Title: METHOD AND DEVICE FOR 4 DIMENSIONAL AUGMENTED REALITY APPLICATIONS

Abstract: The present invention relates to the methods and devices used to implement an Augmented Reality application in 4 dimensions with physically real impacts, for example in the forms of water spray, wind gusts and artificial snow exposed to the user's object. The user's object present is incorporated with Augmented Reality in a display frame to experience physical effects known as 4 dimensions. By applying a particular time specified in accordance with the scene, the real-time physical effects will be in accordance with the scene of interaction between the user's object and Augmented Reality animations.

Figure 1
Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

— with international search report (Art. 21(3))
Description

Method and device for 4 dimensional Augmented Reality Applications

Field of invention techniques

This invention relates to the methods and devices used to implement an Augmented Reality application in 4 dimensions with real physical impact such as water, wind and snow spray to the user.

Background of the invention

Augmented reality is a technology that combines two-dimensional or three-dimensional virtual objects into a real three-dimensional environment and projects the virtual objects in real time. Unlike virtual reality which completely replaces reality, Augmented Reality simply adds or complements reality.

Virtual objects display information that cannot be received by the user with their own senses. It makes Augmented Reality an appropriate tool to help the perception and interaction of its user with the real world. The information displayed by the virtual objects helps users carry out activities in the real world.

Augmented Reality can be applied to all senses, including hearing, touching, and smelling senses. Augmented Reality can be used in fields such as health, military, industrial manufacturing, and entertainment.
The Simple form of Augmented Reality has been used in the field of entertainment and news for quite a long time. An example is television weather reports where the reporter is shown standing in front of changing weather maps. In the studio, the reporter is actually standing in front of a blue or green screen. The original imaging is mixed with computer-generated maps using certain techniques.

Another development of Augmented Reality systems has enabled broadcasters to insert ads into specific areas of broadcast graphics. For example, when broadcasting a football game, this system can put an ad that can be seen on the outside wall of the stadium. Certain applications of mobile phones even have applied to Augmented Reality application for presenting programs that provide entertainment and enhance sale value.

Based on the description above, augmented reality only applies a real world incorporated with virtual world in a single frame in a display or in other words an Augmented Reality in 3 dimensions in video content allowing users to enjoy Augmented Reality by not only looking at and feeling the interaction events with other senses than the eyes.

The presence of 4-dimensional concept that combines physical or tangible elements into 3D, the incorporation of Augmented Reality into 4-dimensional concept will provide an interesting experience for the user, namely the user's object's interaction with Augmented Reality in 3-dimensional
concept accompanied by physical effects felt by senses other than eyes.

Through this invention, the inventor aims to present the incorporation of Augmented Reality based on time that will provide certain physical effects (in 4 dimensions) which will be perceived by the other senses of the user which is not only in the form of video content. In other words, the user, in addition to seeing (in vision), will also feel an experience of interaction with animated objects in the form of other physical effects simultaneously during the interaction.

Through this invention, the inventor will implement a method and device to enable Augmented Reality based on input from the user's object and provide output during the interaction in the form of physical effects such as water, wind or snow based on a real-time event resulting in a more complete interaction perceived by the user.

The invention will allow the maximizing of the incorporation so that the interaction between the user and animated objects (the objects provided using augmented reality technology) will occurs instantly so that users will enjoy the entertainment experience in the form of presence animation object in reality not only in the form of video content.

With this invention, it is expected that development of Augmented Reality application can further increase its usefulness when applied to specific areas that require "sense" other than seeing, will increase the quality of information.
delivered to the user. So that wider benefits will be achieved, not only information in the video content. For example in the fields of education, news, advertising, entertainment and even mining and military.

Brief description of the invention

This invention relates to the methods and devices used to implement an Augmented Reality application in 4 dimensions with real physical impacts such as water, wind and snow spray to the user's object.

Previously, the application of Augmented Reality is only presented in 3 dimensions (only video content), the inventor aims to create a method and device that can deliver Augmented Reality in 4 dimensions so that users can be the object and feel other physical experiences than only seeing video content.

In the present invention, the user's object comes along with Augmented Reality in the screen's frame and during the interaction scene namely between the user's object and animated objects which are present in the display, the user's object will feel the real presence of physical effects experienced during the scene, such as wind, poured with water or sprayed with snow based on interaction events.

In the present invention, the method defined to present physical effects (4 dimensions) on the user's object so long as the digital animation content takes place and interacts in
Augmented Reality in order to provide physical effects to the user.

In the present invention, the device required is integrated with Augmented Reality digital content, physical element equipment and the user's object presence sensor where the user's can also be optionally determined otherwise, in this regard depending on the will.

The user's real object (optionally), in this case man, will trigger the signal to Augmented Reality application to be active and at the same time triggers the signal to the 4D triggering machine for the to the physical element equipment. The 4D trigger machine tool will enable the real-time that has been preset in which the 4D engine has already been integrated in computer software to provide signals to each physical element tool to be active based on its duties.

The operating methods and application device of Augmented Reality equipment will be explained in more detail in the complete description of the invention.
BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows the flow chart of 4 dimensional augmented reality;

Figure 2 shows the diagram of the parts in an application device for applying 4 dimension Augmented Reality applications;

Figure 3 shows the diagram of result of the application of 4 dimension Augmented Reality applications;

Index in relation with Figure

1. Processing Unit
2. Camera
3. Screens display
4. Sensor
5. 4D trigger machine
6. Physical element tool

Detailed description of the invention

This invention relates to the method and device used to implement an Augmented Reality application in 4 dimensions with physically tangible impacts such as water, wind and snow spray to the user's object.

