From dust to stardust: a Collaborative 3D Virtual Museum of Computer Science

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ABSTRACT

One of the outcomes of Moore's Law - according to which the exponential growth of technical advances in computer science is pushing more and more of our computers into obsolescence - is the birth of museums and exhibitions about "ancient" computer science, referring to facts that occurred no more than 50 years ago. The italian computer science virtual museum collects personalities, facts and events of relevance related to the development of Computer Science in Italy during the past century. The museum can be visited online, as a traditional web site, but provides also a three-dimensional virtual reality interface, that can allow people connecting from different parts of the Internet to visit it together. In addition, it contains simple interactive games that illustrate basic principles of computer science, and gives and effective demonstration of how data was handled at the time, presenting in 'real size' a working model of a mainframe of the time. All of this in a sci-fi setting, in which visitors can fly and jump from floating platform to floating platform, in a scenario set in a starry space sky.

This paper will describe the features of the 3D portion of the virtual museum, and the way it enhances navigation inside the museum contents, providing additional fun and entertainment.

THE VIRTUAL MUSEUM OF COMPUTER SCIENCE IN ITALY

The Virtual Museum of Computer Science in Italy started from a project which consisted in gathering documents, material, and facts about the early days of Computer Science in Italy. The results of the research have been collected in a CD-ROM, containing pictures of the first machinery and computing devices of the 50s-70s in use in industries and academies. Along with information about how these devices were operating at the time, and which were the tasks they were used for, the CD provided interviews, both in textual and in video format, to the personalities which contributed most to the development of the field in Italy. In the interviews, curiosities and facts are put in evidence, linking to related information and pictures.

This material has been converted to an on-line, web-based virtual museum, augmented with an entertaining and innovative 3D interface. The 3D interface allows the users to navigate in the museum in a collaborative fashion, because all people connected to the site

can see each other, talk to each other, and go together to look for information. Moreover, this interface offers some simple games, that can be played together with other visitors, and that are inspired to the contents of the museum. In this short paper we will describe the features that the 3D part of the museum offers, and the criteria with which we built this innovative interface.

The technology that was used, WebTalk-I, was developed internally at the Politecnico di Milano, and was effectively used to develop other examples of collaborative access interfaces to Virtual Museums of different kinds.

STRUCTURE OF THE 3D INTERFACE

When entering the world, every user can choose its avatar, that is the shape he will assume inside the 3D Virtual Museum, to be seen by other visitors. There are different kind of robots or human being shapes that the virtual visitor can pick. The 3D museum is organized in pods, which are floating in space, against a starry black sky, which sets the virtual museum in a science-fiction, Star-Wars like environment.

Fig. 1 - A breath-taking view of the floating pods in the starry space. The pods host different 3D objects and information related to the Computer Science museum.

Each floating pod contains a collaborative game, or a collection of items referring to a particular topic of the museum. From the 3D pods it is possible to open the regular web pages and visit the virtual museum web site, with pictures, textual information, and streaming video interviews.

All the pods share the same basic structure:

- an informational billboard, that can be clicked to get help about the game on the pod, or to browse the web page presenting the related information
- a landmark, that is a 3D icon which allows users to distinguish easily one pod from another
- 3D objects that can be examined, or with which users can play, to learn more about early computer science in Italy.

When the users first enter the Virtual Museum, they start from the JumpStation Pod. The JumpStation is the main hub of the museum, containing all teleporters to jump to every other pod. Three teleporters - gathered in the Playground Area of the museum - lead to gaming pods, the other three teleporters lead to the Information Access Area, which provides access to the traditional museum website. By entering one of the teleporters, the users can explore the pods by themselves, or they can decide to follow each other in space to play together, or to go together to a particular page of the museum website.

The most common scenario is that users follow a virtual guide, an expert of the museum that leads other users to the discover of the games and of the contents of the museum, explaining,

teaching and discussing via the chat window available under the 3D representation.

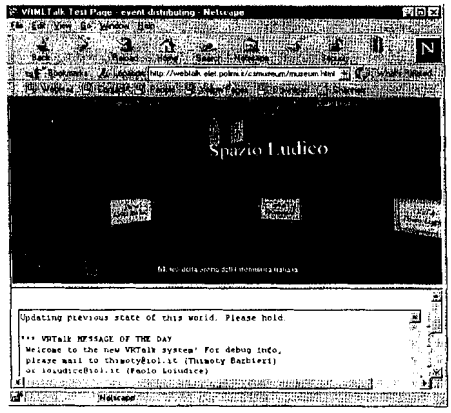

Fig. 2 - The JumpStation Pod provides the users with teleporters to quickly move from one part to the other of the museum. Users can interact via the chat window provided under the 3D view. The system works in a regular browser.

