Realistic VR). Most of the software of the interior design may facilitate an interactive application of interior design in order to catch the eye of the customer. Walls, desks, chairs and other furniture can be used as building blocks to fill in a floor or even the entire building. All the objects of the interior design can be moved around, rotated, removed and even resized as programmed by the programmer. There are also a software that provides 'bird's eye view' that allows for easy overview meanwhile the floor-level view gives an accurate spatial impression of the interior.

There is also software that allow user to draw any kind of 2D interior using the Plan Editor or select from the existing interiors available in the Outline3D catalogs and the 3D model is generated from the 2D interior by a mouse click. It also can publish created interiors in the professional directory at their server and place direct links to them from our own Web site. By clicking the direct link, the software starts and highlighted interior is loaded as a default (Software). The other software ease user by providing a simple drag and drop functions for windows, doors, furniture, texture, color and landscaping make producing top-notch designs a snap (Software function).

What we can gain through here is, it is easy to compare the consequences of different stages for instance from a small room to a large room, from a high closets to a low closets, wall made of glass or wood, color of the carpet or floor and many more. Other than that, to design of the furnishing elements virtual reality system could be utilized in visualization in which the rooms could be visualized with different realistic interior decorations and furnishing before the building has been completely built (Design virtual reality element). This may save the cost in case the interior design fails to meet customer requirements rather than they need to renovate the interior house.

2.5 SENSE OF PRESENCE

The 'Online Interior Design' provides sense of presence to user by increasing the realism of the house environment. Some researches have been done as to what presence is, but none of these researches have actually given a good definition of presence. Presence can be defined as perception of "being in" or "existing in" the Virtual Environment in which one is immersed (Heeter, 1992; Sheriden, 1992; Steur, 1992; Witmer and Singer, 1998). Sense of presence is important in virtual reality application because it will ease of interaction between user and the virtual environment, user initiated control application, pictorial realism, length of exposure, social factors and system factors.

2.6 REALISM OF VIRTUAL REALITY APPLICATION

One of the important criteria in developing virtual reality application is realism. Realism is essential to ease user to interact with virtual application. Realism of a virtual reality application can be increased by having lighting, choosing suitable textures and also consider the additional world elements. Lighting contributes greatly to the level of realism in the model since it gives tonal variations and shadows to the many surfaces (Hecht; Kim; Rausch; Zhang Xiaolong, 1996). In order to increase realism, the project needs to consider these three elements to be in project.

2.7 COMMUNICATION

People still can communicate with each other even though there are in different place and location. With technology that we are already have right now, we are able to communicate for instance via telephone, email and many communication applications such as ICQ, NetMeeting, Yahoo! Messenger, MSN Messenger and many more. People also manage to communicate sing website where they can leave their message to another user of the website.

2.8 BENEFIT

A good system is where the system is able to provide a lot of benefits to users which it can ease human's life. Online Interior Design provides some benefits to users that use the system. The benefits are as below:

2.8.1 Eliminate interior designer difficulty

Most interior design must face difficulty to understand user requirements. Using traditional way, interior designer and client will sit together and discuss how the interior house looks like. Clients will refer to catalog and choose their choices for instance color, texture and furniture. By using online interior design, they can put their idea by modifying the interior house in the virtual environment. Other than that, they can have beforehand experience before they really have their house modified by the interior designer. In addition, the interior designer can easily refer the requirements based on the virtual house modification.

2.8.2 Ease clients

It is hard to express some ideas verbally. Sometimes, we need image or graph to help the ideas explanation. So do the clients requirements. They cannot exactly express their idea and requirements by words. By virtual house aiding them, they manage to explain

the requirements clearly and interior design manages understand the requirements clearly too. The system assists client in such a good way when they can visualize the requirements in virtual house.

2.8.3 Functions are straightforward and understandable

Functions used must use a simple language and concise. Other than that, the most users' common language must be used so that the function is readable and clear. The functions provided by system are quite straightforward and understandable. Most of the users can easily understand. If there has a case where user cannot understand some of the functions, they still can perform the tasks since user can guess what is actually the function does such as rotation function. If user clicks to 'Rotate' function even though they don't know how it works, the object will automatically rotate and user can guess that the function will perform for what type of task.

2.9 LIMITATION

There still has limitation even tough a perfect system is developed and designed. The limitations may caused by hardware, software or people. Online Interior Design also has limitations but at the same time, limitations also create an advantage affect instead of disadvantages only. Below are the limitations of the system:

2.9.1 Only authorized user has full access of all functions

Even though the website provides a lot of functions to user, they still need to be authorized user before they can perform any tasks and functions on the website. This is one of the security features that provided by the system so that people cannot easily do modification or change on the virtual house environment.

2.9.2 Must have Java and VRML browser to browse website

In order to display the website, user must have java and VRML installed in computer. Otherwise, the virtual environment cannot be displayed and functions created using java cannot be functioned. To ensure that user does not face any problem, the website will provide JAVA and VRML browser installer so that user can download and install it into their computers if they cannot see the virtual environment as well as the java functions.

2.9.3 Less sense of presence

The virtual house is not an immersive system where it will be displayed on monitor and as the result; user will have less of presence in virtual environment. Other than that, with the small size of screen display, the user will fell less realism with the visual displayed.

CHAPTER 3

METHODOLOGY/ PROJECT WORK

3.1 TOOLS

In order to develop 'Online Traditional Malay Home Interior Design', the software that will be used is 3DS MAX version 7, Microsoft Visual Studio.NET, Macromedia Dreamweaver MX 2004, Adobe Photoshop CS2 and Apache Server.

3.1.1 Adobe Photoshop CS2

This software is used to edit image for web and graphic designers. It provides simulate painting techniques with painting engine, liquefy distorting tool and pattern maker plug-in, visually browse and retrieve images with enhanced file browser as well as run native on Microsoft Windows XP. This software is used to create textures of background and objects of the project.

3.1.2 VRMLPad

The feature of this software is; it is smart auto complete, dynamic error detection and has visual support for the scene tree operations. It has a routing map and does operations on resources. VrmIpad has the ability to preview the VRML scene and publish wizard.

In VrmIpad Version 2.0, the software integrated with script debugger and let user find and fix errors in the inline vrmIscript code in VRML scenes and on HTML pages with embedded Cortona control. Other than that, it provides fields' validation macro that

checks scenes to ensure the various field values conform to the VRML 97 specification. In addition, it is able to find in Files command in which it enables user to perform an advanced text search in multiple VRML files at the same time.

3.1.3 VRML Plug-in Browser

VRML Plug-in Browser that the system used is Cortona VRML Client. Cortona VRML Client is a fast and highly interactive Web 3D viewer for viewing 3D models on the Web. Cortona VRML Client works as a VRML plug-in for popular Internet browsers (Internet Explorer, Netscape Navigator, Mozilla, and so on) and office applications (Microsoft PowerPoint, Microsoft Word, and so on). The powerful Automation Interface of Cortona VRML Client allows user to add exciting 3D capabilities to the Web site and standalone applications. Other features include complete VRML 97 support; advanced rendering; support of modern 3D accelerators via DirectX and OpenGL; and a full-screen rendering mode with 3D-glasses support.

3.2 PROGRAMMING LANGUAGE

In order to develop the website, there are a few programming languages need to be used. The programming languages that have been used to develop the website are such as Java and VRML.

3.2.1 Virtual Reality Modeling Language (VRML)

VRML is an acronym for "Virtual Reality Modeling Language". It is the International Standard (ISO/IEC 14772) file format for describing interactive 3D multimedia on the Internet. It was primarily designed by the Silicon Graphics VRML team with contributions from Sony Research, Mitra, and many others [10]. A VRML model is defined in one or more VRML files. A VRML file is regular text file that describes a virtual model using a standardized syntax. The content of a VRML file is being viewed

interactively through the use of a VRML plug-in available for all common web browsers (like Netscape or Internet Explorer). This plug-ins can be downloaded from various Web sites and are usually available at no cost for different computer platform.

Online Traditional Malay Interior Home Online Design is a virtual reality application that can be viewed on internet. So, VRML has been chosen as the programming language for the interior design since it can be embedded into HTML by using '<embed>' tag in HTML. In order to view the VRML application on the internet, user needs to install VRML Plug-in Browser for instance Cortona.

3.2.2 Java

Java is a pure object-oriented language similar to C++, but simplified to eliminate language features that cause common programming errors. Java source code files (files with a .java extension) are compiled into a format called bytecode, which can then be executed by a Java interpreter. Compiled Java code can run on most computers because Java interpreters and runtime environments, known as Java Virtual Machines, exist for most operating systems, such as UNIX, the Macintosh OS, and Windows. Bytecode can also be converted directly into machine language instructions by a just-in-time compiler.

3.2.2.1 Applet

Applet is a program designed to be executed from within another application. Unlike an application, applets cannot be executed directly from the operating system. With the growing popularity of OLE (object linking and embedding), applets are becoming more prevalent. A well-designed applet can be invoked from many different applications.

Web browsers, which are often equipped with Java virtual machines, can interpret applets from Web servers. Because applets are small in files size, cross-platform

compatible, and highly secure (can't be used to access users' hard drives), they are ideal for small Internet applications accessible from a browser.

3.3 PROCEDURE

3.3.1 FUNCTION

Online Interior Design for Malay Traditional House comprises of some functions that allows user to interact with the virtual house environment. The main four functions provided by the system are 'navigate function', 'rotate function', 'translation function', 'change color and texture function' as well as 'send message function'.

