EcoBlog: 4d Spatial Framework for Ecological Virtual Community

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EcoBlog: 생태학적 가상 커뮤니티 구현을 위한 4 차원 공간 프레임워크

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Abstract

Although people's anxiety about the environmental problem has been getting higher, they are not provided good quality of knowledge about the environment. Based on this situation, Ecoblog can be a new type of online community to educate the public in ecological knowledge. Especially, Ecoblog can be utilized as a method of "preventive education", and it will contribute to reduce great amounts of environmental budget to restore contaminated environment to previous condition.

Ecoblog also utilizes the concept of blog which user can create and append their site with chosen themes. A weblog or a blog is a non-commercial webpage regularly updated through the use of a blogging software which allows the user to "publish" kinds of amalgamations of text and graphics to the page as posts. The technology offered in Ecoblog is utilizing the concept of 4D place and game metaphor in order to provide users the sense of participation, interaction and immersion among them and the growing community. Thus, it requires applying the CAAD technology by implementing semantically well-defined building data model as a core database to create a 4D virtual community. This research focuses on defining a 4d spatial framework suitable for developing an online ecological community.

Through our study, the state-of-the-art of online community has been studied at the first step. Second, the scenario of using EcoBlog described with content, visualization and navigation are defined based on the critical features derived at the first step. Finally, a 4d spatial framework composed of semantic building data model, content and rule database is constructed to propose factors that are necessary to establish an ecological virtual community.

In conclusion, our framework could enhance the comprehension and interaction between users and virtual buildings in the ecological community by integrating the concept of game design, 4D CAD and semantic data model. Such framework can be applied to any online community for an educational purpose.

Keyword: Structured-floor plan, Place metaphor, Serious Games, E-learning, Online community

1. Introduction

1-1. Background

People's anxiety about the environmental problem has been getting higher and higher day after day. However, they are not provided good quality of knowledge about the concerned environment. Based on this present situation, Ecoblog can be a new type of online community to educate and reinforce Korean public the ecological knowledge. Especially, Ecoblog can be utilized as a method of "preventive education", and it will contribute to reduce great amounts of environmental budget to restore contaminated environment to previous condition. It is developed as a part of a three-year

environmental educational project so called “CyberEcoVillage”[8] funded by Korea Ministry of Environment. The third-year project consists of a group of virtual ecological museums. EcoBlog serves as the community section along with other virtual museums.

1-2. Research Problems

As expressed in its name, Ecoblog also utilizes the concept of blog which user can create and append their site with chosen themes. A weblog or a blog is a non-commercial webpage regularly updated through the use of a blogging software which allows the user to “publish” journal entries, news, links, creative writings, and other amalgamations of text and graphics to the page in a sequential, dated list of entries referred to as posts[1]. What makes blog widespread relies on the appropriate combination of its characteristics. First, blog is easy to use and update. Second, it supports personification which a user can customize blog to express his or her personality. Finally, it provides the feedback channel enabling the other users to express their opinions as well. Our approach is to utilize these advantages of blog. However, the technology offered in Ecoblog is not only the integrated conventional 2D posting system but also the utilization of 4D place metaphor and games design. In other words, EcoBlog refers to a growing community (4D system) changeable according to the user’s interaction controlled by community rules (game system). Together with the enhanced visual sophistication by utilizing 3D place metaphor, this will create the senses of participation, interaction and immersion among users and the growing community which are essential to the elaboration of the environmental educational project. After all, it is necessary to apply the new CAAD technology capable of interacting with users and growing through the time. This can be done by implementing semantically well-defined building data model as a core database to create a 4D virtual community. Thus, this research focuses on defining a 4d spatial framework suitable for developing an online ecological community.

1-3. Methodology

Through our study, the state-of-the-art of online communities and other related systems have been studied at the first step to specify common and special characteristics such as the level of interactivity, the type of metaphor and game system. Second, the scenarios for using EcoBlog described with content, visualization and navigation are defined based on the critical features derived at the first step. Finally, a 4d spatial framework composed of semantic building data model, content rule and database are constructed to purpose what necessary to establish an ecological virtual community is.