The gaming pods provide a Logic Circuit quiz in which users learn what are logic ports and boolean logic, playing together with input switches to AND, OR and NOT ports. In another pod, there is a simulation of a CPU interacting with registers and a ALU. All these fundamentals notions are explained via direct interaction with the game, and by information accessible from the 3D billboard.

Another pod provides a reconstruction in real size of a mainframe, and a huge stack of punched cards - the equivalent of a 1.44 MB diskette - to convey to the user the feeling of the dimensions of these devices at the time. The computer can be operated to read the punched cards in, and provides a link to the website page describing it. Via the information access pods it is possible to go to an interview, or to particular device or machinery.

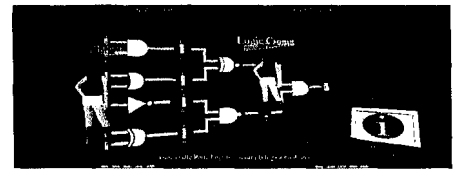

Fig. 3 - Three users (two in view, the third looking at them) are playing together on the logic circuit pod

Fig. 4 - The users are exploring the CPU/ALU game

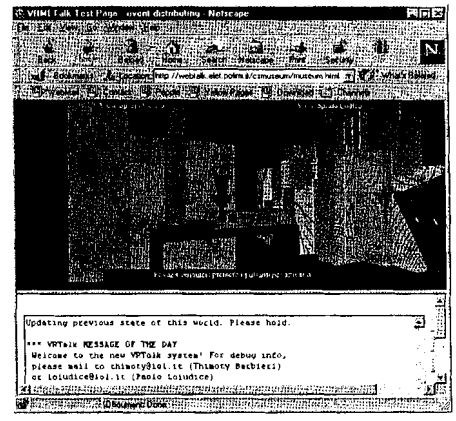

Fig. 5 -The big EDVAC unit is reading the huge stack (equivalent to 1.44MB floppy) of punched cards

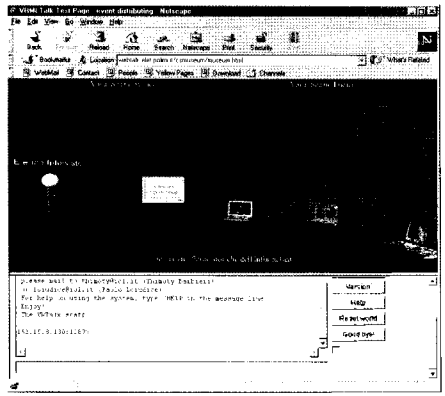

Fig. 6 - The pod providing collaborative access to the interviews. Each laptop links to an interview. The pod has also a landmark (the microphone) to allow the users to easily distinguish this pod from the others.

PREPARING FOR A NEW TECHNOLOGY

The Computer Science Virtual Museum is basically an experiment on how to organize complex contents for collaborative exploration, using 3D interfaces. The museum itself is not online, due to the instability of the technology supporting it. Soon a new framework, WebTalk-II, already in an advanced status of development, will be distributed to the public to address this issue. There is however another project similar to this one, Leonardo Virtuale, which was made available to the public on the web site of the Italian National Science Museum, and that gave rise to interesting results in terms of response from the general public.

While the WebTalk-II framework is being finished in our R&D Labs, the team continues in its experiments around designing and trying collaborative 3D access interfaces, in order to understand better how do they work and which is the best way to tackle the problem at the design stage. A lot of work is being put into this subject at the moment.

CONCLUSIONS

In our constant research about how to provide ways to collaborate while accessing information via the Internet, we are getting more and more convinced that museums provide a formidable application for 3D collaborative access structures. This Computer Science museum, with its innovative access systems, is more entertaining, more engaging, and more fun to visit than its CD or conventional website counterpart.

As in the near future we will continue developing our technology (applying it not only to museums or cultural heritage related applications), we will make it stabler and easier to use. This way of navigating and interacting with others may become common practice in on-line cultural heritage applications, where the complexity and the richness of information calls for ways of guiding each other to the discover of the contents which are provided.

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