Navigate Function

Navigate function is to allow user to walkthrough the virtual house. The navigation functions are already built-in function provided by Cortona VRML such as 'Walk', 'Fly' and 'Study'.

Rotate Function

Rotate function is one of the functions provided by the system. The rotate function is to allow user to rotate object in the virtual house as the user want to.

Translation Function

Translation Function in the system enable user to move and translate objects that have provided in the system. This function allows user to move the objects in the house to the desired place or position.

Change color and Texture Function

For this function, user manages to change any texture in the house or color of the house to their own. This function provides a lot of color and texture so that user can change colors and textures of objects, wall, furniture, floor and many more.

Send Message Function

Send message function is to allow user to communicate with the interior designer. This function enable user to write message to interior designer about their idea and comment about the house.

3.4 PROGRAM FLOW

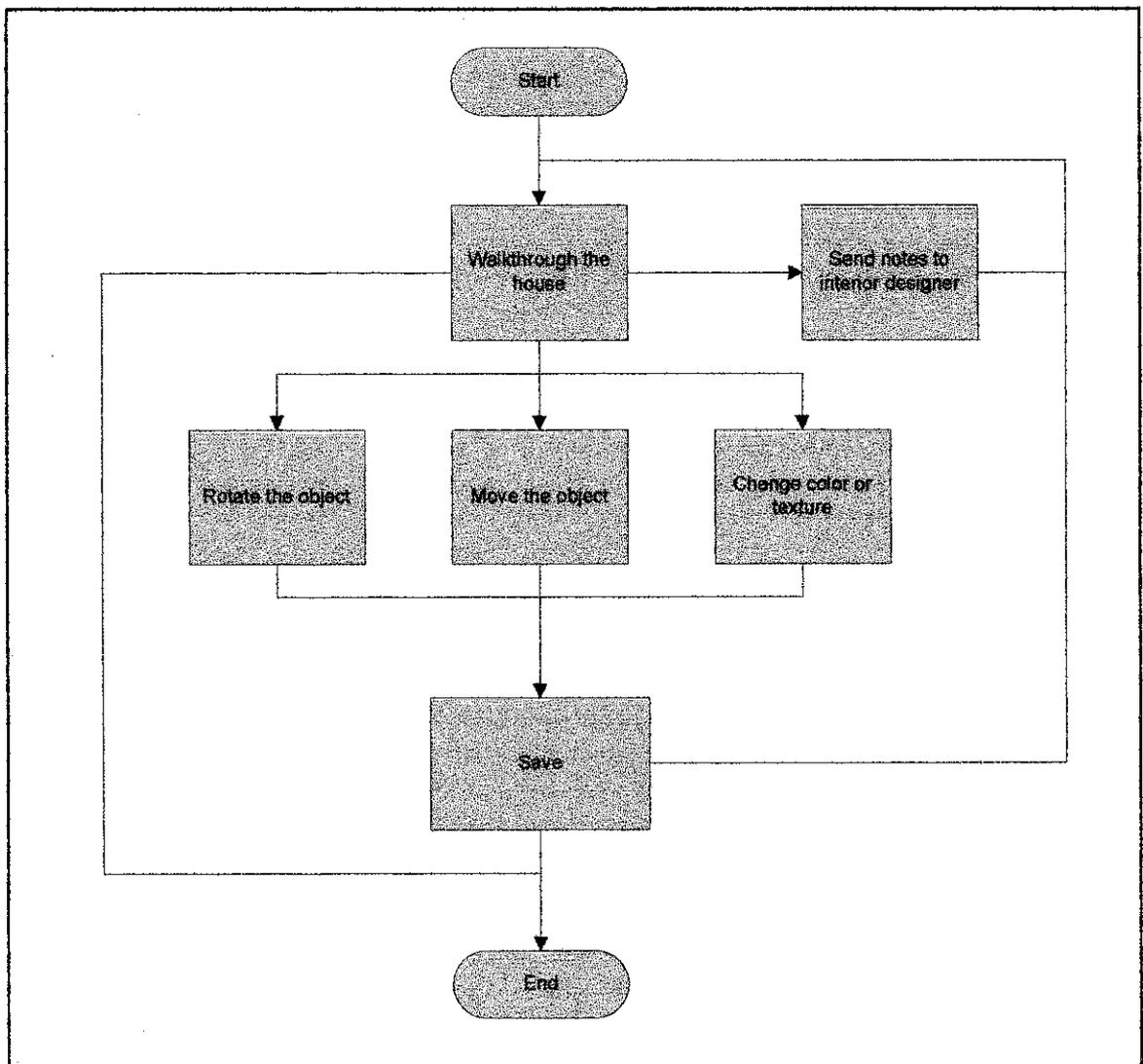


Figure 3.0: Program Flow of Online Interior Design for Malay Traditional House

Figure 3.0 above shows the program flow of Online Interior Design for Malay Traditional House system. The program flow is the path of execution for the system whereby it shows the possible ways on how user can interact with the system. First of all, the user needs to know how to access the website. Once they get through the website, they can perform some functions provided in order to interact with the virtual Malay Traditional House.

Once user get access the online system, user manages to walkthrough the house. User can navigate with the virtual environment using the built-in functions provided by Cortona VRML. The functions for navigation are such as 'Walk', 'Fly' and 'Study'. Other than that, we can find other functions for example 'Plan', 'Pan', 'Turn', 'Roll', 'Go To', 'Align', 'View', 'Restore' and 'Fit'. From the functions provided, user manages to perform vary of navigations for the virtual house.

User is given a few choices in order to interact with the virtual house. One of the choices is; user can send notes to the interior designer their opinions about the house design, the choices of furniture that they can provide, the structure of the house or the color of the house in terms of the decoration of the internal house. Once they submit their notes to the interior designer, then they have a choice to end the system or to walkthrough again the virtual environment and perform the other functions provided by the system.

The other function that user can perform is to rotate and move the object to the desired position they want. User interacts with the object in the virtual house using this function. They can rotate any object and move the object to the specific position in the house and save it once they satisfy with the decoration and design of the house. Once they save the designed house, they have option to end the system or walkthrough again the virtual house and perform any other functions.

User can change the color of the object or change the texture of the wall or the door. A variety of color as well as texture samples will be provided to user so that user can have many choices in order to decorate their house. They can save the changes once they have decided the best color or texture that they can use to decorate the house. After that, they have choice to walkthrough again the virtual environment and perform more functions or leave the system.

Once user wants to end the system, user needs to ensure that any modification and changes are clearly defined via notes or messages send to interior designer since the interior designer will refer to the changes of the virtual house. User can leave the system when they really satisfy with the desired design of the internal house by closing the application.

3.5 SYSTEM DEVELOPMENT LIFE CYCLE

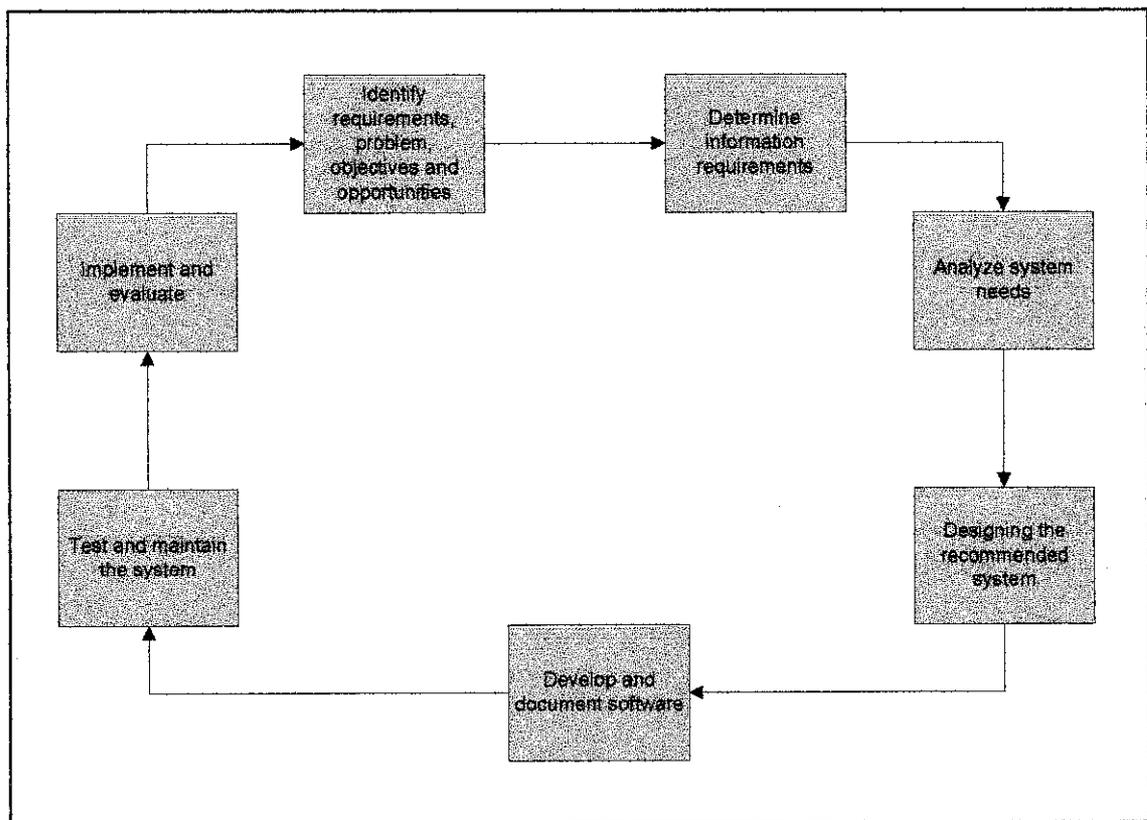


Figure 3.1: System Development Life Cycle

Figure 3.1 above shows the System Development Life Cycle of Online Interior Design for Malay Traditional House. The System Development Life Cycle is a phased approach to analysis and design that holds that systems are best developed through the use of a specific cycle of analyst and user activities.