2. Analytical Review

Unlike conventional online communities, the development of Ecoblog is focusing on how to educate the users as members of the online ecological community. Special functions and characteristics must be provided. In this section we investigate some outstanding systems relevant to our research. By evaluation these cases, numbers of essential components are summarized indicating the direction to the developed EcoBlog.

2-1. Online community

1) Cyworld

A famous Korean Internet service called Cyworld lets the users create their own home pages that can accommodate an unlimited numbers of photos, documents, and other goodies[5]. Cyworld's main feature is a blog-like "mini hompy," short for mini homepage. The most attractive feature is the "mini rooms" that lets users customize and decorate their room with items which they can buy at a cyber gift shop with virtual money. The more attractive and interesting the room, the more visitors it gets. Users can search for friends and create virtual "buddy" with other members. One can use buddy's goodies from art to photos on his or her page. The chain of wave-riding visiting creates communities on the Net, which often develop into clubs of common

Figure 1. The snapshot of Cyworld

interest in the real world: clubs for fishing, bike riding, and going to jazz performances, among others[5]. The site also provides the statistic reporting the popularity for each homepage. It even measures sexiness and friendliness, which it gauges by the number of gifts a person gives or receives. Instant messaging is included in the service, so users can chat with visitors. Mobile phone can also be used to visit Cyworld.

2) Active World

Active World is an online community that permits users to enter, move about and interact with others in a computer generated, three-dimensional virtual environment using the Internet[3]. Unlike the others, the strength of this community relies on its flexibility and complexity. It offers users to create their world just as desire. 3D Homepage Creator is also provided. Any type of building, vehicle and even on any other planets can be built. Users can use his or her 3D homepage for any purpose. Since it is 3D community, avatar represents

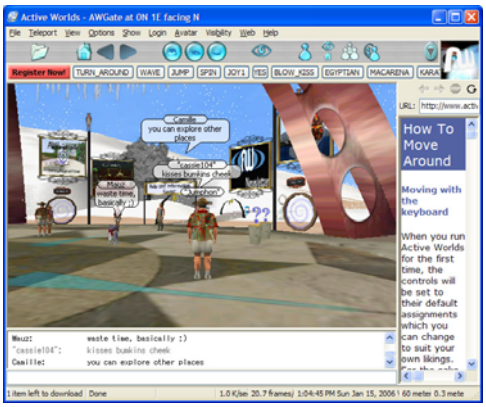

Figure 2. The snapshot of ActiveWorld

each user can explore the alpha world and interacts with

Figure 3. The snapshot of Habbo Hotel

the others in a realistic manner. Avatars can walk, run, jump, swim, dance, fly and chat with the others. All benefits are traded off with high-bandwidth requirement and payments.

3) Habbo Hotel

Habbo Hotel was lunched in early 2001, and is powered by a powerful Java backend technology and Macromedia's Shockwave front-end technology[2]. The online community implements 2D luxury hotel metaphor. In Habbo Hotel, real people create avatars to have authentic conversations, play games, enter competitions, and develop new friendships. It is a funny and nonviolent game environment. In spite of its 2D environment, visual sophistication is the strength of this community. Users can dramatically immerse into the virtual hotel through sophisticated functions and characteristics. Depends on the context, avatars can autonomously perform some impressive expressions. They can sit on chairs, lie down on beds, pick a cup and carry it around, sipping on it occasionally. They can swim in a pool after changing into swimming suit. Similar to Cyworld, users can create and decorate their own personal rooms (guest room) with the purchased items.

2-2. Ecological website

1) Ecotonoha

Ecotonoha is a web site created to nurture a virtual tree collaboratively, and at the same time contribute to the actual environment[4]. When the visitors posts their messages as the Ecotonoha's leaves, the virtual tree will grow. For each of 500 entries, a real tree will be planted

by NEC. What makes this site unique is the linkage between the virtual and the real world as well as the time-base visualization integration. Visitor can track back and see those virtual trees from the other days. This expresses the concept of four-dimension and growing system changeable according to the user interaction and time. After all, the site is capable of urging the public to concern and take good care of the world ecology.

