INTEGRATING 3D GAME ENGINE TO ONLINE INTERACTIVE PRESENTATION FOR COLLABORATIVE DESIGN WORK ON PDA.

Collaborative works Anytime, Anywhere

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Abstract. In this research, Quake Engine on PDA (Pocket Quake) is modified and developed to make an appropriate environment for collaborative design work in the representation phase for the architectural design teams. The system is being designed for working in the centralized environment by using central server, such as when the designing team has changed 3D Model Information and uploaded to the server then the PDA client will change the same 3D Model automatically. Game Engine will be used to develop this presentation’s tool by designing new user interface and functions for working in PDA. The trial project, The Victory Monument’s Area Development Project, will make the Online Interactive Presentation by using 3D Game Engine on PDA to reconstruct around The Victory Monument in Bangkok. Hopefully, this will make the Virtual World Online anywhere, anytime being more available and give the comparison between the site existing and the new architectural form which designed on the site for good understanding about what the design answers.

1. Introduction

Nowadays, the world is taking preliminary steps toward a new era called Ubiquitous (Weiser, 1998). Which is a time that any kind of communication, management now accessible by all collaborative design teams, anywhere, anytime in this world. For instance, the result in research laboratory of
designing the Virtual Design Studio System for Collaborative Work on PDA (Monchai and Ekasidh, 2003) has developed the application called PDS (Pocket Design Studio). Basically, it allows design teams to exchange their information and to help them make decision on their work from anywhere, anytime using Mobile Devices known as PDA (Personal Digital Assistants). However, PDS is still limitary. It can only make 2D presentation under circumstance called Desktop Metaphor (Mary Lou Maher, Simeon J. Simoff and Anna Cicognani, 2000). In term of architecture, this will become more understandable if only we could present our work in 3D. As a result, the research of collaboration Design has introduced the 3D presentation in real time known as integrating Game Engine to online interactive Presentation Tool (Raktum and Araya, 2003). Which the design teams are able to take a better look at their architectural work freely by using QuakeIII Engine. The Engine is a game in aspect of First Person Shooting. It has been created to enhance online interactive presentation. In present, we find the engine has been improved to be used online as Centralized Environment and along with PDA (Further information at www.quake.pocketmatrix.com). As a consequence, the idea of making use of Quake on PDA in order to uplift the online presentation as 3D model is proposed. This is to build a shared Environment in aspect of Place Metaphor (Mary Lou Maher, Simeon J. Simoff and Anna Cicognani, 2000). By using PDA, the collaborative design teams or the customers can take the PDA with them to where the project really take place and make presentation online with Wireless Telecommunication. This is to prove that Collaborative Design Works using Quake engine will enable designers or those who are part of the project to compare their previous project with the new one better.

2. Quake Engine on Pocket PC

In the past, many researches brought Game Engine to develop tools for making the design process in desktop computer by using 3D Shooting Game Engine. These kinds of game have First/Third Person perspective display in 3D environment, run on most platforms and can download source code, scenery (levels) and 3D animated characters (Bot/Monsters) from its website. These reasons make game engine can be modified or adapted to the appropriate tools, using in architectural design process. Using Game Engine making Collaborative Design Tool for Architectural Design Process, such as Using Quake II in the Exploiting the Internet to Improve Collaboration Between Users and Design Team (Richens, P. and Trinder, M., 1999) or Collaborative Design: Integrating Game Engine to Online Interactive Presentation Tool (Raktum and Araya, 2003), this research used Quake III Engine to develop tool for architectural presentation in high quality real-time
that presented the information’s objects trend in 3D environment of Game Quake III Arena and having chat function for using in design process through TCP/IP network.

Nowadays, when PDA become more popular, more 3D games on PDA are developed too. Such as Wolf 3D Game, Quake modified to play on PDA. (Figure 1, 2) Quake II has been ported to the Pocket PC Platform (Dan East, 2001) using GPAI (Game API) to drawing and input controls for Pocket PC, making users can use it portable in everywhere. The Quake II modification by Id Software opened Quake II Source Code under the GPL Agreement on 21 December 2001.

![Figure 1. Pocket Wolf3D](http://example.com/pocketwolf3d.jpg)

![Figure 2. Pocket Quake (http://quake.pocketmatrix.com/)](http://example.com/pocketquake.jpg)

This research is modifying program by cutting off the violation and game fighting then adding the information gathering and chatting function, using benefits in rendering 3D modeling and collaboration through network
system in multiplayer mode, from Quake II to using to architectural presentation.

![Diagram of use Game Engine for Develop Tool](image)

**Figure 3. Diagram of use Game Engine for Develop Tool**

### 3. Program Modification

The program development using Quake II Engine has many steps:

- Modifying program’s source code: This step is to modify game’s format suitable for working in architectural design process.