3.5.1 Identify requirements, problems, objectives and opportunities

The first phase of the system development cycle is to identify requirements, problems, objectives and opportunities. The problems that have been identified are regarding less of virtual Malay Traditional House created and also there has no software designed and built for Malay Traditional House. Other than that, the requirements for the system are identified in order to develop and design the system such as tools needed or the programming languages that are used to develop the system. In addition, the objectives of the system are to be identified such as to design a virtual Malay Traditional House and to design an online system for interior design for Malay Traditional House. The opportunities are to be defined for the system on how the system can be accepted by the market and even there has any opportunities in the market.

3.5.2 Determine information requirements

The next stage is to determine the information requirements. The information requirements are to be obtained from sampling, investigating hard data, interviewing, questionnaire and getting source from Internet. At this stage, we try to understand what information we need to perform the system. In order to understand the information, we try to find the details of the function such as who will be the user of the system, the place where user can use the system, when user can apply the application and how user can actually use the system. This is important because these will be considered during designing the system. For instance, the software needed to develop the system is to be determined as well as the programming language that use to write the system.

3.5.3 Analyze system needs

The next stage is analyzing system needs. This stage is to analyze the tools, techniques, methodology in order to make requirement determinations. VRML and Java are used in order to develop the application. Data flow diagram is used to chart the input, the processes and the output of the system. At this stage, the structured are used for decisions which for the conditions, condition alternatives, actions and action rules. In addition, this stage summarizes what have been found, the cost, the benefits and recommendations on what should be done.

3.5.4 Design the recommended system

The system is to be design at the fourth stage. All the information that have been gathered and collected is to be used as guide or reference to design the system. Part of logical design of the information system is devising the user interface. For instance, the virtual environment is designed and developed. Then, the virtual environment connects to java applet so that it can performed more behavior as well as more interactive. The design phase also includes designing files and databases that will store data.

3.5.5 Develop and document software

In the fifth phase of the systems development life cycle, the system is to be developed. Some of the structured techniques for designing and documenting are being done such as structure charts and pseudocode.

The effective documentation of the software also is to be done in this stage. The documentations are such as procedure manuals, online help, or 'Read Me' files. Documentation tells others what to do if the software problems occur.

3.5.6 Test and maintain the system

After developing and documenting software, the system is being tested and maintains using in black box testing and white box testing. Some of the testing being done by me but the testing is also assigned to some of the students to test the system. Maintenance of the system and its documentation begins at this phase and carried out routinely throughout the life of the information system. The testing is done for every stage.

3.5.7 Implement and evaluate system

The last but not least stage is implementing and evaluating the system. This phase also includes training users to handle the application. Evaluation is mostly for the sake of discussion. Evaluation is being done at every stage or phase. This stage is also to detect if there has any problems so that the system can be returned to the previous stage and the previous stage can be redone since it is a cyclical process.

3.6 DESIGN

Storyboard

Storyboard can be defined a set of drawings outlining the plot and shot sequence for something to be developed or designed. Storyboard is important before starting to develop the system. Storyboard is sketched on paper so that it can be referred when designing and developing the system. Figure 3.2 and Figure 3.3 show the storyboard for the interface.

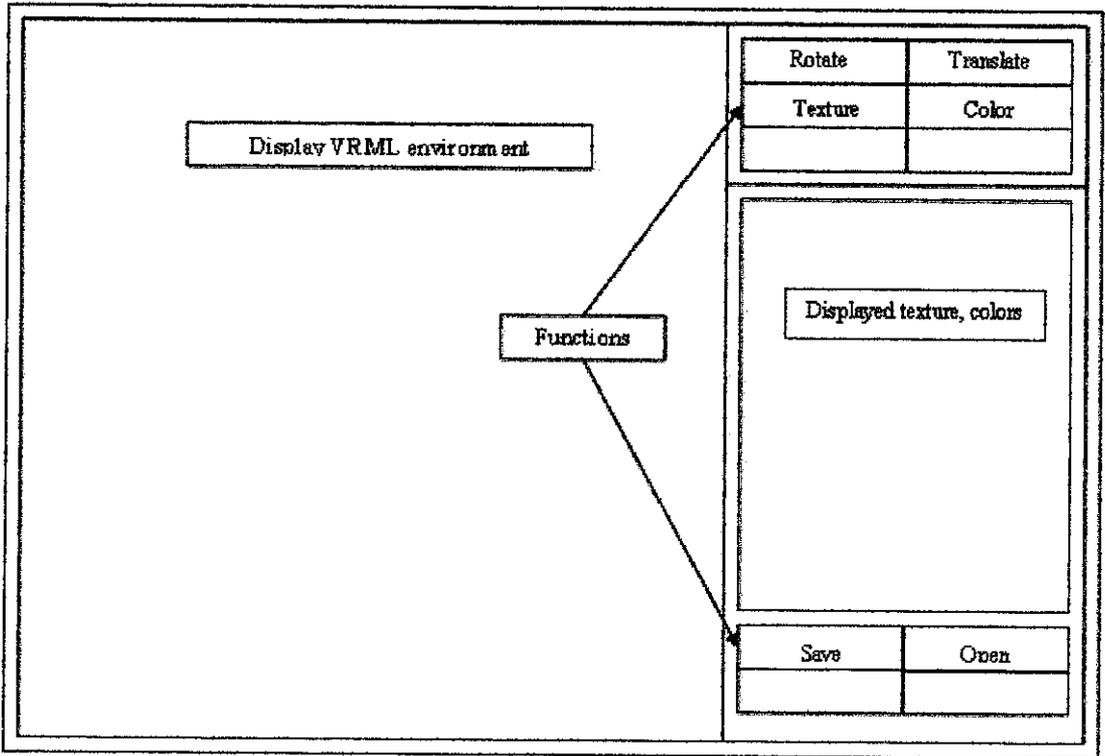


Figure 3.2 Storyboard for the virtual house environment and functions interface

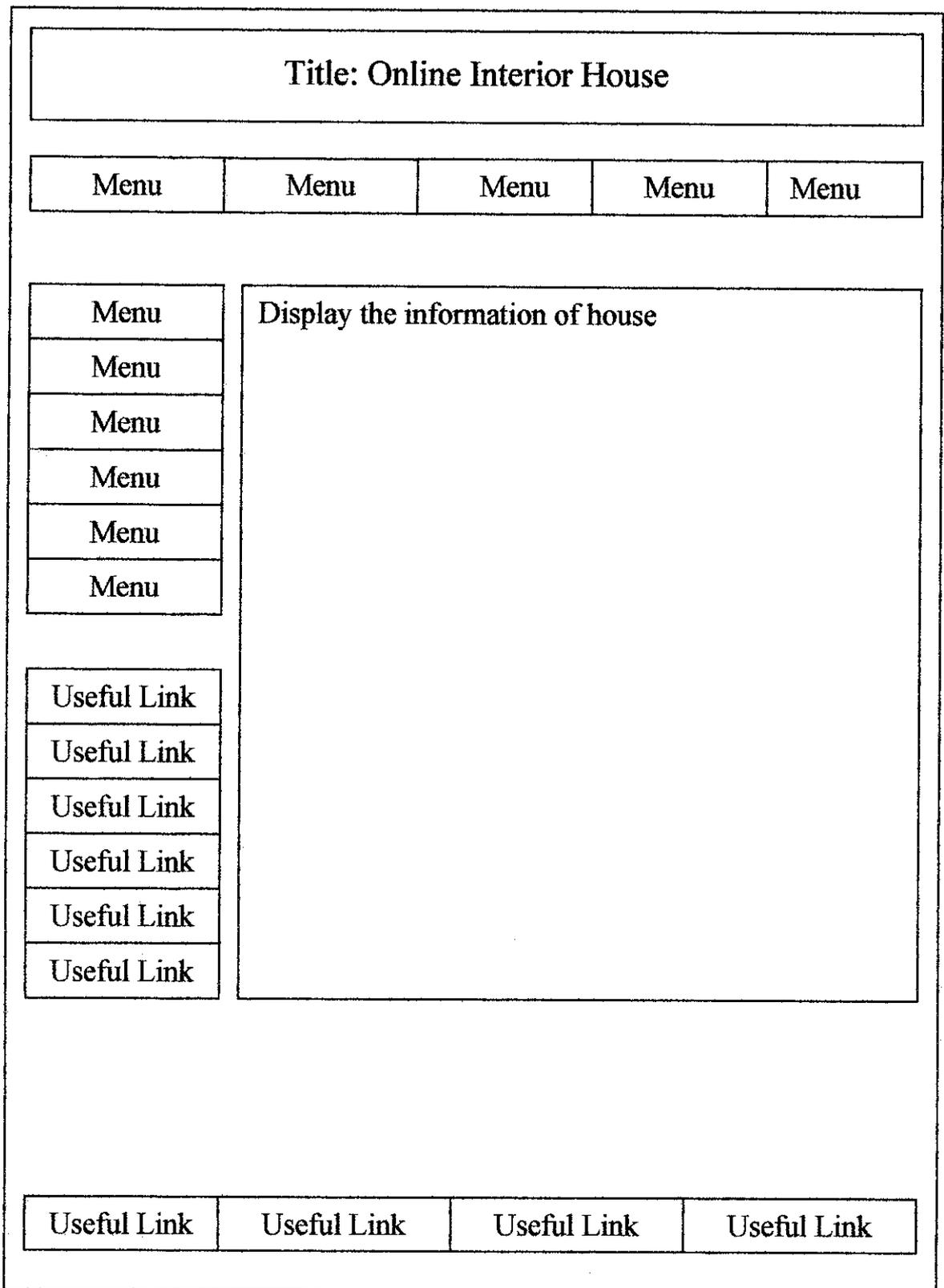


Figure 3.3 Storyboard for the website of the online interior design

3.7 DEVELOPMENT

The development of the system has four levels:

