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DIGITAL SPACE DESIGN WITH THE APPLICABLE DATABASE OF INTERACTIVE AVATAR BEHAVIOR

Ku Bon-Chun, Kim Yong-Seong and Lee Byong-Chan

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1. Introduction

The presence of the digital space has a considerable effect on the whole of the society and culture, and is now being risen as a medium which has an upcoming infinite expandability. Hence, it is a high time for us to see the digital space as the extension of the real life, to recognize it as an ideal aspect not a spatial aspect, and to need an access for all the human behaviors within the space. This research interprets the meaning the space has in the digital circumstances as the expanded realistic space and thus accesses to it architecturally. As human is the spatial subject of real life, avatar is that of the digital space. And, by its digital nature, the variables representing a wide variety of the spatial experience could be extracted from the subjective data. More advanced space can be created if it is used to the space establishing oppositely. This research is to extract a form of avatar as a subject of the space creation and variation in order to produce its database, and to propose the design of the digital space for the space variation and experience in accordance with the interaction between avatar and the space.

2. The DB Interaction and the System Build for the Digital Space Design

The technical understanding to design the digital space is basically a prerequisite. Accessing to the space design underlying the digital technology and the precise knowledge on it can provide the visitors to the space and administrators with the digital space experience. This chapter reveals the solution of the technological aspects, which builds the database interaction system and designs the form generator which can create a form in the digital space using this database.

2.1 Avatar

In short, an avatar is a 'visual image of your other self in cyberspace'. Avatars became incorporated into the Internet as a symbol of virtual reality, going beyond their original meaning. The correct meaning of an Avatar is an animation character performing the role of the user as a substitute in cyberspace. It is different from characters like Mickey Mouse because it is according to the user's will and act as a substitute of the user. An avatar is a second self in cyberspace. It is a close approximation of our life. The created avatar waits for you wherever you enter a site. It is a real self in cyberspace and can be a vain reproduction of the creator.

2.2 Network and Database Interaction by JAVA

Basically, Java applet restricts the access to the client system to secure the client. For example, transferring files or access to the client's files is prohibited. The database from server can provide

clients but can not be provided. This basic attribute of applet causes a lot of problems upon the database interaction. Remote Method Invocation (RMI) was used to solve that problem in this research, and it makes possible for object to be transferred and shared effectively under the remote circumstances of the effective database interaction with applet.
RMI, which is in charge of communication between client and server, was used to archive the information records such as the movement of avatar, event occurred, etc. as database. The methods defined in the remote object can be used as if they are methods in their own territory. And remote object technology in Java was used, considering the expandability for prospective multi-user system
VRML is composed of the combination of node object. The input and output of the event through EAI can be done effectively by managing systemically node within scene graph. For managing the node, the table including addictive information of the node ID and itself is managed.
The subsequent node ID is allotted, when a client enters into the world whether it chooses a avatar or it is allotted automatically by random function. The movement of avatar and data on event, time, etc are saved in database with node ID, and it can be retrieved easily by ID search. Besides, the node ID in display is transferred to applet thorough EAI and the addictive data according to the node ID in database are transmitted, when avatar chooses an display by methodical management of node naming.

2.3 The Database Builds of Avatar Information (Form Generator)

MySQL is such a remarkable relational database, comparing to common commercial database, as a free relational database. It was chosen as an essential DBMS in this research to use its easy and outstanding performance, and the table for overall database structuring can be largely classified into avatar and the source table for world structure and its detailed list is as follows.
The application for database administrator is produced due to effective database management. The administrator mode, which has an authority to modify, complement, add, and delete the database mentioned above, must be added and the application must be installed in database server. The database in this research is not huge, but the proper administrator system, which is compatible with the database being used in the project, is required for the huge database management, and the online and offline controls are available, while it is advisable to avoid the online control in security aspects

2.4 The System Design for Design Application

In this paper, the system structure can be largely classified into server and client as figure 25, and web server and RMI server functionally. The web server has its function transferring VRML file to the client as transferring general HTML, and the first connection between server and client is effected. The server was configured by the Apache. The RMI server continues to connect server and client and performs all the clients other than VRML file transfer. It manages the remote object, so that the remote method can be called from client by its nature of RMI.

