

# **Web3D Publishing Interior Design and Residential Collection based on WebGL Technology**

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## **ABSTRACT**

Virtual experience can expand product knowledge, influence brand attitudes, and increased the purchase, which is influenced by 3D visualization technology, this step affective reinforces the need for marketers to consider the impact of virtual experience in planning marketing tactics directly and indirectly. Currently housing marketing and interior design is done is still limited to using print media, electronic media and the use of miniatures as a means to promote housing and interior design will be marketed. The development of Web3D technologies especially WebGL (Web-based Graphics Library) can provide the best solution that can be adopted by the housing marketing and interior design in building a marketing ploy. with the aim of introducing the product to the consumer, the consumer can see the model of housing and interior design is presented in 3D in real-time via a web browser, consumers are expected to have a simple to access information, allows consumers to imagine the results of the design of the building, so that consumers can assess visualization buildings offered, as well as stimulating the curiosity and interest of consumers.

## **Keywords**

3D Visual, Virtual Experience, WebGL, Real-Time.

## **1. INTRODUCTION**

Virtual experience can expand product knowledge, brand attitude affects, and is affected by an increase in the purchase of 3D visualization technology, this step affective reinforces the need for marketers to consider the impact of virtual experience in planning marketing tactics directly and indirectly, this suggests that the virtual experience in combination with direct or indirect experience to increase product knowledge and influence attitudes toward individual brands[7]. Consumers can learn about the product either through direct experience and indirect, while direct experience comes solely from the actual product contact, indirect experience can be generated from various sources such as word of mouth, brochure, and advertising. Interactive product advertising in the form of 3D visualization will simulate a new kind of direct experience in the virtual experience. virtual experiences and interpreted psychologically that consumers are experiencing an exciting emotional experience when interacting with 3D visual products[14]. Interactivity and richness of 3D advertising is able to simulate the directly experience to a product, even in the context of online advertising, consumers are aware that they can not touch the product, as a result, they take advantage of the interactivity and richness of 3D advertising to gather visual information sufficient to form a belief a product that they want[8]. Underscoring the superior properties of 3D advertising, in terms of affecting the confidence and strength, and to

influence attitudes toward the product, that 3D ads will trigger consumer response, as direct experience. 3D interactive character ad allows consumers to actively inspect the product, 3D visualization format allows consumers to develop a strong belief and a favorable attitude toward the product used in the experiments. Indeed, 3D advertising to attract and persuade consumers[8].

Currently housing marketing and interior design is done is still limited to using print media, electronic media and the use of miniatures as a means to promote housing and interior design will be marketed. The development of Web3D technologies khususnya development WebGL technology can provide the best solution that can be adopted by the housing marketing in building a marketing ploy. Technology WebGL (Web-based Graphics Library) is a 3D graphics library APIs (Platform Application Programming Interfaces) that allows Internet browsers to create a 3D scene, has a client-based rendering approach where the elements that make part of the 3D scene are usually downloaded from the server, but all the processes needed to get the picture done locally using hardware graphical client[5]. The housing marketing can adopt these technologies, aims to introduce their products so that consumers can see models of housing and interior design is presented in 3D in real-time via a web browser, consumers are expected to have a simple to access information and visualize the results of younger building design, so that it can assess the building has to offer visualization, and stimulates curiosity and interest of consumers.

## **2. LITERATURE REVIEW**

### **2.1 Web3D**

Web3D Basically the concept of 3D interactive content that is displayed through the world wide web[18]. Web3D terms are intended to include all the specific technology to display, explore web content in three dimensions (3D)[18], Web3D is a website design three-dimensional (3D) virtual objects used for anything that can be seen from three sides, namely X, Y, Z simultaneously. Each user can see objects clearly from the side where the user will see, the object can move and coordinate the move is controlled by the user who interact via mouse and keyboard. Web3D was initially an idea to display and navigate the website using 3D graphics, the term is now used for all interactive 3D content that is embedded into web html, and can be viewed and presented through a web browser. Web3D technologies require Web3D viewer to see what kind of content, such as, WebGL (Web-based Graphics Library) is a JavaScript API for interactive 3D graphics rendering and 2D graphics in a browser compatible without using a plugin[17].