3.7.1 Basic VRML modeling and behavior

VRML is used to specify object behaviors and it provides interaction between user and the virtual environment. Other than that, it is to give response to user events. Other than that, this level is to connect 3D object nodes and fields to behavior driven sensors and timing in VRML world.

3.7.2 VRML communication to Java through Script Node

This level is the interaction between Java to VRML through Script Node interface with API. Script Nodes encapsulates Java functionality and connect variables in the Java environment with VRML object field values. Nodes can contain a program, identify a change or a user action, receive events from other nodes and send events to change others.

3.7.3 VRML communication through External Authoring Interface(EAI)

The EAI provides a Java interface that communicates with an external HTML Web browser. EAI applets can send information to and from VRML scenes embedded in an HTML page.

3.7.4 CGI scripts in Perl Language for Formatting Functions

CGI scripts in the Perl language to support input, saving and processing of forms, new world files and file uploads. A server side CGI Script in Perl reads values set by a Web page form, does processing on these values and creates an output after closing the document.

CHAPTER 4

RESULT AND DISCUSSION

4.1 RESULT

4.1.1 PERFORMANCE

Performance is a critical requirement within the system application operations to ensure the system will provide a high quality system. Online Interior Design for Malay Traditional House performance can be measured and analyzed from various perspectives such as availability, reliability, security, functionality and maintainability.

Availability

The availability of a system is where the system performs as the system intended. Other than that, the system responds when user trigger for action. The availability of the system is where user able to walkthrough the virtual house, perform the functions provided as well as able to save any modification that they have done.

Reliability

The system is reliable when user rely on system in order to perform function that user wants. As for the project, the reliability of the system is where user relies on the system to assist them to design and decorate the interior house. Other than that, the system is

reliable when it is being used by user and the consistency is maintained unless there has internet connection error.

Security

Security of a system is important to ensure that the system is not being attacked by intruders or the data of the system is secure enough to be kept. The online system has the security feature where only the authorized user is managed to do any modification, and the other user has lack of authority to perform all the functions provide by the system. In order to ensure that the system is secure enough, the authentication is required before they are allowed to do any modification on the system.

Maintainability

As long as there has no external error such as internet connection problem or power supply problem, the system will be able to maintain during user performs the functions provided by the system. The maintainability of the system is where the system is able to keep on processing the program during the user use the system and it manages to uphold all the functions on the system so that user can make use all the tasks on the system.

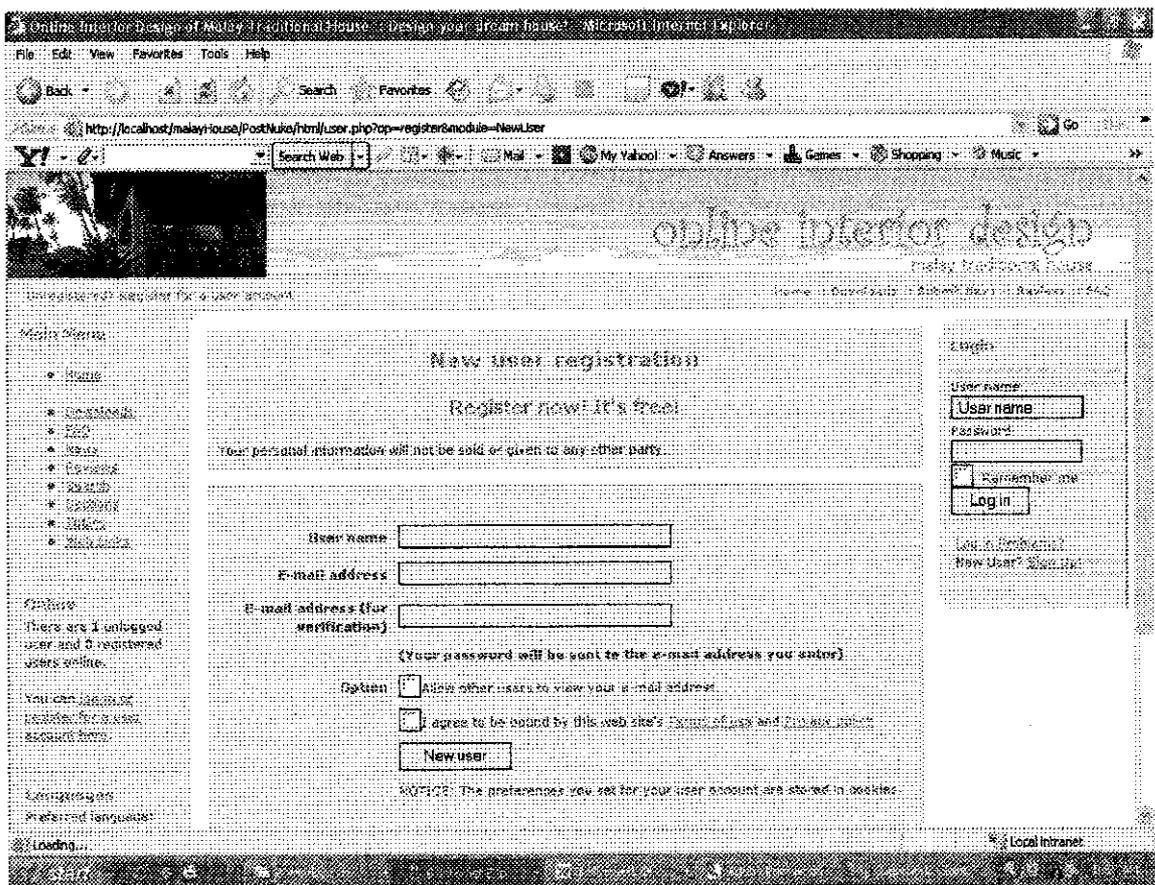
Functionality

There have some functions provided by the system such as walkthrough, rotate, manipulate, change texture or colors. The functionality of the system is where the system is managed to provide functions as to meet the objectives of the project. Other than that, the functionality of the system is where the functions can perform as intended once user use the system.

4.2 ONLINE INTERIOR DESIGN DESCRIPTION

Online interior home design provides various functions on the website. It includes download, Frequent Ask Questions (FAQ), News, Reviews, Search, Web Links, Submit News, Topics and many more.

First of all, user needs to sign up as user before they can have privileges to access more functions provided by the website. User can sign up and register on the form provided by the website. Figure 4.0 shows the registration form that user needs to fill in.



The image is a screenshot of a web browser displaying a registration form. The browser's address bar shows the URL: `http://localhost/malayhouse/PostNuke/html/User.php?op=register&module=NewUser`. The page title is "online interior design". The main heading of the form is "New user registration" with the sub-heading "Register now! It's free!". A disclaimer states: "Your personal information will not be sold or given to any other party." The form contains several input fields: "User name", "E-mail address", and "E-mail address (for verification)". Below these are two checkboxes: "Allow other users to view your e-mail address" and "I agree to be bound by this web site's Terms of use and Privacy policy". A "New user" button is located below the checkboxes. To the right of the form is a "Login" section with fields for "User name" and "Password", a "Remember me" checkbox, and a "Log in" button. Below the login section are links for "Lost your password?" and "New User? Sign up!". On the left side of the page, there is a "Main Menu" with links to Home, Downloads, FAQ, News, Contact, Search, Links, and Malaya. At the bottom of the page, there is a "Loading..." indicator and a "Local intranet" label.

Figure 4.0 Registration form

For the users do not able to display the virtual house environment, they can download the VRML Browser Plug-in installer and install it from download section as shown at

Figure 4.1. Other than that, if they are not able to display the java applet, they need to install (Java) J2SDK so that they manage to view the functions provided by Java applet.