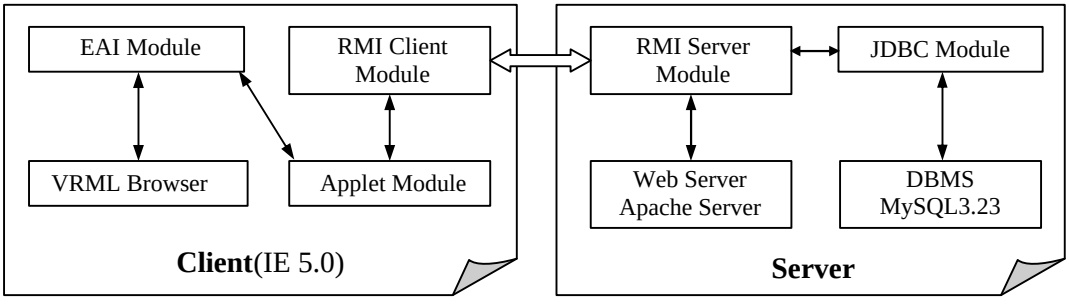


Figure 1. System Module Structure

3. Design Proposal

This paper results from re-using and interaction of DB with avatar, and it is to design a space where interactivity grows infinitely. In this design we need to concern 4 characteristics; the ability to growth, database, temporality, and Particle-space.

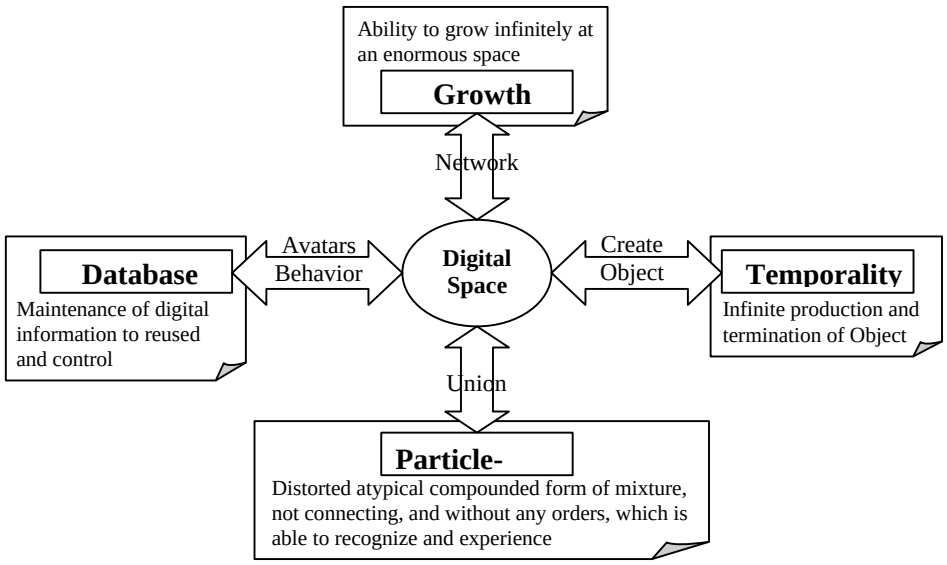


Figure 2. Design Concept

3.1 Design Process

Basic factors of design are experience and recognition subject, and it is an display of objects which determines the space and characteristics of avatar. The basic factors of design interact with one another, and they have great relations with each other. This space is not just a simple space, it is a very complicated space made from many subjects.

