All In Good Timing

By Ben Davis

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Timing and information are basic ingredients of experience. What we process and when we do it collude to create those moments when we "get it." How many times has just the right piece of information come to you just when you needed it most? What's that you say? Good timing!

But there are deeper implications of good timing. Until the 1700's ships found their way across the oceans by "dead reckoning", watching the stars – if you could see them, the shape of the shore – if you could see it. The reason they couldn't chart longitude was because they couldn't move time. That is, they didn't have a portable clock that would give them a consistent reference for time so they could accurately compute distance. Not before John Harrison designed the marine chronometer was it possible to take a clock on a moving vehicle that could retain the memory of local time (Greenwich, England). They could finally sail with the certitude that time and maps were in register. There experience of exploring the seas was finally based on …good timing.

New Times

For a good time, jump ahead three hundred years. Today, Virtual Reality technology is in many ways a time machine because it models and manipulates the perception of time and space. We are familiar with stunning simulations of flying though the air, through outer space, through the human body. In a very real sense, oddly enough, simulation means being in two places at once – inside your own body and inside a digital reality. VR is bringing us in contact with everything from artist's perceptions of imaginary sculpture to the reconstruction of ancient architectures. But in each case we are forced to seemingly leave the real world and enter the artificial clock of the computer.

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Composite Time

There is a growing field of research that is concerned with something other than artificial "virtual" time and space. This line of inquiry asks: What if there was a composite digital/analog experience available? What if we could add information to the real world in order to maximize performance or enhance perception without leaving the time dimension of the real world?

> **"Scientific people... know very well that time is only a kind of space" -H. G. Wells,** ***The Time Machine***

Augmented reality research strives to keep the user in the real world and add or manipulate information in a seamless way. There are a number of approaches to augmented reality that require different mechanisms to combine digital information with analog experience. These mechanisms take a variety of approaches to one of the key limitations of augmented reality, registration.

Harrison's Marine Chronometer
Copyright National Maritime Museum

To render digital information and fuse it with experience is not an easy technical task. Errors in registration will make the process not only confusing but useless.

Registration, then, can mean anything from making relevant digital information available at key moments of experience (timing), to visually registering computer animation with real events (visioning), to some combination of time and perception. Augmented reality can be facilitated by personal instrumentation, computer-controlled space, or some combination of instruments and spaces.

Clocking Experience

Since the late 1960's museums have made use of "audio tours" to augment the reality of visitors. We have quickly come to take this technology for granted as a staple of museums but it wasn't so very long ago that the only "enhancements" in a museum were the labels on the wall. Now, with multi-tracking and digital audio, the museum visitor can

visit Tahiti in the 1880's in the headphones in front of that Gauguin painting.

Another very interesting example of augmented reality is the J. Paul Getty Museum at the new Getty Center in Los Angeles. The mission of any museum is to provide light with the understanding that light always changes, that time changes light. This seemingly simple statement actually represents a very complex concern for what the experience of art means.

Artists work with physical materials that manifest qualities of color and light. When you "freeze" a painting with a particular wavelength of light provided by electric lights you narrow the quality of the experience to a very thin slice of time. The particular wavelength may be roughly equivalent to 10AM to noon in the Northern Hemisphere.

Exhibiting the work in some semblance of the actual varieties of light that were used to create the work gives the viewer a closer communication with the artist's feelings and intentions.

What the galleries of the Getty represent in both a poetic and technical sense is a time machine - one aspect of it being to let the light of the moment illuminate the work but also to give you a sense of what the work might have looked like at the time(s) of its creation as well.

Controlled Light Gallery
Copyright Getty Center

Time and Light Registration

The galleries of the museum are lit by skylights of heavy, UV filtered glass that allow about thirty percent of the external natural light into the rooms. Working above the skylights are computer controlled louvers that orient themselves automatically based on the best possible natural light for the time of day and time of year. Elaborate look-up tables from data collected by photocells measuring the natural light falling on six by ten-foot wall areas in the galleries were collected for every hour of every day through the seasons of an entire year.

These tables tell the louver inclinometers how to orient themselves on a schedule that subtly shifts them at prescribed times during the day. This allows a maximum amount of natural light to fall into the galleries at any given moment during the day. The computational system "augments" the natural light in the room by carefully timing the position of the louvers. In a sense, the entire room is like a clock that regulates the quality of natural light to its maximum intensity all day long, all year long.

Visitors have the extraordinary experience of never seeing a painting in the same natural light twice but they will never notice the technology orchestrating the experience. The subtle shifts in color in the artwork from moment to moment, season to season makes each museum visit unique.

As the natural light begins to fade at the end of a day, electric lights come on so slowly that the visitor doesn't notice that the traditional "frozen" light system is taking over.

Enhancing the Time

This example of augmented reality goes to the heart of the use of technology to seamlessly enhance experience. No one who visits the museum is aware that they are in a "smart room". The vibrancy of the artwork is the only indication that something is special, that light and time are being registered by computation.

The attention to the specificity of light, the use of computational technology to lend clarity and the invisible nature of the situation makes these rooms magical in sense. The registration of time, light , and content is perfect in this situation.

The experience is a not a technological experience. It is more akin to a communion with content. For artists and historians, however, it is simply the right way to be with art. Visitors may not know how any of this has been done, but they do know that the artwork at the Getty is memorable. Time and light have been harmonized by computation, the experience is all in good timing.

for more information

Getty Center
http://www.getty.edu

Planetary Virtual Reality
http://www.pgd.hawaii.edu/prpdc/vr/planetvr.html

Rochester Institute of Technology Augmented Reality Page
http://www.cs.rit.edu/~jrv/research/ar/

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