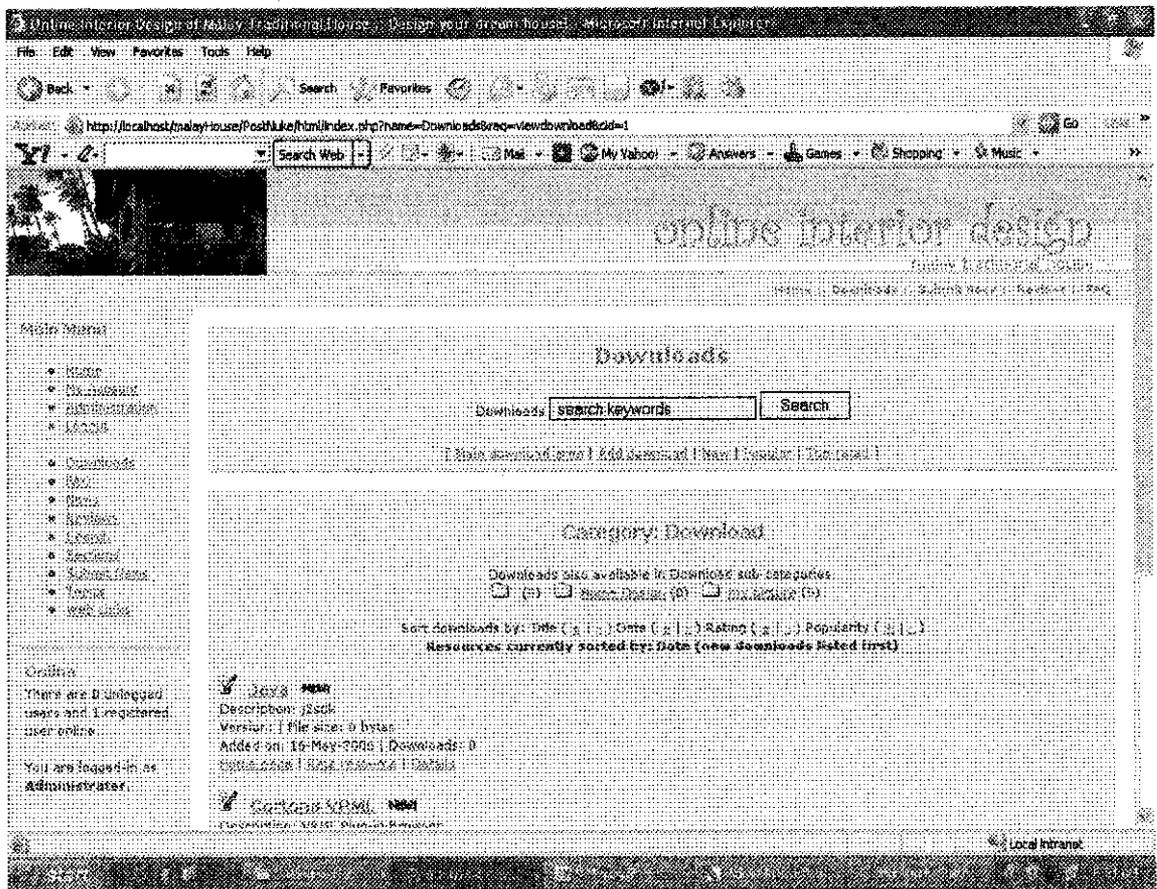


Figure 4.1 Download section

Figure 4.2 show the web links section in which user manage to get related web links to Malay Traditional House on the Internet. User manages to get the related web links without searching via Google or Yahoo! Search engine. Other than that, the web links have been filter and categorize into related their related group to ease user to find their favorite website.

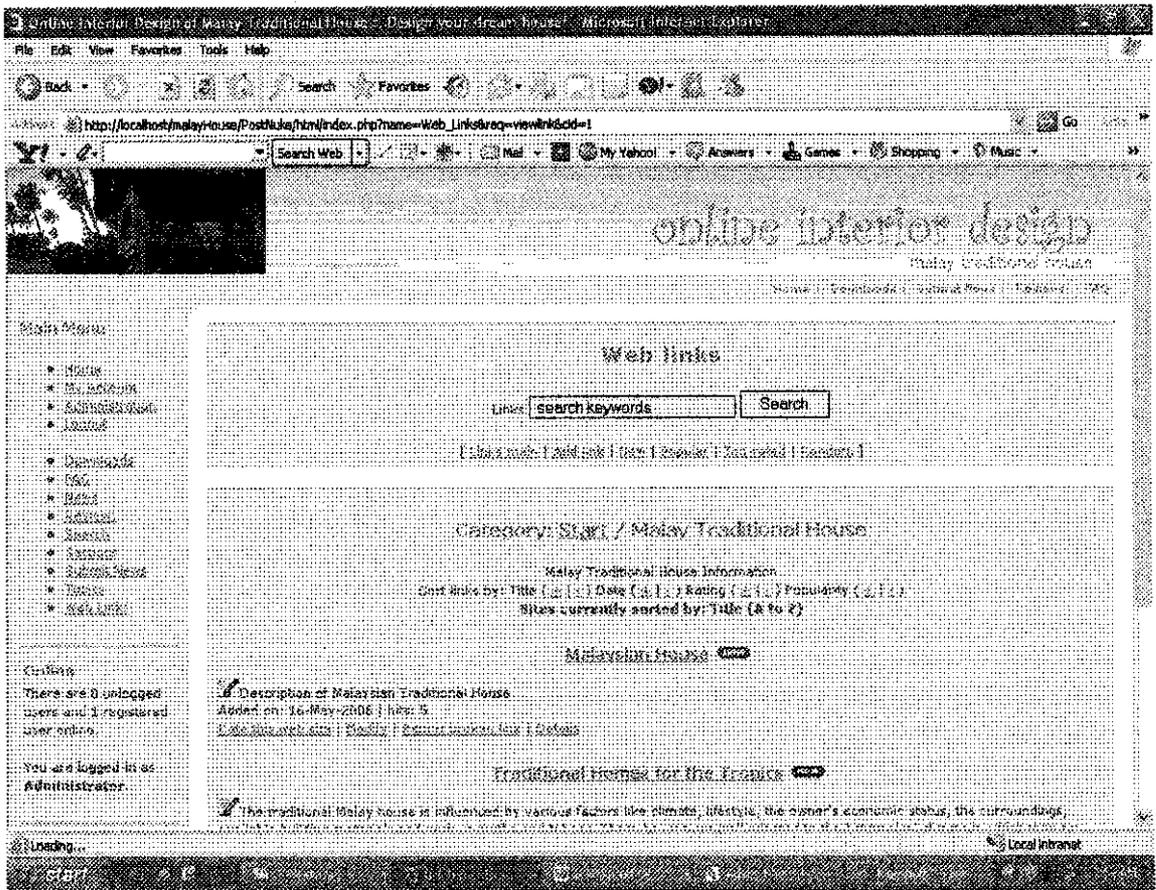


Figure 4.2 Web links section

In order to access the virtual house, user needs to access web links so that user can get the link required. Figure 4.3 shows the location where user can access virtual house on the website.

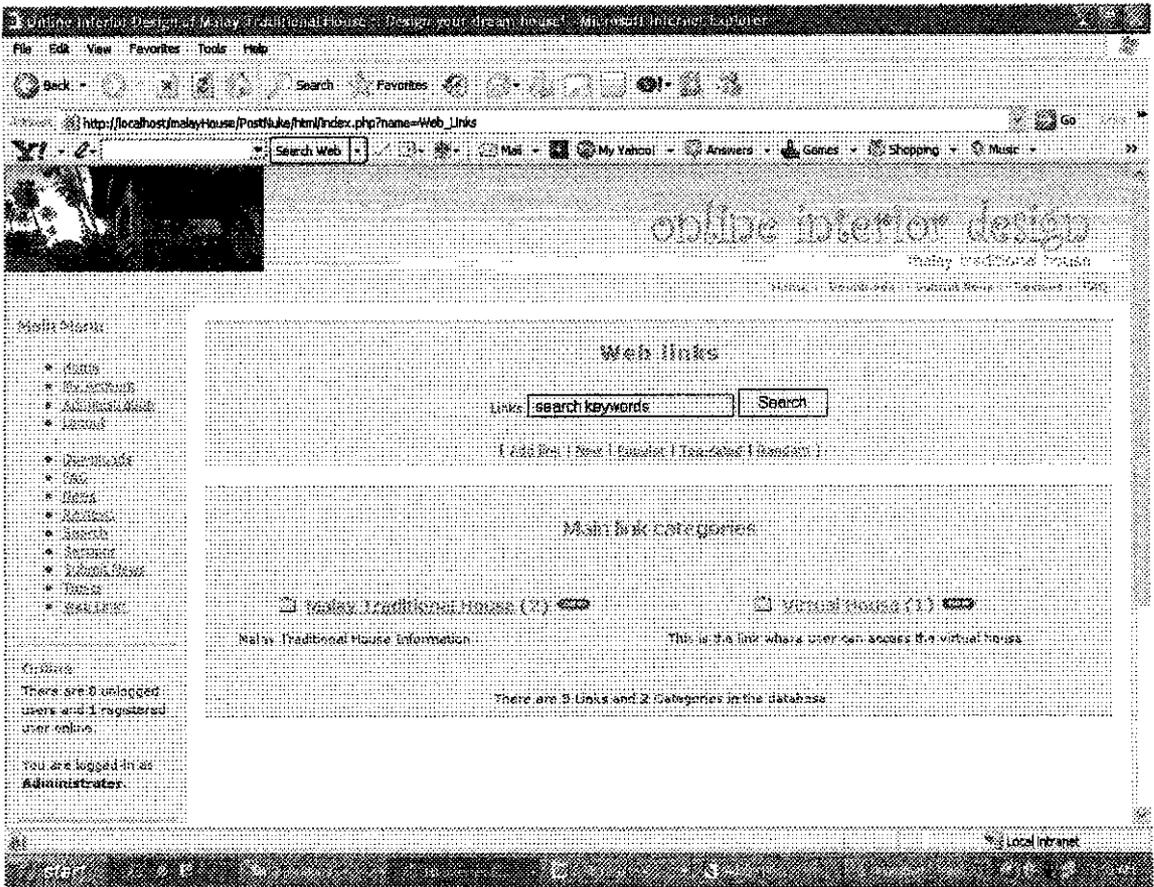


Figure 4.3 Virtual house link

The virtual house links can be found inside the 'Virtual House' folder as shown in Figure 4.4. The list of link of are linked to the virtual house environment.