The inventor aims to create a method and device that can deliver Augmented Reality in 4 dimensions so that users can feel other experience than only seeing video content.
In the present invention, the methods that must be done before applying Augmented Reality applications in 4 dimensions are as follows:

1. Performing Processing Unit (1) active in advance by Augmented Reality software in the computer to set the animation scene, so that the planning of the desired input and output can be specified;

2. Performing the determination of the desired time parameter for providing physical effects in the animation scene, wherein the points of time desired based on animated scenes on the digital content is then used to provide signal to the 4D trigger machine (5) tool;

3. Determining the input sensors based on the needed animated scenes for the user's object that will be used as an input signal to enable the commencement of 4 dimension Augmented Reality application;

4. Determining the camera (2) and screen display (3) which will be used to display the input from the camera and bring Augmented Reality in the form of animated objects;

5. Determining the physical element tool (6) as the desired output based on the animation scene physical effect to be felt by animation;

6. Designing 4D trigger machine (5) to process the command signal from the computer to execute at least one or several physical element tools (6) based on the required inputs and outputs;
Assigning the physical element tools (6) needed by the augmented reality scene to provide physical effects, such as requirements, water spray, gusts of wind, and snow.

In the present invention, the devices used to implement Augmented Reality application in 4 dimensions are as follows:

- Processing unit (1), which is used to receive the input signal from sensors (2) and run Augmented Reality application and process the timing adjusted to the 3D animation;
- Camera (2), which is used to display the real conditions shown by area photographed;
- Screens display (3), which will be used for the display of the camera (2) and Augmented Reality application result;
- Sensor (4), which is used as the provider of input signal that Augmented Reality application has been start and input signal on the 4D trigger machine (5) tools;
- 4D trigger machine (5), as the processor for counting the time to be integrated into the physical element tool (6);
- Physical element tool (6), as the tool used to provide physical effects, such as water pump, fan, or artificial snow spray based on the desired Augmented Reality scene.

In the present invention, there are three components that are simultaneously interacting namely input sensor (4), processing unit (1) of Augmented Reality software in computer and 4D trigger machine (5).
Description of the working method of Augmented Reality applications in 4 dimensions is as stated in Figure 1, with the explanation as follows:

The camera (2) that has been activated will present the real situation based on the area photographed in real time and inside it the user's object will present in a single screen display (3) frame;

The User's objects present in the screen will activate the sensor (4), such as a sensor pad on which the user stands will generate signals simultaneously to the processing unit (1) of augmented reality applications and to 4D trigger machine (5);

Augmented Reality applications will show animated scenes in the screen display (4) and the 4D trigger machine (5) will perform appropriate timing so long as the animated figure is active;

So long as Augmented Reality occurs with interaction with the user's object, according to the timing of 4D trigger machine (5) will give a signal to execute the physical element tool (6);

The physical element tool (6) will respond and be active to produce physical output to the user's object.

By not limiting the invention, the need for animation can be expanded to meet the desired requirements, in the forms of other desired physical effects such as (other than water, wind or snow). As needed, the presence of the user's object can
optionally be dispensed with based on the desired Augmented Reality animation in the form of anything that can give input signal to start the application.
CLAIM

1. A method of 4-dimensional Augmented Reality application which comprise:

   Presenting the user's object in front of screen display (3) and record by camera (2),
   Activating the sensor (2) input by user's object,
   activating processing unit (1), to process input sinyal from sensor (4) and camera (2) by software applications of Augmented Reality,
   activating 4D trigger machine (5) and physical element tool (6) by output sinyal from processing unit (1).

2. A method as in claim 1, wherein record by camera (2) is intended to then show the real state in the screen display (3) frame to put the user's object.

3. A method as in claim 1, wherein activating processing unit (1) to process input by Augmented Reality software is intended to initiate the appearance of 3-dimensional animation which is then incorporated with the user's object in one frame screen display (3).

4. The 4D Augmented Reality application consists of:

   a. processing unit (1) devices such as computers, which are used to receive input signals from the
sensors (4) and camera (2) to activating Augmented Reality applications;
b. Camera (2), which is used to input by displaying the real condition based on the area photographed;
c. Screen display(3), which will be used for the display the result of processing unit(1);
d. Sensors (4), which are used as input signaling to processing unit(1) that said object is ready;
e. 4D trigger machine (5), as the processor of timing be integrated into the physical element tool (6);
f. Physical element tool (6), as a tool used to give the physical effects to the user's object.

5. The 4D Augmented Reality application in claim 4, wherein the physical element tools (6) such as water pump, fan, or artificial snow
Figure 1
Figure 2

- camera + the user's object
  - In Monitor Screen
  - Computer viewing augmented reality content (audio, video, text, picture, 2d/3d animation)
  - sensor active?
    - No
    - Yes
      - signal process
      - activating 4d trigger machine
      - activating the user's physical elements in the forms of air/water/snow
      - physical effect to the user's object
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06T19/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>TAEJIN HA ET AL: &quot;Usability Test of Immersion for Augmented Reality Based Product Design&quot;, 11 June 2007 (2007-06-11), TECHNOLOGIES FOR E-LEARNING AND DIGITAL ENTERTAINMENT; [LECTURE NOTES IN COMPUTER SCIENCE; LNCS], SPRINGER BERLIN HEIDELBERG, BERLIN, HEIDELBERG, PAGE(S) 152 - 161, XP019061654. ISBN: 978-3-540-73010-1, section 3; figure 1</td>
<td>1-5</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

Date of the actual completion of the international search

16 October 2014

Date of mailing of the international search report

28/10/2014

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