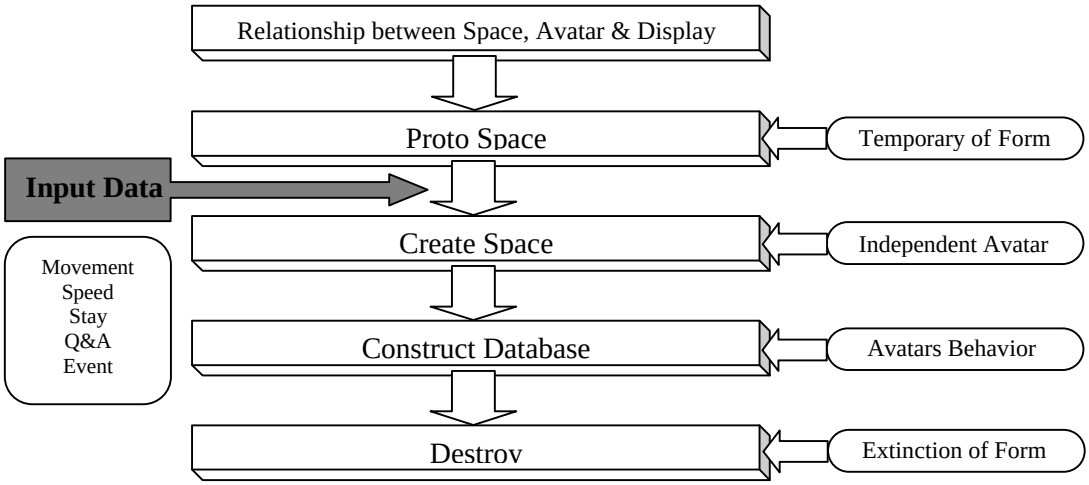


Figure 3. Design Process

3.2 Generation of Display Path & Digital Form

(1) Flow : sequential flow by theme / parallel flow by subject
(2) Select path : Entering gallery by the choice of the audience such, display and flow
(3) Random path : Randomly producing the path from the formation of random number by random method. (Gaussian Distribution : average 0.0, standard variation 1.0)

The chosen path becomes 3 dimensioned and avatar observes through the path. Avatar's form-movement, speed, stay, event and quality change the space through out this observation. And the existence of the display varies with the attention of avatar, it might extinct and it might become more definite. And the interaction between the display and avatar, unity forms in this whole digital gallery, and gallery is mostly based on avatar behavior. These results become DB and after that it vanishes on the scene of the client's browser.

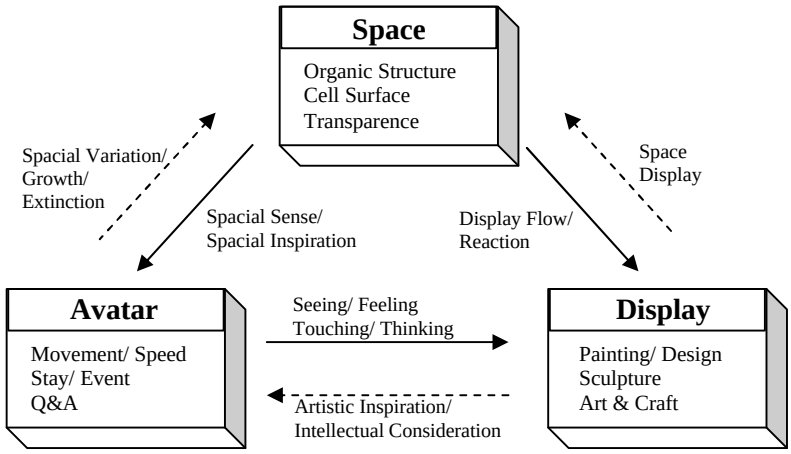


Figure 4. Relationship of Basic Factors in Digital Space

The information that interacts between avatar, display and cells become DB, and display flow produced from avatar will be saved as Visual DB with other displays. A gallery formed by an individual avatar will interact with other spaces produced by other avatar and it will form the whole gallery.

4. Design Process Model

4.1 Log in/ Form Gallery

Members are maintained to structure the basic information for visitors, and they key in their basic information and preferences. This will be saved in avatarInfo table and becomes a major categorized yardstick for the information use. The visitors enter to the gallery after they basically choose the art field (paintings, sculpture, industrial arts, design) which they wish to view. The digital gallery can be viewed in two methods. First thing is viewing when avatar creates the space (Trace Gallery), and second is choosing out of some sorts of galleries. The methods are viewed according to one's preferences. The following is the overall flow [figure 43].