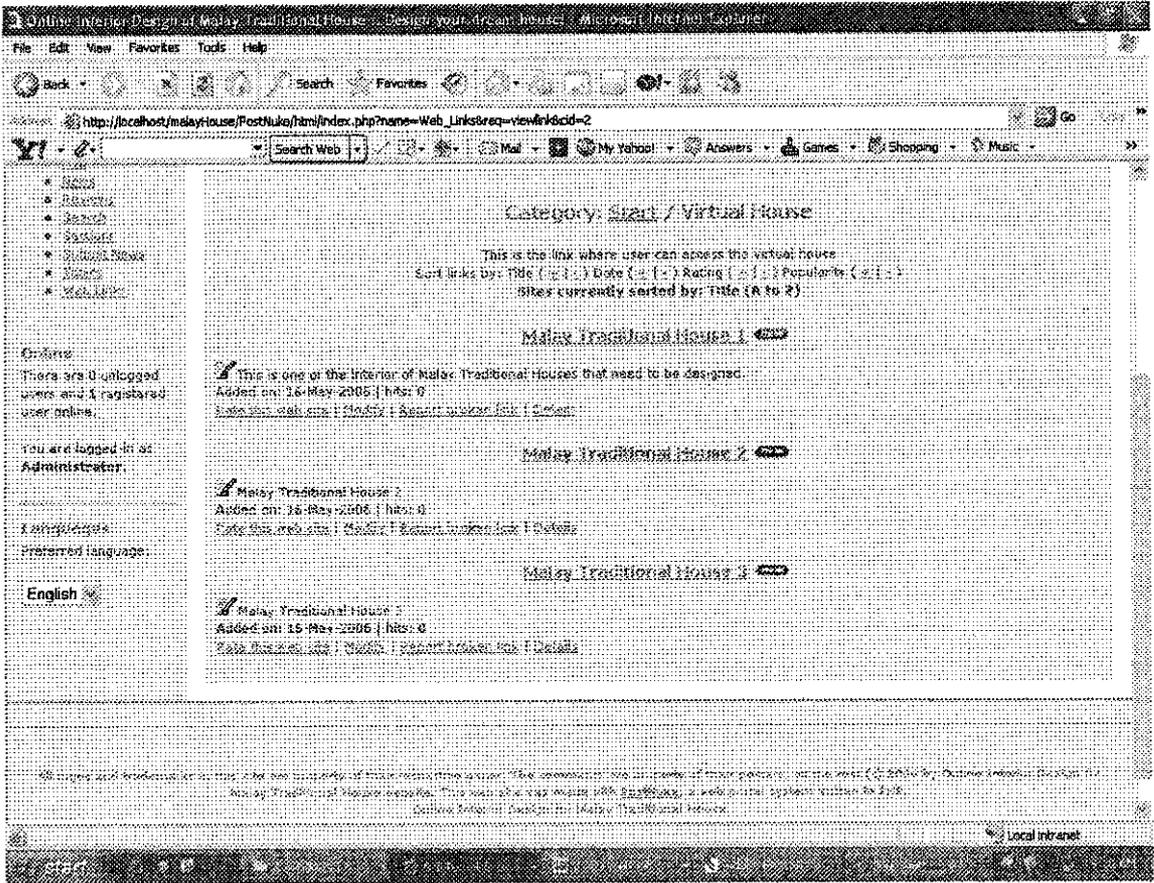


Figure 4.4 The virtual house links provided by website

Once user click to the one of the links above (Figure 4.4), user manages to get into the virtual house environment as shown in Figure 4.5 and Figure 4.6.

