

Sujin Lee

Artworks: Time visualization by Other I's



Abstract:

Project theme / concept

This work is to visualize the motion of spectators by using a multi layering three-dimensional structure in computer. Space and time in the real world belongs to a theory of relativity. We believe that the motion follows this rule of the relativity. In this work, the virtual space in computer has conceptually been shown that the relativity is depicted by spectators' moving. The motion is a change in position of an object with respect to time[1] I have been studying not only to express time to visualize by space but also to be interactive between the work and spectators. In my work, only when spectators are moving, the features appear detected by a camera. Spectators make their feature by themselves in a motion.

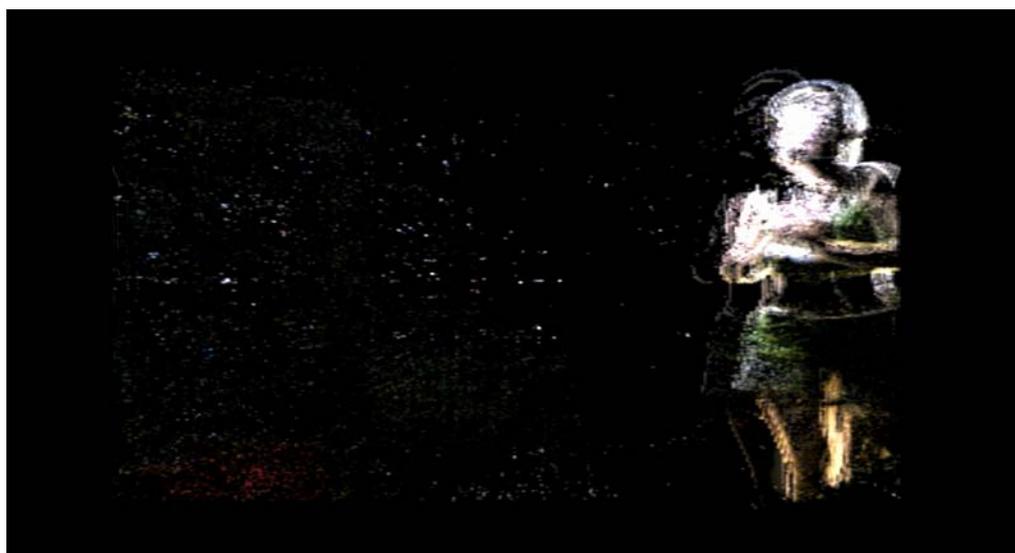
"I wished to show that space-time is not necessarily something to which one can ascribe a separate existence, independently of the actual objects of physical reality. Physical objects are no in space, but these objects are spatially extended"[2] Albert Einstein said.

I wished to visualize his idea which I totally agree with

Technical synopsis

The work based on multi-layer plane structure displays moving via spectators detected by a fire –I camera. Spectators are the standard of time in this virtual space. The goal of this work is to present visualization of time in a three-dimensional space. For the purpose, the program was coded in C using OpenGL and shader and the algorithm of camera detecting used DSVL.

Through the program, a three-dimensional representation of space and time based on a multi-layer display structure is portrayed in this work. The virtual space in computer makes it possible. The work with technologies that present space and time in the virtual space has brought the paradigm shift in perception of the work.



Topic: Art

Author:

Sujin Lee

Sogang University,
School of Media,
Seoul, Korea

www.gsmc.sogang.ac.kr

my blog_

www.genegraphy.blogspot.com

References:

[1]

Wikipedia,"motion" [http://en.wikipedia.org/wiki/Motion_\(physics\)](http://en.wikipedia.org/wiki/Motion_(physics))

[2] Albert

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Contact:

genegraphy@sogang.ac.kr

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Time Visualization by Other I's Artworks for GA2010

Sujin Lee

Department of Art Technology, Sogang University, Seoul, Korea

www.genegraphy.blogspot.com

e-mail: genegraphy@sogang.ac.kr

Abstract

Time Visualization by Other I's is to visualize the motion of spectators by using a multi-layer display structure in three dimensional virtual space in computer. Space and time in the real world belongs to a theory of relativity. We believe that the motion follows this rule of the relativity. In this work, the virtual space in computer has conceptually been shown that the relativity is depicted by spectators' moving. The motion is a change in position of an object with respect to time[1] I have been studying how to not only express time visualized by space but also be interactive between the artwork and spectators. In this work, only when spectators are moving, a figure appear detected by a camera. Spectators make their figure by themselves in their motion.