Figure 4. The snapshot of Ecotonoha

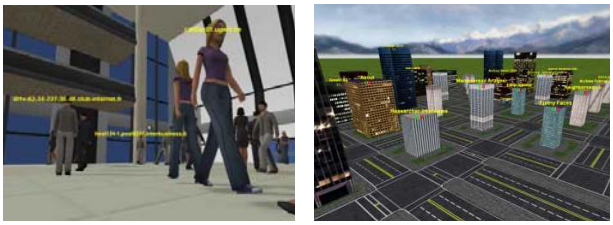

Figure 5. The snapshot of VistorVille

2-3. 3D web analysis tool

1) VisitorVille

VisitorVille is a live tracking service that lets a webmaster monitor and analyze the traffic in real-time. It can also "play back" historical traffic. What differentiated this system is the richly visual, intuitive way of metaphor. VisitorVille takes a revolutionary visual approach to web analytics. It does not represent website visitors simply as numbers or graphs, but as real people in a real environment. A webmaster can monitor the site traffic as if he or she was people-watching in a big city. [6] Each avatar in VisitorVille represents a real visitor to a website. The different clothes each person wears indicates what kind of visitor that person is (business, academic, governmental, military, etc.) Every visitor has a "Passport" with 24 types of information on them. Each building in VisitorVille represents a web page on the website. When a person visits one of the web pages, it is reflected in VisitorVille as a person visiting a building. The buildings grow as more visitors fill them; and shrink as visitors leave. Each bus in VisitorVille represents a referrer (search engine or other external link that the visitor followed to reach the website). When a bus delivers a visitor to the gate of a house in VisitorVille, it is mirroring a referrer that brought a visitor to a specific page on the website.

2-4. Serious Game

1) ETHGame

ETHGame is a prototype of serious pervasive game developed at ETH Zurich campus. The objective is to investigate how one easily and effectively conveys architecturally relevant theories and practices of pervasive computing in teaching. The resulting interactive prototype takes advantage of the campus's extensive wireless local area network infrastructure. The game mutates the whole of the ETH Zurich campus into a knowledge space, issuing position dependent and position relevant questions to players[6]. Here, the concept of serious game makes us interesting. The game utilized the concept of role-playing game forcing a player to answer the quizzes generated according to his or her class and location. If the answer is correct, the player gains more points. At a certain score, player can level up by answering a specific question. There are 5 classes; student, ancillary assistant, teaching assistant, doctor and professor. As level goes up, the avatars look is

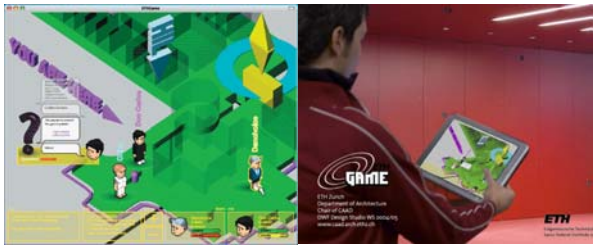

Figure 6. The snapshot of ETHGame

changing. The players have the possibility to turn from a simple student to a distinguished Nobel Prize winner. The student, which has collected the most points, is the

winner and receives the main prize.

3. The concept of EcoBlog

After reviewing all related works and combining their advantages, the key characteristics of Ecoblog have been defined indicating the development direction as personalization, virtual reality, role-playing serious game, and seamless integrated content and communication tools.

3-1. Personalization

The most common and critical feature among our studied cases is personalization. Because a person has control over his own piece of the community landscape, he feels a powerful ownership of his space. In this way, it's the same as a real-life neighborhood-each participant has his own space, his home, where he can feel safe, yet he is also a part of a larger community, the neighborhood. [2] This concept will be applied to EcoBlog by providing users their personal EcoHome. Like Cyworld and Habbo Hotel, each EcoCitizen has his or her customized avatar and decorative EcoHome.