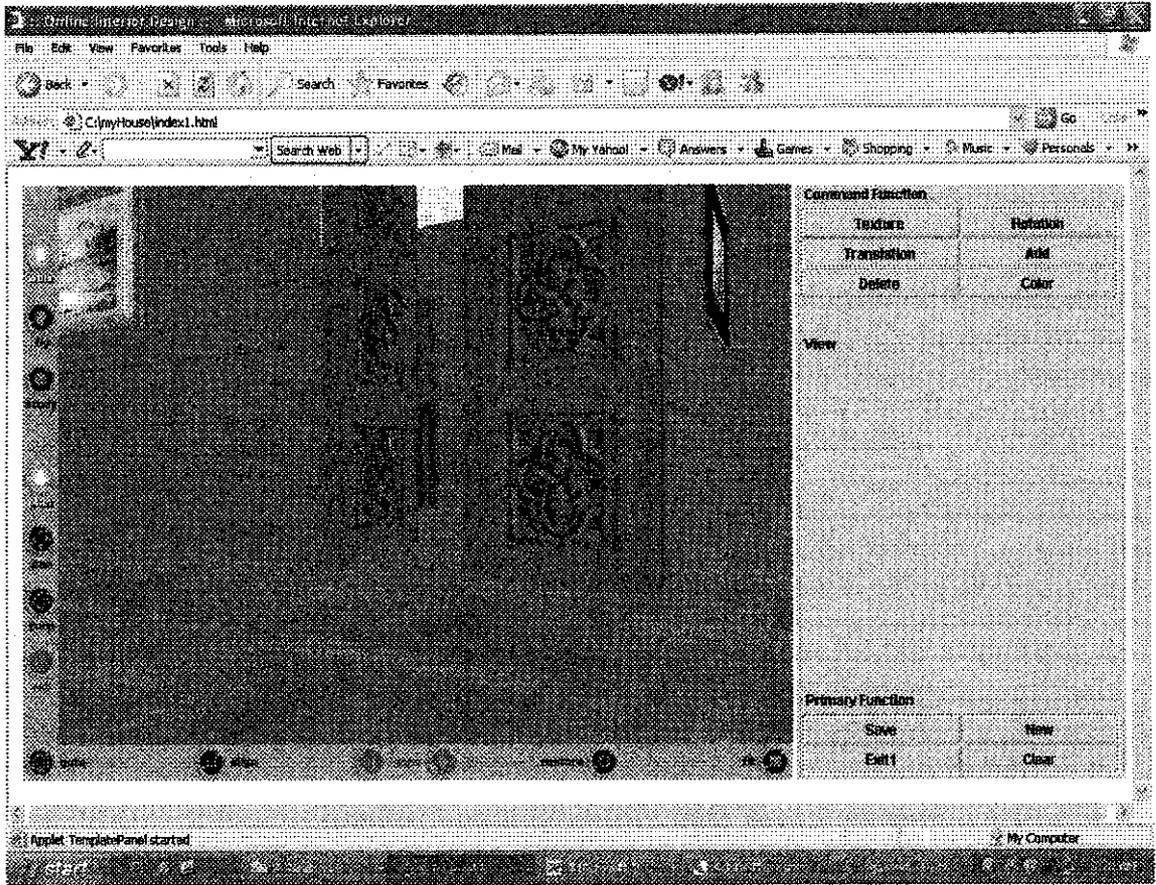


Figure 4.5 Virtual house environments

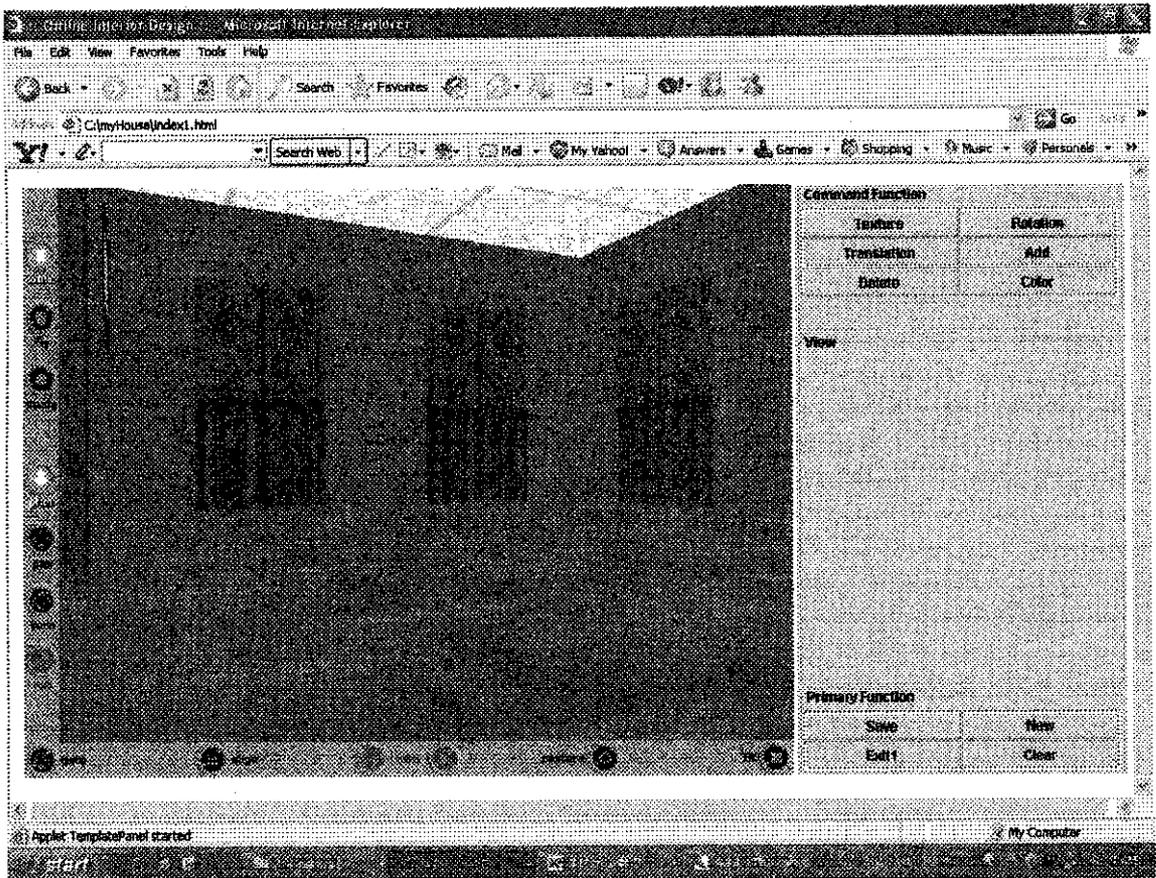


Figure 4.6 Virtual house environments 2

Functions provided on the right of the screen allow user to manipulate the virtual environment. The functions are such as rotation, translation, changes color and textures and many more. Figure 4.7, Figure 4.8, Figure 4.9, Figure 4.10 and Figure 4.11 show the environment of the virtual house.