The artwork based on a multi-layer plane structure displays the movement via spectators detected by a web camera. Spectators are the center of time and controlling a multi-layer plane mapping their figure images in this virtual space computer. The goal of this work is to present visualization of time for a three-dimensional virtual space. For the purpose, the program was coded in C language using OpenGL and the algorithm of camera detecting used DSVL library.

In this work, a three-dimensional representation of space and time based on a multi-layer display structure is portrayed in the programming. Also the virtual space in computer makes it possible. The work with technologies that present space and time in the virtual space has been induced the paradigm shift in perception of the artwork.

1. Introduction

1.1 Where the idea comes from

My work has begun from how different the way of time perceptions between the real world and Cartesian coordinate world by computation. In the world, which is composed by space and time , everyone lives under the same condition of time protocol as the meaning of the quantity that you measure using a clock. Time has several definitions for philosophers, physicists, economists and artists. One view is that time is part of the fundamental structure of the universe, a dimension in which

events occur in sequence. This is the realist view, to which Sir Isaac Newton subscribed, in which time itself is something that can be measured.

A contrasting view is that time is part of the fundamental intellectual structure within which we sequence events, quantify the duration of events and the intervals between them, and compare the motions of objects. In this view, time does not refer to any kind of entity that "flows", that objects "move through", or that is a "container" for events. This view is part of the mental measuring system rather than being an objective thing to be measured. The question, perhaps overly simplified and allowing for no middle ground, is thus: is time a "real thing" that is "all around us", or is it nothing more than a way of speaking about and measuring events? Many fields avoid the problem of defining time itself by using operational definitions that specify the units of measurement that quantify time. Regularly recurring events and objects with apparent periodic motion have long served as standards for units of time. Examples are the apparent motion of the sun across the sky, the phases of the moon, and the swing of a pendulum. In other views of time, there is conceptual time definition for example economics view. In this time, however, I refer the time in my work to a real time in the world.

1.2 Time visualization

The goal of this study was to visualize of time in a three-dimensional virtual space by using a multi-layer structure . Space and time in the real world belongs to a theory of the relativity. The usual way of visualizing the virtual reality consists on making a three-dimensional virtual space in computer. In this study, the virtual space in computer has conceptually shown space and time of the real world. We are often thinking that time is not relative but absolute facts because we have the rule of time GMT(Greenwich Mean Time) in the world. That can be the only same condition of space.

I am trying that some rules under the concepts which is announced by Albert Einstein be shown but certainly do not try to prove his mathematical and physical theorems.

2. Environment

In my work, there is the process of affecting which is internal environment and external environment. The internal environments is computer hardware specifications which are CPU, a memory, VGA, etc(*c*). The external environment is the setting ways such as the brightness(*a*) and a web camera specification(*b*) out of screen.

In fact, this is approximately the environment variables. There is another variable also. This work coded by OpenGL API and programmed how to get images depends on input parameters. The spectator's images on the screen that real time video about 30 frames per second have been read through a web camera. At this moment, each frame with real time video from camera has the flexible threshold value which is I can control of. The output of images on the screen may be just like that most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it.

However, in this case, I intend that the threshold value controls the speed of the images having been made and the output figure on the screen.



(a) Lights

(b)



*(d) Human interface
also a spectator*



*(c) A web camera, screen and a
computer*

Fig.1 Installation environment

3. Implement

A computer is, for the most part, a logical device. As part of this, the image elements or “pixels” on its display is square with X, Y axes in Cartesian coordinates system. In this square, I was setting up a three-dimensional virtual space with Z axis. The space with X, Y and Z axes is a virtual space but representing the real world. On the virtual space in computer, the mapping images of a movie could be controlled orthogonally and horizontally. The programming was used OpenGL API with related to Translate function. Translate function is possible to making rotation, scaling, movement, perspective of objects. In this algorithm it was used DSVL library for reading a camera sensor data from outside(a real world). Also images from a camera(outside) were having a procedure to the analysis and manipulation of digitalized images. This is not at all new algorithm techniques but rather programming of what I have tried in my artwork.