Web3D classified into two categories. The first category, Web3D-based model, or commonly referred to based

geometric landscape, to build a virtual model and the view with geometrical entities. Geometry entity model is built by Different 3D Authoring Software Acability and Scalability of Web3D Product Models. The second category is based on Web3D technology based primarily on picture with panorama, which is a type of multiple points of view enclosed space[19]. VRML (Virtual Reality Modeling Language) is a standard file format for vector graphics 3-dimensional (3D) interactive, designed for the World Wide Web, developed by Silicon Graphics[9]. X3D is the ISO standard XML-based 3D computer graphics, X3D is the successor to the Virtual Reality Modeling Language (VRML) with some improvements such as NURBS extension, humanoid animation, morphing and use of XML-like syntax so it can expand (extensible) and facilitate use with other applications[9]. X3D features extensions to VRML, the ability to encode location using XML syntax, as well as the Open Inventor-like syntax of VRML97 or binary format, and enhanced by programming interface API. O3D is an open source JavaScript API developed by Google to create interactive 3D graphics applications that can run in the browser, O3D has a license from the Berkeley Software Distribution (BSD).

## 2.2 WebGL

WebGL (Web-based Graphics Library) is a Platform Application Programming Interfaces (APIs) 3D graphics library that allows Internet browsers to create a 3D scene with a simple and efficient manner[5]. WebGL was first introduced by Vladimir Vukicevic a software engineer in 2007, in 2009 WebGL web standards began to be developed by the Khronos Group and Opera, and began to be followed by Google (Chrome), Mozilla (Firefox), Apple (Safari), and developers other 3D[5]. WebGL has a client-based rendering approach where the elements that make part of the 3D scene are usually downloaded from the server, but all the processes needed to get the picture done locally using graphics hardware client. WebGL was developed aiming to address the problem, most of the available 3D web applications require, and utilize plug-ins, such as flash3D, Silverlight, Java3D or additional software to be able to run 3D content on your web browser, to answer these problems WebGL technology provides a graphical web browser without the need for plug-ins.

Compared to some technologies such as Flash 3D, Silverlight, Java 3D, and others, WebGL has several advantages including[5]:

- WebGL is programmed in JavaScript-Programming, this makes it easy to integrate WebGL applications with JavaScript libraries such as JQuery and other HTML5 technologies.
- Unlike OpenGL and other technologies, where there are special operations to allocate and deallocate memory manually. WebGL that does not like variable scoping in JavaScript and memory are automatically deallocated when no longer needed (automatic memory management), thus simplifying programming, reducing the required code and easy to understand.
- WebGL can be implemented on the Android platform.
- WebGL application performance comparable to an equivalent standalone application, because of the ability of WebGL to access local graphics hardware.

WebGL is an API platform that brings OpenGL ES 2.0 into website as 3D content in the context of HTML, a low-level interface Document Object Model (DOM). WebGL uses the

language of OpenGL, GLSL ES, and can be cleanly combined with other web content that layered on top or underneath the 3D content. It is suitable for dynamic 3D web applications in the JavaScript programming language, and will be fully integrated in the browser. WebGL was first released by the Khronos Group WebGL 1.0 specifications that have been developed and tested[6]. WebGL integrates perfectly into all standard browsers that allows the use of accelerated Graphics Processing Unit (GPU), image processing and effects as part of the canvas page. WebGL is a program that consists of a control code written in JavaScript and shader code that is run on computers Graphics Processing Unit (GPU). WebGL uses the HTML 5 canvas element, to display 3D graphics and use the Document Object Model (DOM) to transmit data which is then stored by the computer's memory. Automatic memory management provided as part of the JavaScript language. There are several libraries for WebGL development, such as:

- (i). CopperLicht API is a JavaScript API to create games and interactive 3D applications using WebGL, developed by Ambiera. The purpose of the library is to provide a simple API to make it easier to develop 3D content for the website. To make use 3D CopperCube editor[12].
- (ii). Three.js is a JavaScript API that is used to create and display 3D animated graphics in the browser. Three.js script can be used with the HTML5 canvas element, SVG or WebGL.
- (iii). Processing.js is a port of the JavaScript, a programming language designed for the visualization, graphics, and interactive content. Allows web browsers to display animation, visual applications, games and other graphic content without the need for Java applets or Flash plugin.
- (iv). OSJ.js is WebGL framework based on the concept of OpenSceneGraph. Allows the user to use the toolbox OpenSceneGraph like to interact with WebGL via JavaScript, and provides facilities for exporting files to various formats osgjs.
- (v). GLGE is a JavaScript library to facilitate the use of WebGL, which is basically a native browser JavaScript API to provide direct access to OpenGL-ES2, enabling use of hardware accelerated 2D and 3D without having to use the plugin.

## 3. RELATED WORK

This study raised miniature model of housing that is implemented using WebGL technology, the miniature rendering of housing accessible to consumers using a web browser, consumers can use a keyboard and mouse to change the position view of miniature houses, miniature housing development model based WebGL, consumers can easily obtain information such as model, structure and design of the houses they need, before consumers actually physically building meilhat. Housing market system merely miniature model of housing which is visible from the outside of the building in 3D, is an effective way to introduce consumers to the picture house, building or building overall looks and feel 3D visual form design[1].

## 4. INTEGRATION WEB3D PUBLISHING

In the integration stage Web3D Publishing, through several stages in between, steps to build 3D content (object interior

design and residential), which consists of 3 Step, step process of building 3D content can be seen in Figure 1.

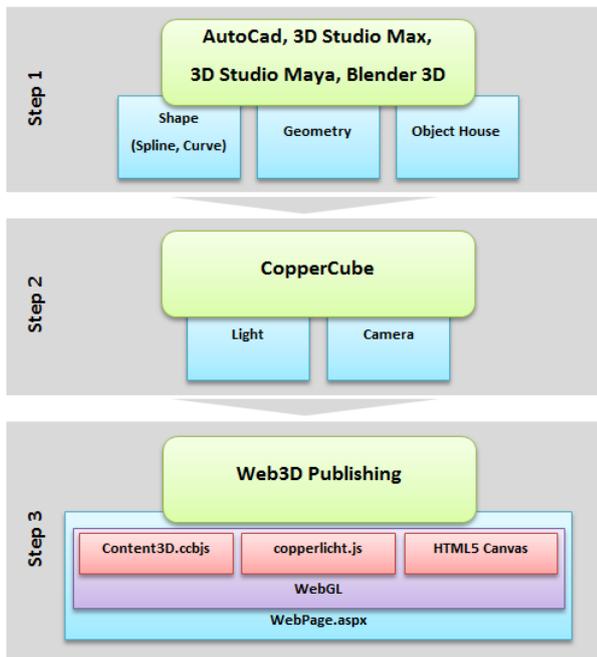


Fig 1: Stages of build 3D Content

3D Content (object interior and residential) can be constructed using 3D modeling tools, such as AutoCAD, 3D Studio Max, Maya and Blender, the stages are as follows:

(i). Step 1

Stages of build 3D content (Interior Design and Residential) use tools 3ds Max, such as material, color composition, shape, size and environment. 3D Content that has been built, then exported using collada (.dae) file types. Collada (Collaborative Design Activity) is an open standard, XML schema defines the format that enables 3D data presentation, Collada was designed and developed by Kronos Group. Collada is an open standard (royalty-free) based on XML technology standards. Collada format allows data transport (intermediaries) from one application to the other application for digital content creation. There are many applications that support the use of this format include Maya (ColladaMaya), 3dsmax (ColladaMax), Poser (v.7.0), Lightwave 3D (v.9.5), Cinema 4D (Maxon) and several popular open-source applications such as Google SketchUp, blender and GLGE[3].