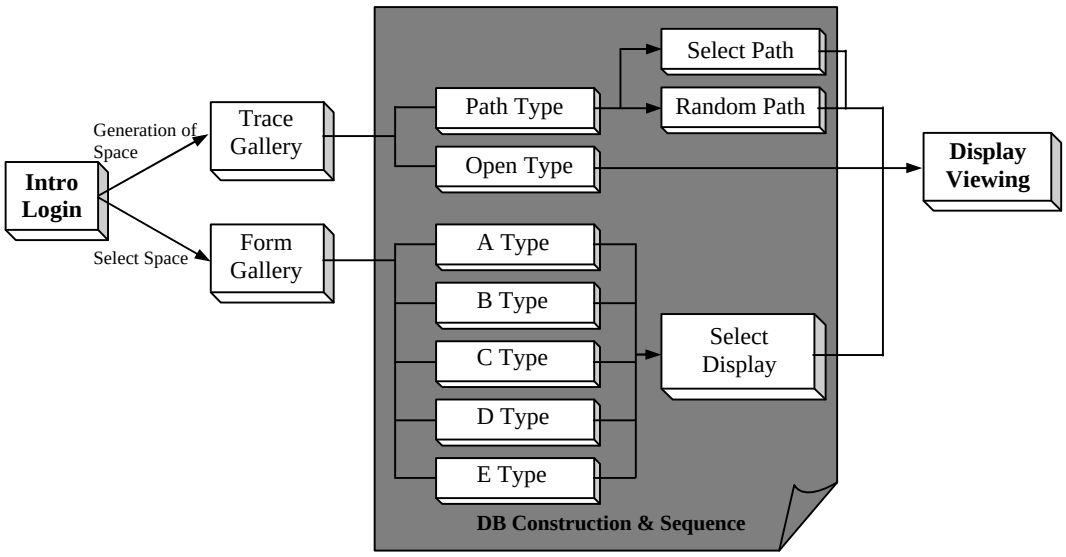


Figure 5. Display Viewing Flow

4.2 Select Path/ Path Gallery

The flow of the path gallery can be chosen in two methods. One is that the system creates the path randomly using random path system, and the other is that avatar chooses out of 16 kinds of paths.

4.3 Open Gallery

Avatar views displays being scattered randomly. The behavior of avatar is saved in database upon viewing them, and it is drawn in the real-time trace system according to the movement of avatar.

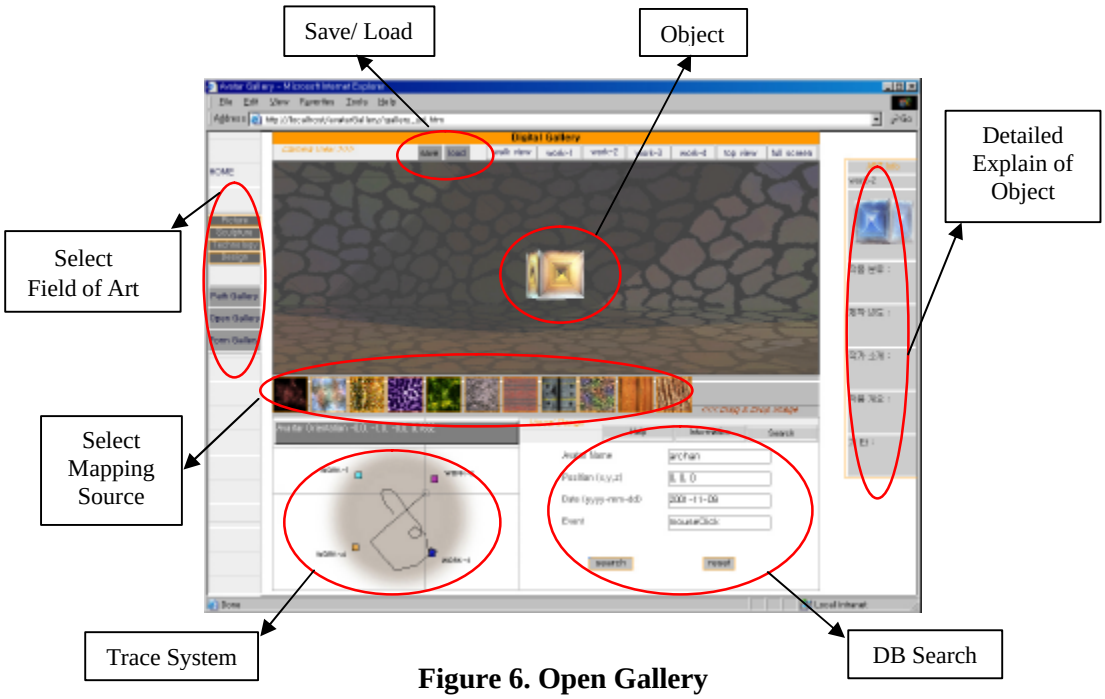
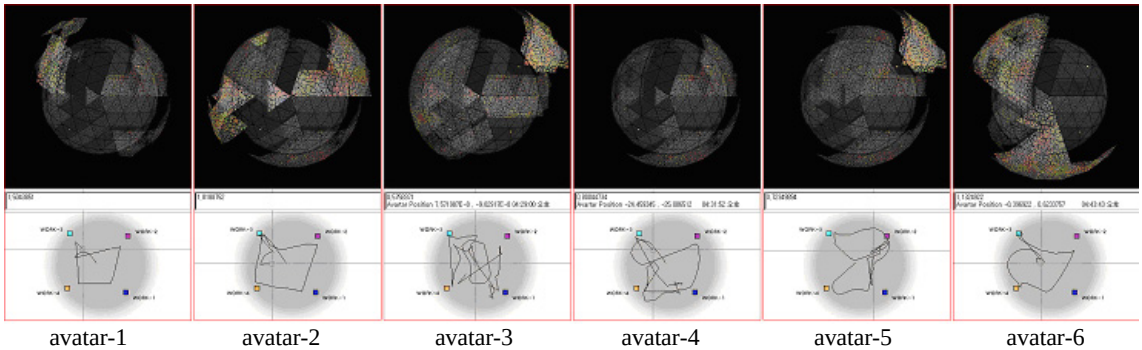