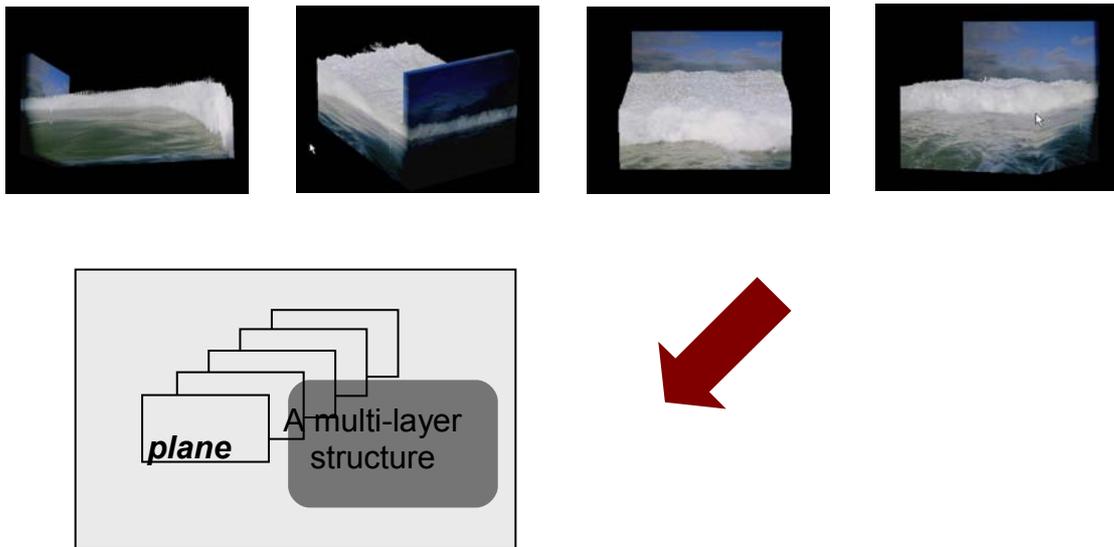
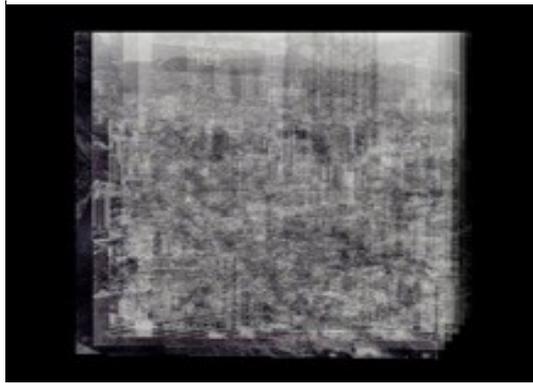
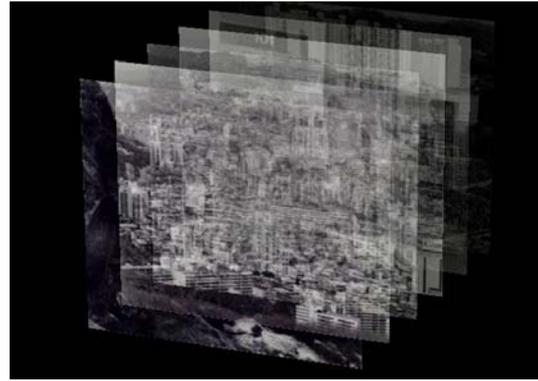


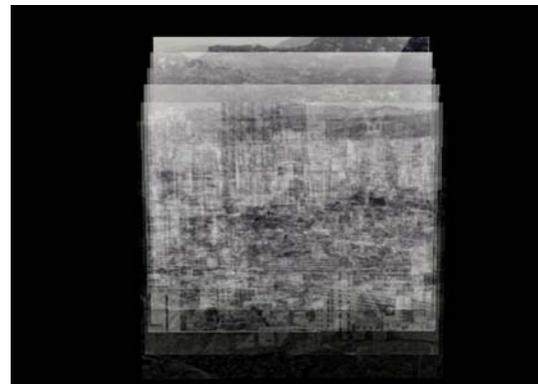
Fig 2. Each plane mapping waves image



*(c) Mapping images have transparency
planes + images mapping*



*(b) Planes interval are controlled by
user interfaces mouse, sensor, etc.
This is human interaction computer.*