3-2. Virtual Reality: 3+1D Metaphor with Context Awareness Building Data Model

We have seen that by using different type of metaphor, it can differentiate the level of immersion and interaction. The more dimensions we use the better interaction we gain. Thus, it reinforces the feeling of 'being there' which makes users strongly perceive that they are belong to the community. This feature makes Habbo Hotel members keep chatting in the virtual hotel instead of using other conventional instant messaging services. Although two-dimensional environment can perform well, our approach is to develop EcoBlog as a three-dimension environment which can grow according to the user's interaction and time. However, due to the limitation of real-time rendering on web, 3D environment has to be limited to only EcoHome area.

3-3. Role-playing Serious Game

Our strategy to educate the users about ecological issue is to include the concept of role-playing serious game. A reward system is set providing the 'rule' for the player. An EcoCitizen can earn scores by answering ecological quizzes in the virtual museums. The member can use the virtual money called 'EcoLeaf' to buy 'EcoProducts' and use them to decorate their 'EcoHome'. Moreover, at a certain score, the citizen can level up and have more abilities. The higher class the citizen is the more valuable and various 'EcoProduct' the citizen can buy from the 'EcoMarket'. The citizen classes are various from 'Apprentice', 'Specialist', 'Expert' and 'Sage'.

3-4. Seamless Integrated Content and Communication Tools

As mentioned in the introduction, one factor that makes blog popular is how it provides the feedback channel. Feedback means two-way communication. We have seen this evidence in Cyworld where it is easily to post a message and get the feedback for asynchronous mode or chatting with 'buddies' in an integrated instance massaging for synchronous mode. All contents are well-integrated through the 'virtual buddy' relationship. We also apply the same idea to EcoBlog. 'Green Buddy' defines a special relationship between two citizens. Citizens with 'Green buddy' relationship can use 1:1 integrated instant messaging, inviting one another to visit their EcoHome or even view private contents. The idea of 'Green buddy' creates sub-communities within the overall community enhance the interaction among EcoCitizen,

4. Scenario

Once we have set up the project concept, it is more convenience and relevant to set up the scenarios explaining how a user communicates and interacts with other users and the community. The output will help us defining the framework described in the next section. The summary of scenarios is displayed in Figure 7. Note that we used some pictures generated by Simutrans[10] as the background and avatars from iDance. [11] for developing our graphic user interface. All scenarios are broken down into 3 levels of scenario; they are scenarios at community level, town level and home level.

4-1. Community level

Once a user as logged-in, the community home page is the first place to visit. Here, a user can choose between entering virtual ecological museums where he or she can learn about ecological knowledge and do some quizzes to gain more 'Eco-leaves' or visiting 'Eco-towns' where several 'Eco-homes' are located. Other available functions are checking messages, searching for the location of one's green buddies as well as checking news and status of the community. Note that there is also a shortcut for a user to enter his or her EcoHome from this level. The environment of community page is a metaphor of 2D city.

4-2. Town level

There are several Eco-towns in EcoBlog community. A new town can be created if the population is over limited. As a user visits and registers EcoBlog for the first time, the user has to select his or her avatar and