(ii). Step 2

3D Content (Interior Design and Residential) export results from 3d Studio Max (collada: .dae), then use the import tool CopperCube, in this stage can be added 3D content objects such as model viewers. 3D walkthroughs, 360° panoramas, camera flights, and set the camera viewpoint or View (Light and Camera). After that 3D Content to publish using Copper-Cube, then the 3D content files that have been successful in export will have a data type (.ccbjs) and are automatically added to the JavaScript Library (copperlicht.js). CopperLicht is a JavaScript Library to create games and interactive 3D applications using WebGL that can run in a web browser, JavaScript li-

brary objectives / 3D engine to make it easier to develop 3D content on the web[12], copperlicht developed for use with the 3D editor CopperCube, although copperlicht freely used, but Coppercube under commercial license developed by Ambiera, Ambiera is an independent game development company that provides commercial development services and tools to simplify the development of multimedia software and games. CopperCube used to compile the 3D content into a binary file that is small, 3D file formats are supported such as 3ds, obj, x, lwo, B3D, csm, dae, DMF, oct, irrmesh, ms3d, My3D, mesh, lmts, bsp, md2, and stl. CopperCube can publish 3D scenes or 3D content into Flash or WebGL file that is ready to run in a web browser[2].

(iii). Step 3

3D content files that have been successful in export will have a data type (. Ccbjs) and are automatically added to the JavaScript Library (copperlich.js). The next stage of the files are compiled with ASP.NET pages (WebPage.aspx) to be sent to the client browser.

Stages of integration Web3D Publishing is applied with using ASP.NET 4.0 technology which is a collection of technologies in Framework .NET 4.0 to build Web3D Publishing Interior Design and Residential Collection, an ASP.NET page is executed on the server will then be made makrup pages such as HTML (Hypertext Markup Language), WML (Wireles Markup Language) or XML (Extensible Markup Language) to be sent to the client browser. HTML pages that are returned can also optionally contains client-side script code, which is directly interpreted by the browser (JavaScript). Figure 2 illustrates the integration scheme Web3D Publishing, where the Client has requested the file extension (.aspx), ASP.NET read a file from the file system server, ASP.NET read every tag in a file and loaded into memory, after loading all the tags in memory, ASPNET run the source code of each component of the server control. This will access the source code of the Web Server, the code may change the content or properties of server controls on the page and can also add or remove a server control, when all of the code in a server control is completed on the run, ASPNET in order to tell each control to render itself, After leaving the page server, ASPNET release controls of the server and other sources that have been made previously.

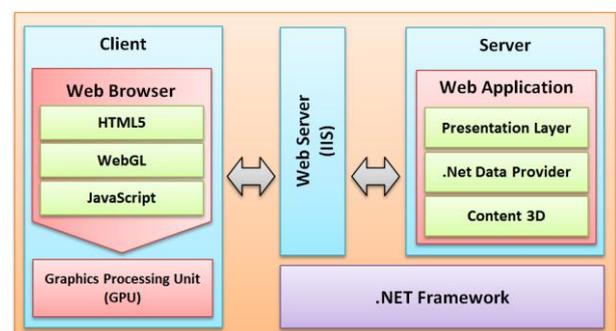


Fig 2: Integration Web3D Publishing

(i). Client

Client can be rendering 3D content via a web browser, where the elements part of the 3D scene is done locally using graphics hardware client, so the client can see a model of housing and interior design is presented in 3D in real-time via a web browser.

(ii). Web Server

Stages of integration WebGL Publishing, using a web Server IIS (Internet Information Services) technology, function handles the request from the client. Communication between web browsers and servers using TCP / IP (Transmission Control Protocol / Internet Protocol).

(iii). Server

Server is responsible for providing all information Web3D Publisher, as required for 3D Contents rendering (vertices, polygons, color, lighting, texture, identification of regions, the information associated with each size, environment, etc.).

## 5. RESULTS AND DISCUSSION

Web3D Publishing Interior Design and Residential Collection implemented using WebGL technology, the results of rendering 3D content accessible to consumers via the web browser, Visualization results can be seen in Figure 3.