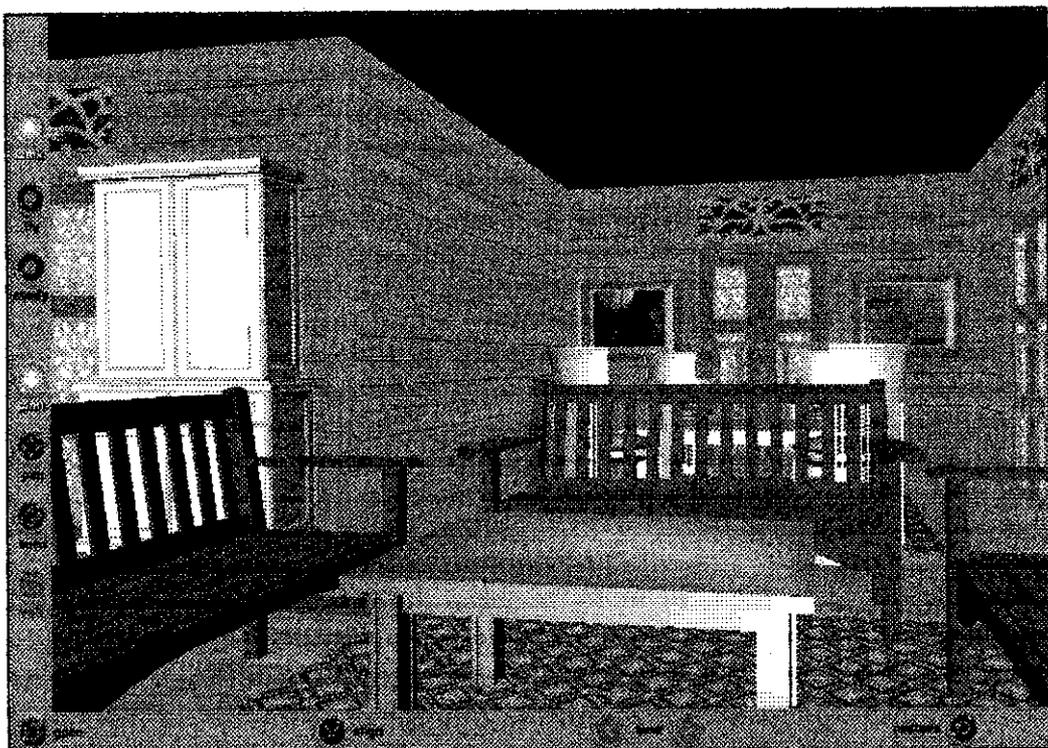


Figure 4.7 The living room

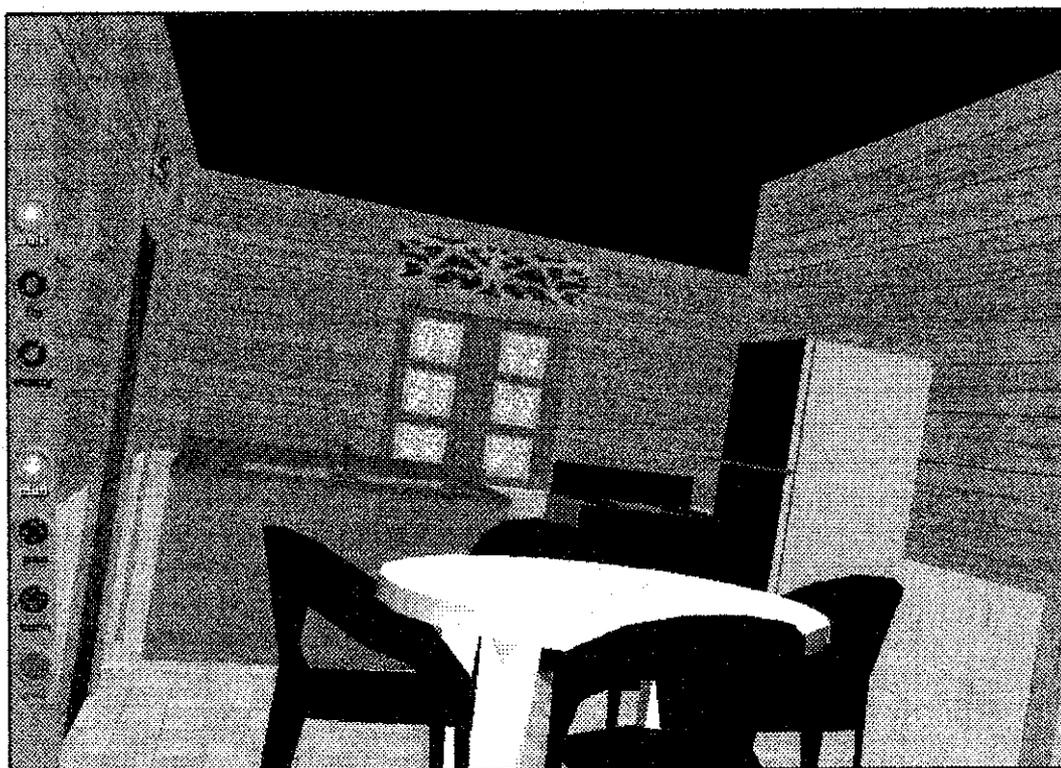


Figure 4.8 The kitchen

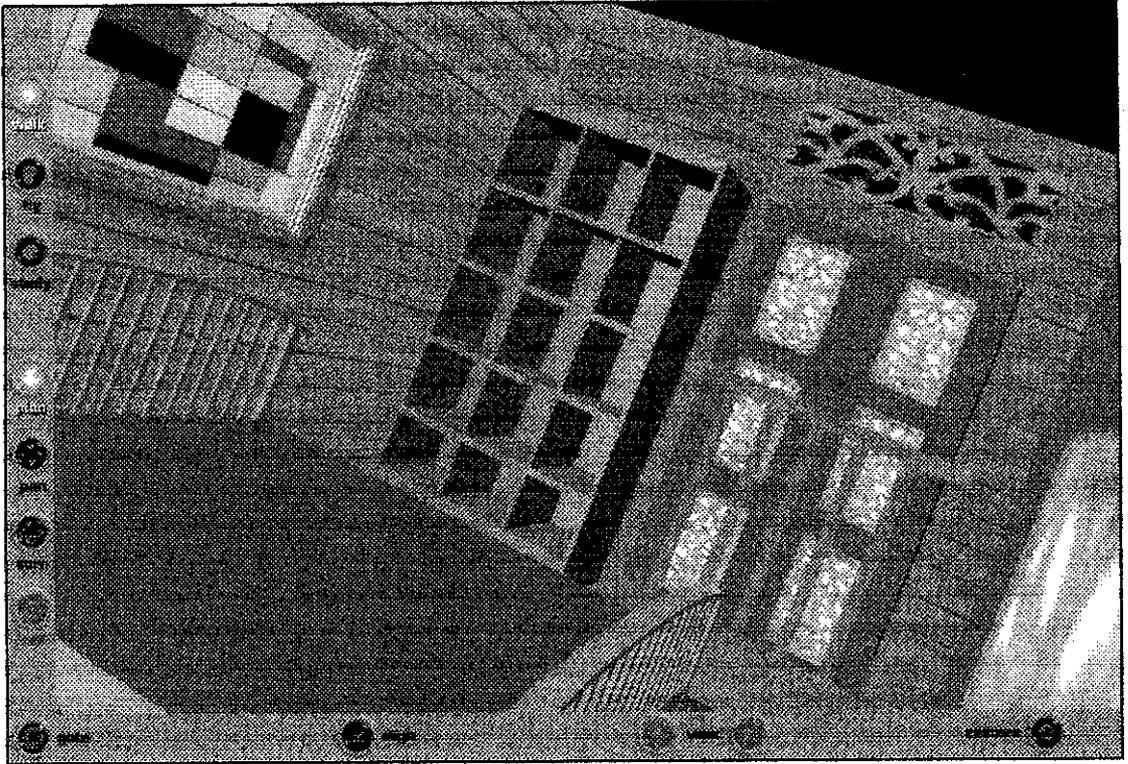


Figure 4.9 The bedroom

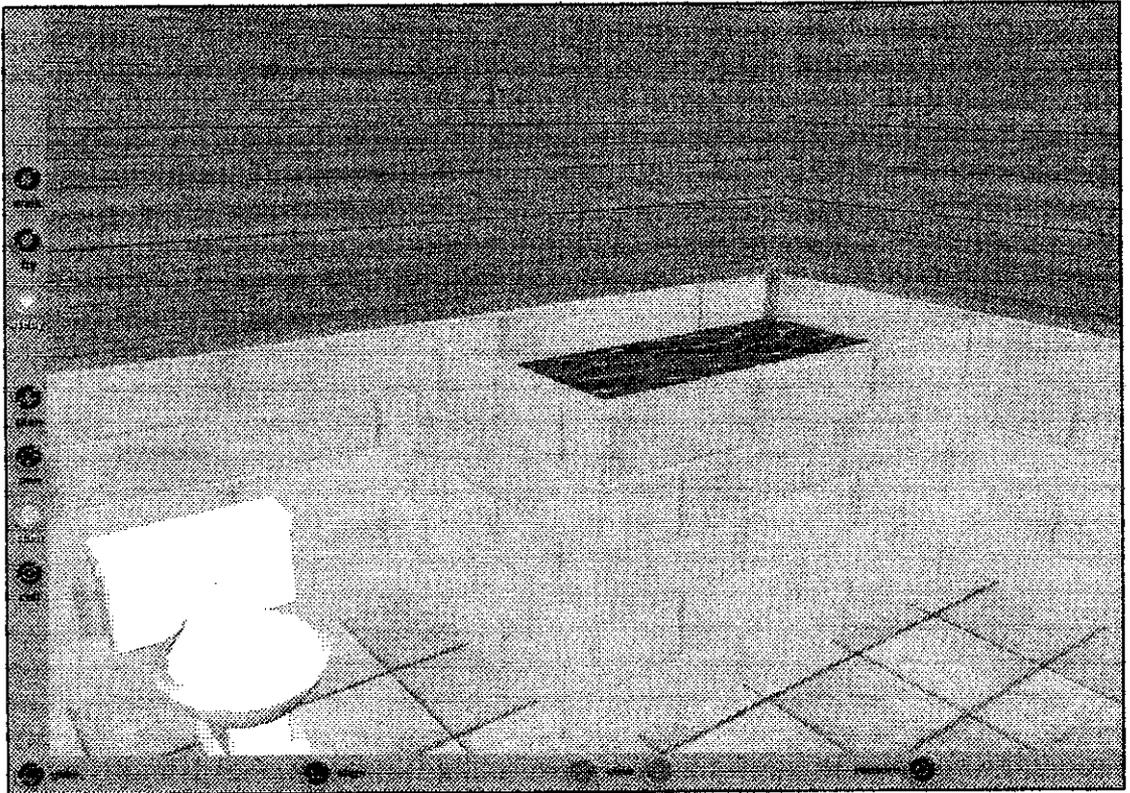


Figure 4.10 The bathroom

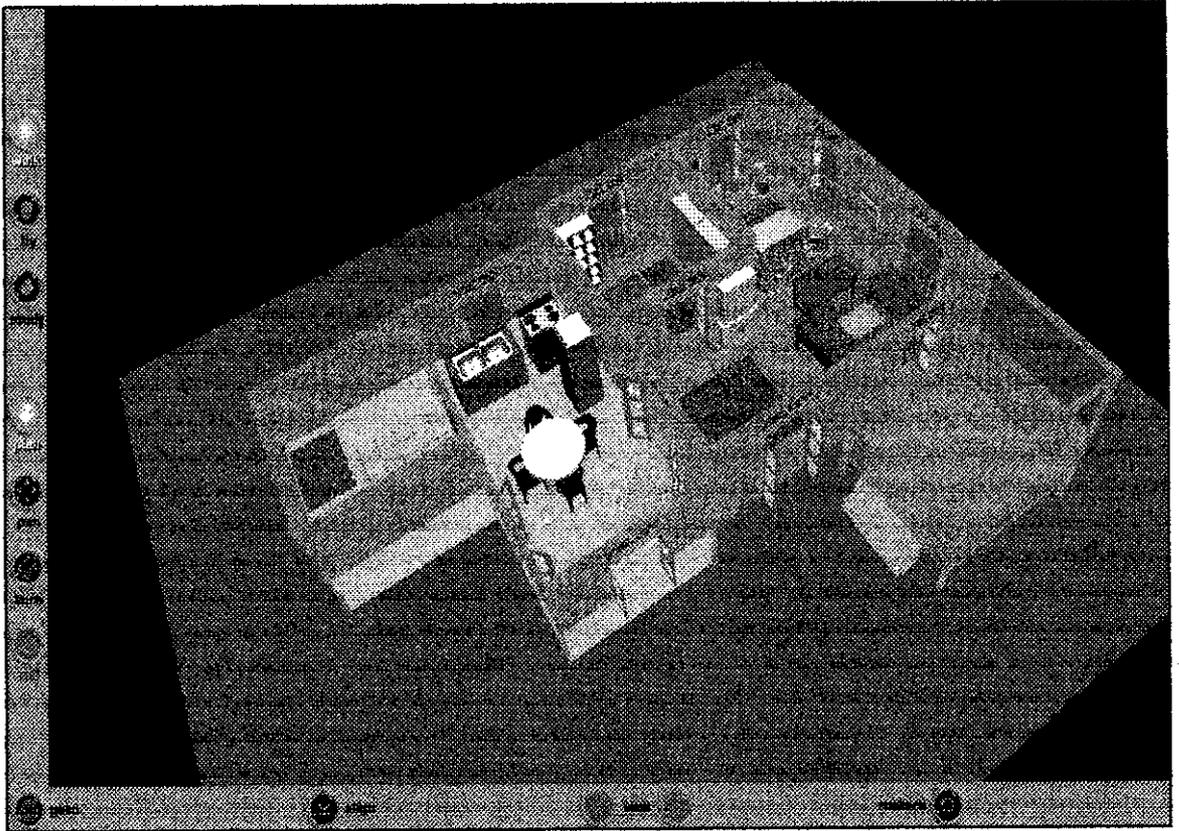


Figure 4.11 The top view of the virtual house

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 RECOMMENDATION

The system needs future enhancement in order to improve in term of performance of the system. Furthermore, user can feel more sense of presence provide by the system. The system also can perform a better function if more enhancement done for the system.

5.1.1 Use virtual reality interface

Virtual reality interfaces are the devices that can be used to navigate the virtual environment so that user can increase the sense of presence when they navigate the virtual house. The virtual reality devices that can be used are such as head mounted display, gloves or active glass. The devices help user to increase the sense of presence of the virtual surrounding.

5.1.2 More choices to user

If there have more choices given to the user, there will be more effective since user will have more choices in order to decorate the house. More choices will attract more users to use the system. Other than that, if the system is enhanced by offering the choices by package where it will be more interesting as package will include the suitable theme of color, texture or furniture that helps user to make decision.

5.1.3 Provide more virtual houses

Since the system will develop a general house of Malay Traditional House, the future enhancement for the system is where more virtual houses are created to provide to the user. Basically, the house actually designed by the architect and being developed by interior designer to give some choices to users to choose which is best for their houses.

5.2 CONCLUSION

As a conclusion, 'Online traditional Malay interior home design' is a very practical virtual reality application since this application really reduces cost of doing the design of the interior house. This is because the user will never suffer from purchase paralysis again or experience the what-if syndrome after the remodel because now, in virtual reality at least, the modeling, the redecorating or landscaping project is limited only by imagination.

The possibility of redesign the interior of the house is quite high since customers of the interior design house nowadays are very fussy if there has any non-satisfaction for the design on how to decorate the interior house. The cost of modifying the physical equipments as well as materials is quite high. So, in order to prevent the problem from happening, it is important to have an application that allow user to have same experience in order to decorate their house.

The 'Online traditional Malay House design' is not only for user to decorate their house but they are also allowed to walk through the house especially for those who are really interested to know more about Traditional Malay house and want to experience to walk through the house.

The most important thing, 'Online Traditional Malay Interior Home Design' can be accessed through all over the world and this website can introduce to non Malaysians about the uniqueness the creation of the Malay house and it can be introduce to our

young generation that most of them live in the urban area and no experience living in their own traditional house since the population of people lives in village is decreasing meanwhile the population of people in urban area is increasing.

In a nutshell, the 'Online Traditional Malay Interior Home Design' is a good project since there still has no website regarding virtual traditional Malay House on the internet.

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Appendix A: MALAY TRADITIONAL HOUSE