(d) Perspective

Fig 3. Transparency & Perspective & Rotation

4. Artworks

4.1 A three-dimensional representation of spatio-temporal video

I tried to find out how to visualize time sequences and space at the same time. This work based on multi-layer plane structure displays moving panes via a spectator detected by a web camera. On the screen it is layered several planes by computational system. Each plane is mapping one recording video. Also each plane has interval space between planes. Whenever spectators are moving to some direction, several planes are following to the direction in a order and making interval between planes.

Video has spatio-temporal characteristic and I want people to look at the insight meaning of movement. Also It is shown that a spectator's movement is controlling several recording video planes according to the sequence.

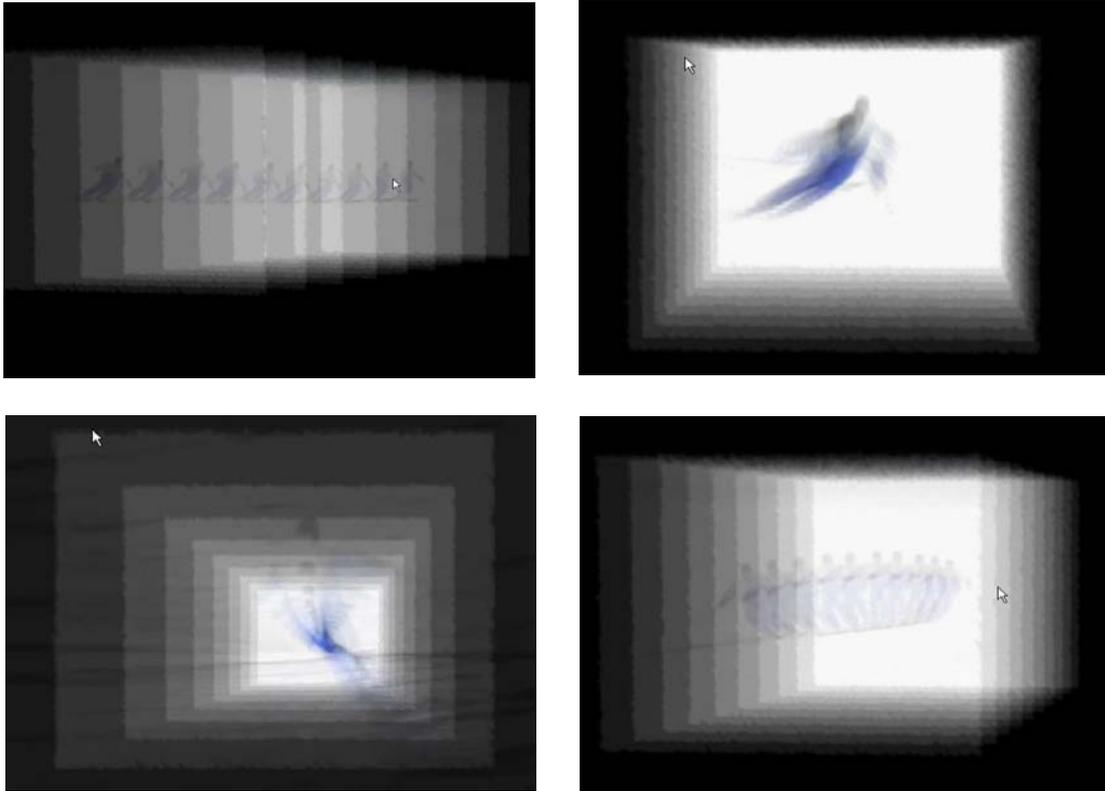


Fig4. Plane mapping skiing video

4.2 The movement

The planes of mapping moving images are Lin Hwai 's work "CURSIVE II" which is expressed the art of calligraphy. There is a similarity between the bodies of his dancers and Chinese calligraphy, the initial energy. I used source images because their motion can be expressed well ***the movement***. "CURSIVE II" is a ballet directed by Lin Hwai-min for Cloud Gate Dance Theatre of Taiwan. Also, I am permitted the Opusarte company which has authorized this DVD.