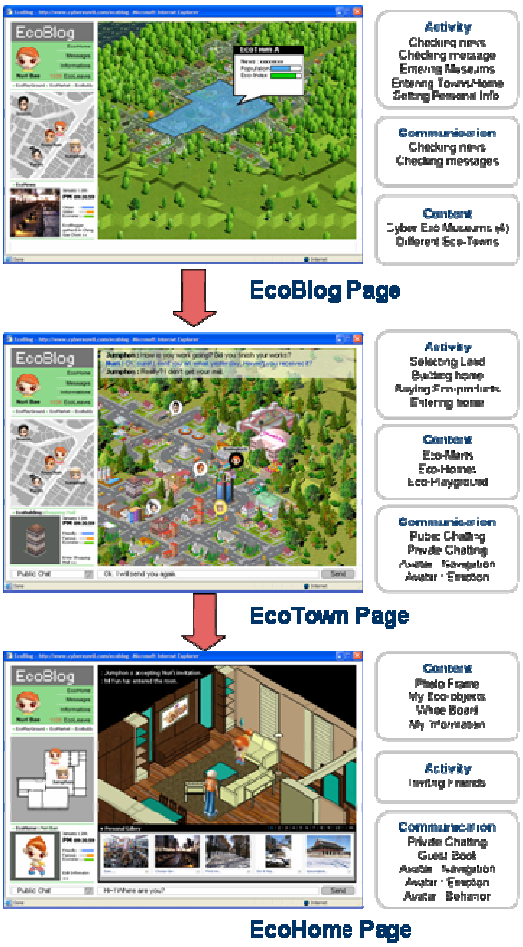

Figure 7. The EcoBlog scenario

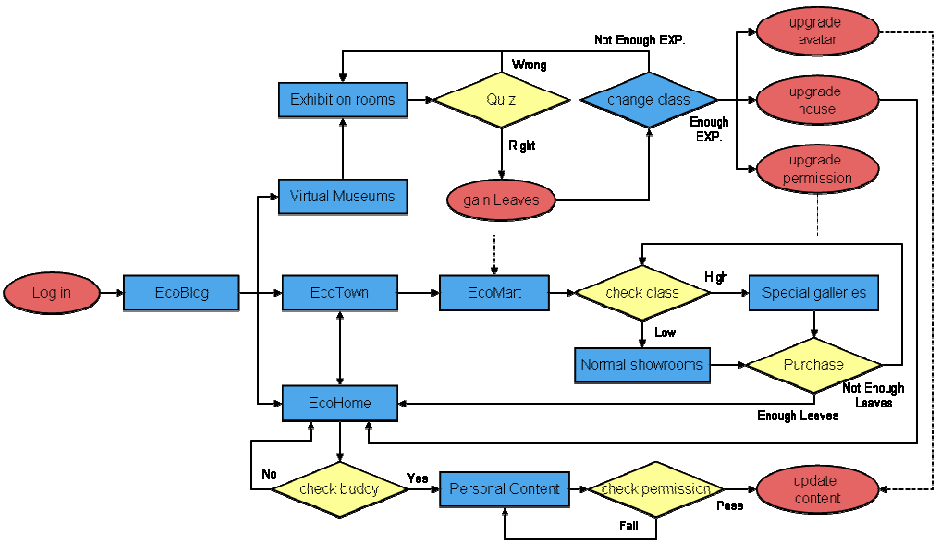

Figure 8. The system diagram and game rule of Ecoblog

choose an available Eco-Town to locate his or her Eco-house. Hence, as time goes by, Eco-towns can be growth according to the changing in population, type of houses and the class of each citizen. At town page, a user can visit his or her own EcoHome and the others as well as enter other public spaces such as EcoMarket where EcoProducts are sold, EcoPlayGround providing online games as well as EcoTownCenter. The town level is also a metaphor of two-dimensional town. Users have to control their avatar to explore and enter EcoBuildings. One can also communicate with the other using 'one to many' instant messaging function in public area as well as inviting a friend to chat in 'one to one' manner.

4-3. Home level

The smallest level in EcoBlog is EcoHome page level. Each user has a private EcoHome where personality can be expressed. EcoProducts purchased from the market are delivered and stored here. Users can decorate their home as desire. One may invite his or her EcoBuddy to visit the home for chatting. The house owner can take the visitor looking around the three-dimensional virtual home. The home also organizes personal contents such as calendar, photo frames as well as a bulletin board. They are actually placed on the walls. User can click on them to access the contents. The area of EcoHome and available furniture can be upgraded once the house owner has changed his or her class.