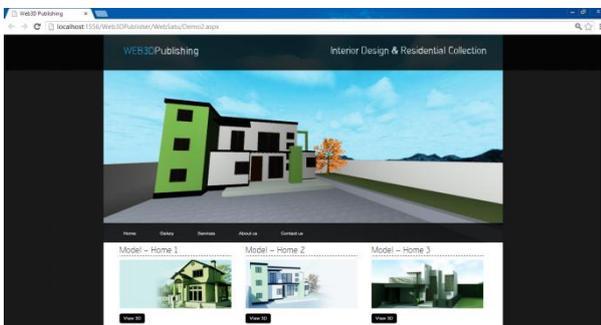


Fig 3: Model 1 (Visible from outside the building)

With the development of Web3DPublishing WebGL-based, consumers can easily obtain information such as model, structure, and interior design they need. before consumers actually see a physical building, consumers can use a keyboard and mouse to change the position view interior design and residential. Visualization results can be seen in Figure 4 and 5.



Fig 4: Model 2 (Visible from outside the building)



Fig 5: Model 2 (Visible from outside the building)

Web3DPublishing is not just a miniature model of housing which is visible from the outside of the building in 3D, but consumers can access information such as facilities, and interior design contained in a miniature house such as chairs, tables, a kitchen, living room, bedroom, and other support facilities as offered by the housing marketing, consumers can explore every room, like entering a living room, kitchen, using the keyboard and mouse to change the position of view (as the navigation controls), visualization exploration can be done by the customer can be seen in Figure 6 and 7.

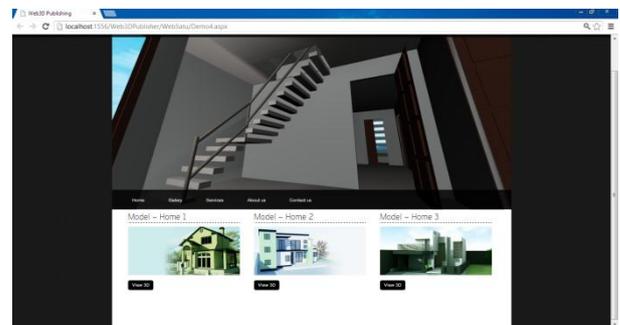


Fig 6: Model 3 (Visible from inside the building)

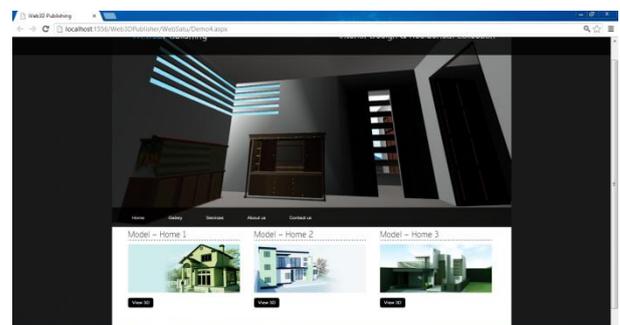


Fig 7: Model 3 (Visible from inside the building)

With this feature, customers are expected to experience an exciting emotional experience when interacting with 3D visual product (visually explore), Interactivity, and 3D visual richness is able to simulate the experience directly to a product, gather visual information sufficient to form a belief in a product they want.

## 6. CONCLUSION

WebGL technology can be adopted by the marketing of housing and interior design in the building housing a marketing ploy than the use of brochures, and advertisements 2D, approach to advertising with 3D visual models can consumers expect to see housing models are presented in 3D in real-time via a web browser, an effective way to introduce consumers to the picture house, building or buildings look as

a whole, with the use of Web3D Publishing based WebGL, consumers can see and feel the shape and design of the 3D visuals, in addition, consumers are also able to see the material and the material that will be used in the manufacture of building, consumers are permitted to access the information they need, and consumers more easily visualize the results of the design of buildings so that it can assess the building visualization offered and stimulates curiosity and interest of consumers.

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