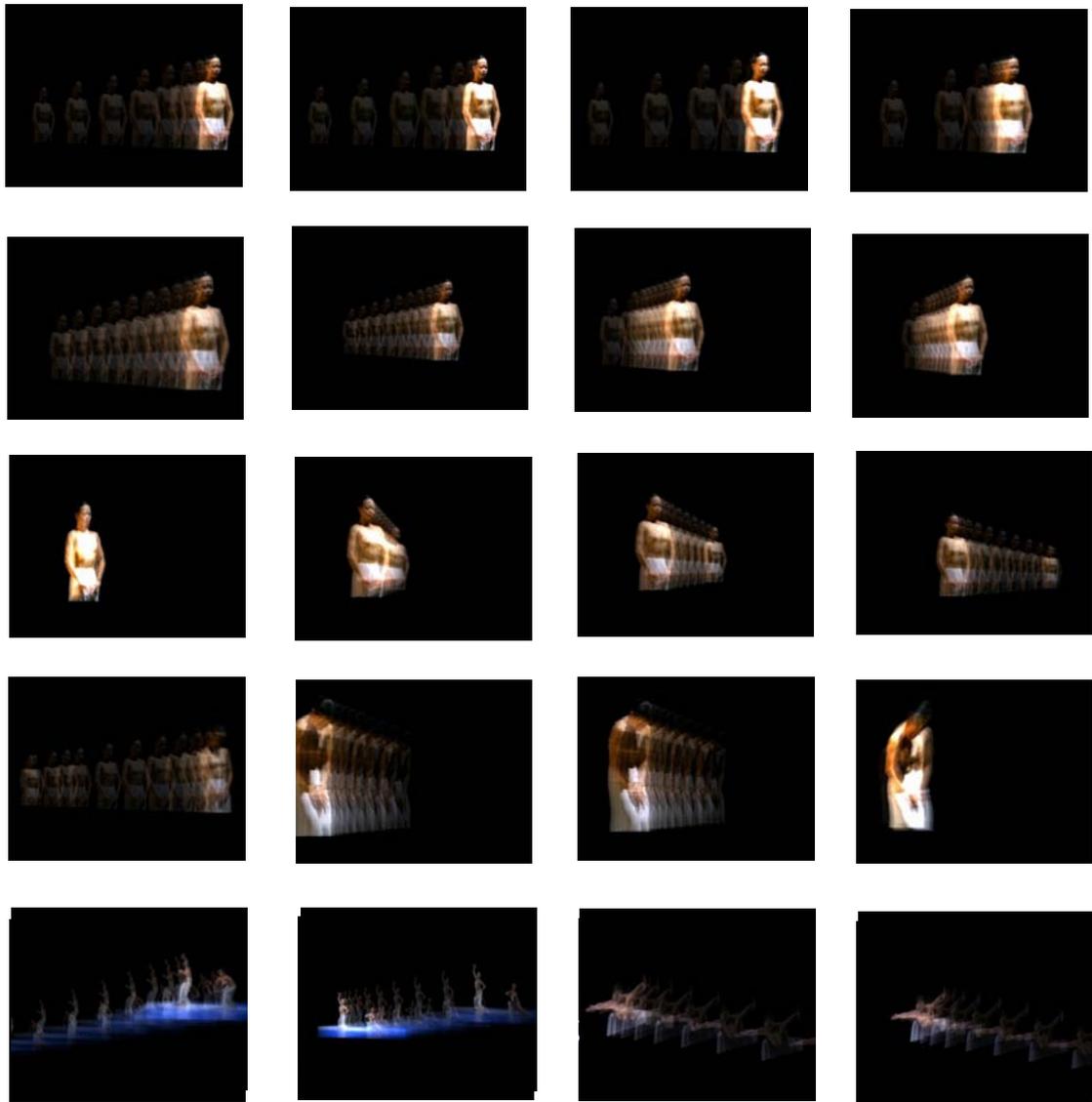


Fig5. Plane mapping waves image

4.3 Time visualization by other I's

This is finally what I want to show.