- Building the scenes: This step is to build some structures and accessories in the building, including making the textures, lighting and some inventories of the architectural structure, such as:
  - Making 3D Model of the building by using “GtkRadiant” (Figure 4).
  - Preparing the textures of the building by scanning or digitalizing pictures.
  - Building the accessories in the building, i.e. tables, chairs or lamps, this type of object is the low polygon 3D model.
  - Building the characters and rearranging them to be more natural.
The Program Development
The program development of Pocket Quake II is using CCP Language Programming for modifying game source code that will change some functions of the same game.

- Modifying interface of Pocket Quake II: The new interface have control box at the bottom of the display, using it to chat, show map and have some toolbars inside (Figure 5).

- Adding function for architectural process: emphasizing in collaborative design work and exchanging the information between users.
• Developing functions to work both synchronous and asynchronous collaboration: such as bulletin board system, instant messenger or commenting architectural design work by attach the message to the object in the scene directly in virtual world, like using Post-it in the physical world, which can be made by collecting the messages sending from game server, do database and then writing programming language to display them in 3D scene.
• Developing for using in Thai language: This can be done by adding bitmap fonts and using the encoding and decoding steps for Thai language.
• Developing tools for transferring architectural works from CAD programs such as AutoCAD: This process making by using VBA on AutoCAD read the coordinates from the drawing, writing them to text files in the .map format and building tool for picking up materials and objects then shell to call program compiling scene that will make the scene is easy to build in the architect mind and make the system will be more admissible.
• 3D Walkthrough Function: This function allows user to enter the Virtual 3D model which has been freely designed.
• Object Information Function: In Virtual 3D model, user can touch the objects and the description of that object will appear.
• Head Up Display (HUD) and Chat Screen Function: This is the function that allows users to communicate among themselves by typing.
• Status Checking: Let we know the status of each person whether they are online or not and where they are working in Virtual 3D model.

4. Designing Project for Study

The trial project to be used Online interactive Presentation by 3D Game Engine on PDA is to reconstruct around The Victory Monument in Bangkok (Figure 6). This Monument was built in 1941 to admire heroes, soldiers, polices, and civilians who died in the conflict between Thai and France, in subject of developing borders Thai and Indochina. At present, this area is the center of communication and commercial in Bangkok. Due to the lack of a good city planning, people cannot go to the Monument directly. This is because there is a big street in between. For this reason, people do not get opportunity to get to know their valuable piece of architectural work in Thailand which might be forgotten soon.
Therefore, the idea to make the Monument be more accessible for everyone has been brought up. Firstly, the design teams have to gather all information and use PDA (Monchai and Ekasidh, 2003) to evaluate a preliminary step into 2D. When the conclusion is met, Model 3D will be built to use for presentation purpose and GTK Radiant is needed to achieve this (Further information at www.Qeradiant.com). Afterward, all information will be uploaded to server and participants will choose designs using individual PDA to determine from the real location in 3D form. Also, this will indicate what will happen or if there is any change within the area. Then, decision will be made immediately.
5. Further Development

From this research, we found that the Online Interactive Presentation by 3D Game Engine on PDA could be developed in such these ways:

- Developing Tools for importing 3D Modeling: These tools may be using for transforming 3D model from any kinds of 3D Modeling file format which is used by architects to build the environments for game scenes.
- Developing the virtual online presentation using Quake Engine to be easier to represent the architectural perception: This tool could be developed by adding the functions to work with mobile device, GPS
development tools and the detection system in the building area. Such as when users bring the PDA to work with and move to many positions in real place, the 3D virtual model in the virtual environment will be moved exactly matching the real place. That situation will make the design team, coordinators or decision makers precisely perceptive that which positions are designed and being placed.

6. Conclusion

The consequences from the modification and development Quake Engine to work on PDA bringing the appropriate environment for collaborative design work in the architect team will be the beginning of virtual world online anytime, anywhere working. Even if it has found some problems now because of the PDA abilities itself or the enormous information transmission from 3D modeling task through wireless internet that has limited in the speed and sometimes being lack of signal. Nevertheless, in the future, the PDA trend will be developed to be much more prosperous than ever, such in the processing, gathering and displaying information. Moreover, the wireless internet has that trend too, it will be widespread, especially the beginning of the Metropolitan Area Network (MAN) that should be helping this designed system more than ever. Not only that, this research results indicated this presentation way is able to help users to exchange their commentaries, making their decisions or perceptions easily, especially someone who has authorized in the project but has not any ideas in working drawings. This presentation will help them for making perception in architecture that will be made.

References

Planet Quake, URL at http://www.planetquake.com
Pocket Quake on PDA, URL at http://www.quake.pocketmatrix.com