Figure 6. Open Gallery

4.4 Tracking of Avatar's Movement & Event

The behavior of avatar is affected directly by the movement and event while avatar views. As indicated in 'Trace System' below, avatar is moving about aggressively in the work-2 and work-3, and the cells in right field from overall form, the digital gallery, are showed more distinctly and its form was varied significantly, since its staying time and event have occurred considerably. The form created through this process can be saved or opened by clicking save/load button.



avatar-1 avatar-2 avatar-3 avatar-4 avatar-5 avatar-6

Figure 7. Example: Circular Flow Guidance Display

5. Conclusion

The category of the architecture is expanding with society and culture over time, and it is evident that among the expanded category is the digital space design. In particular, the digital space design can be

experienced through avatar, while it has an architectural meaning in the aspects satisfying simultaneously tangible and intangible implications. This research concludes as follows from the results designed the experimental work to confirm the architectural availability for the digital space and analyzed human behavior within the digital space in this research.

First, the spatial empathy is possible by means of the interaction with the space in the digital space showed in this research and the database interaction. Obviously, with the current technological restriction, changing human feeling into electronic information is difficult, but the basic data of avatar was extracted using Java and VRML in this research, and, concurrently with structuring database, the digital space was structured using form generator. The digital space, which was created by this process, is directly affected by the movement of avatar, event, selection, query response, etc., and is structured into a digital form in accordance with preference by a form of avatar, as a result. In addition, the effect on the space a form of avatar has and the work interestedness of avatar in the display space can be inferred by observing the classified database, and the data requiring for smooth display flow can be also inferred.

Second, through the behavior of avatar can be available in the space analysis. The analysis of human behavior is instrumental in planning the space for human, such as urban planning, master plan, or floor plan in the department store. The technical method applicable to the realistic space is provided by structuring database from form of avatar in the digital space. For example, if a random street network is copied unchanged in the digital space to sample a short-term form and create the system, a long-term human behavior can be thus catalogued. This database can be utilized as a objective data in the space analysis which can forecast the future prosperity.

Finally, this study indicates the possibility of utilizing the digital space. With the application of form database of avatar and digital space structuring processor, the future-oriented method was proposed to design the web contents such as virtual house, shopping mall, gallery, etc. in the digital space. And the methodology of the technological aspects in the space design and digital space structuring processor were established, and the proposition of the digital space form plays a key role in reconsidering the possibility of the digital architecture.

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Ku Bon-Chun
Department of Architectural Design, Graduate School of Techno Design,
Kookmin University, KOREA
861-1, Chongnung-dong, Songbuk-ku, Seoul, 136-702, KOREA
tel. 0082-2-910-4595/4266
fax. 0082-2-918-7079/ 910-4609
Email: nayana99@hanmail.net