In this time I did not use the movie expressing my concept. This work would be not another version of my works but also same concept *Time Visualization*.





Fig 6. The specific threshold value

When spectators are moving in front of screen, the computer is depicting their figure consisting of pixel. Real-time video from a web camera has been processed with the specific threshold value that I intended to do. Also that is depending on lights and hardware specification. So lately, I have been looking for some another way to read images from a web camera and of course I focus on that visualize time in the space. The change of threshold value led to following results. (*Fig 6*)

There are the foreground and the background on the screen. The foreground was moving objects and the background was some objects not moving. Distinguished the foreground objects from the background, the images could be other I's.

5. Results

Computational silhouette drawing is not critical and unique skills but in my case I do not use “the drawing” concept to be usual tools of paintings from traditional artistic media. The computational system and spectators are producing the output of artwork by themselves. The idea of three artworks, which are a *three-dimensional representation of spatio-temporal video, the movement, Time visualization by other I's*, is based on the same idea time visualization and using the interaction between spectators and artworks in a real-time.

I have experimented with the idea by computational image processing. As a result I realized to consider several condition which are computer hardware system, environment of computer system outside and input parameters in algorithm. There is not only my intention to implement artworks but also the unpredicted change to be tested.



Fig 7. The low threshold value

6. Discussion

I am thinking everytime how I make invisible things visible. We could see objects for our eyes but there are so many things that we should read that in our cognition even though we could not see physically. First my trying was *Time*.

We want to live in our lives to have been the being among people. Also we want to be satisfied our lives, feel happy the present and memorize the past a certain way within the time. Maybe I seemed to talk about life. That is the broad theme which I can not easily figure it out until the end of my life.

However I also want to try to express and communicate people in my thought. This is actually attempt at implementation for low technologies.

I would like to mention that my artwork was oriented by three things.

- I did not view the programming that consisted of writing code as a new idea skill implementation.

- Given algorithm to be very popular.
- I was continuously trying to revise a few factors that visualized my concepts.
- I wanted to communicate some of the new ways to a direct interaction between me and others via my work.

Also, I am thinking of Albert Einstein's idea the meaning of the time-space and he figured it out by physics but I am trying to depict and visualize the meaning of time conceptually. I wish to visualize his idea which I totally agree with.

"I wished to how that space-time is not necessarily something to which one can ascribe a separate existence, independently of the actual objects of physical reality. Physical objects are no in space, but these objects are spatially extended"[1] Albert Einstein said.

7. Conclusion

Time Visualization by Other I's results from computational silhouette drawing by a spectator's motion.

In this work, I replaced the movie to real time spectators' motion. When they stood in front of a web camera, their image data by a web camera put into a computer and a computer executed its algorithm. Instead of movie, I used the figure of self-spectators.

They are actually the interface between a human and computer and also might gaze at the screen such as a mirror. When they move, they can see their figure on the screen. If they stop moving, they cannot see their figure.

I design that a computer executes their motion using camera motion detecting and image processing algorithms. The reason why I designed eliminating the movie and read spectators' motion figure in a real-time was that I want people to be able to feel and think the time using the sense of vision such that idea mentioned to Introduction.

8. Future Work

It is not easy to embody the picture in my mind in visualization. The thing of visualization can be possible to the perceptual experience of seeing. In other words, there are the agreement needed but the creation is not that.

However, I think that technologies can be reduced to ambiguousness of art, moreover it can be communicated The views of the arts could not be neatly summarized, but are expressed as understood experiences embodied by artists. Even though I am using technologies by computational process, I am still the shortage of embodiment that I carry out my idea to algorithm. In this work, I used OpenGL API in this work, but I would be developing my ideas by expanding tools that I use the open source such as OpenCV and openFrameworks which is an open source toolkit designed for "creative coding". OpenFrameworks is written in C++ and

runs on Windows, Mac OS X, and Linux. It is developed and maintained by Zachary Lieberman and Theo Watson.[2]

References

[1] Albert Einstein " Relativity: the special and the general theory",
Forgotten Books, us , 2010

[2] [http:// en.wikipedia.org/wiki/openFrameworks](http://en.wikipedia.org/wiki/openFrameworks)