5. Framework

5-1. System Diagram and Game Rule

The process and relationship among contents and rules are illustrated in Figure 8. The diagram shows how a user gains EcoLeaf (virtual money) and changes the class after answering given quizzes in the virtual museums. The change also affects the rest components including avatar appearance, size of house and special permission to purchase high-end products. The diagram also explains the connection among key components indicating how the user navigates in EcoBlog.

5-2. System Architecture

At the moment, Ecoblog is developed running on World Wide Web protocol using ActiveX technology. On one hand, all computation and processing are taken place in the server side. Database is also stored within the server. In the other hands, a client is accountable for dealing with the input and output data through the user interface as well as providing communication channels with the other clients.

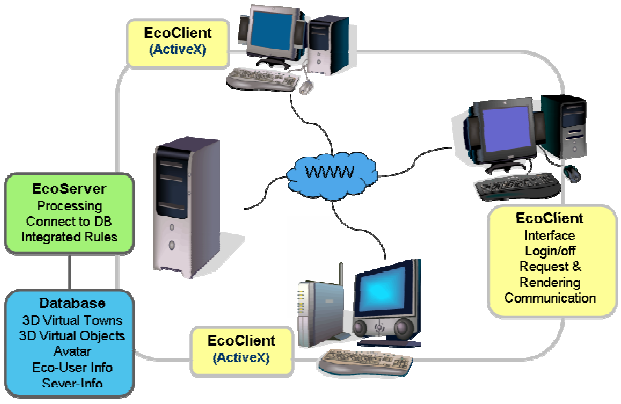

Figure 9. The system architecture of EcoBlog

5-3. Database

The Database of EcoBlog can be categorized into 2D Virtual Building, 3D Virtual Room, 3D Virtual Objects, Avatars, Maps, Textures and Other Contents. Here our database is developed base on an object oriented building data model so called "Structured Floor Plan". [x] Such data model is capable of integrating semantic information where relationships among spatial objects are maintained. As a result, we can detect the current location of virtual avatar enabling specific functions or interactions according to the current spatial context.

5-4. Interface

On EcoClient side, a user interacts with the community through the user interface. The interface composed of navigator bar, input-output message panel, stage and information bar. Navigator bar includes shortcuts linked to main places in EcoBlog including

EcoHomes. Input-Output message panel enables the user to post and get the message to communicate with other persons. Stage displays the contents the user has requested as describe in Scenario section. Finally information bar provides the statistic information of EcoBlog, EcoTown and EcoHome.

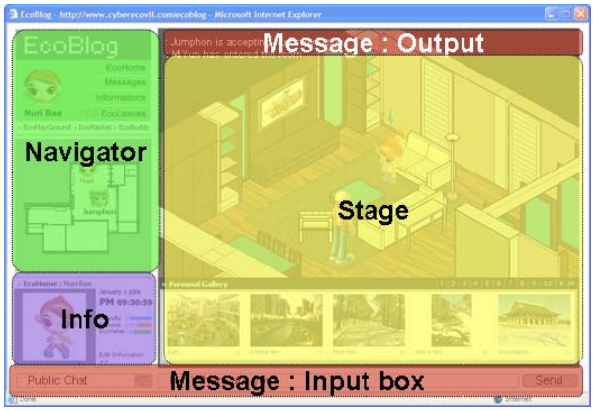

Figure 10. The interface design of Ecoblog

6. Conclusion

Our online ecological community for education, EcoBlog, has been developed by integrating the concept of blog and serious game in a four-dimensional environment. Semantic building data model is also implemented to extend the interactivity of virtual environment. Although the project is still in its infancy, the frameworks composed of system architecture, system rule, database and graphic user interface are defined based on our empirical study. It is the novel type of online community for educating the Korean public about the concern natural environment. Thus, we believe that our framework could enhance the comprehension and interaction among users, virtual environment in the ecological community by integrating the new concept of serious game design, 4D CAD and semantic data model. Furthermore, such framework can be applied with any online educational community about environment. Finally, Ecoblog will contribute to reduce great amount of environmental budget to restore contaminated environment to previous condition.

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