

SYSTEM AND METHOD FOR ASSOCIATING INTERACTIVE CONTENT TO  
THE FACES OF A POLYHEDRAL INTERFACE OBJECT

Technical Field

Efficient use of the display or screen real-estate in presenting information to the user continues to be a major design concern in the community. The rapidly increasing popularity of the World Wide Web (Web) has even increased the focus on the traditional design challenge.

A relatively new way to present visual content on a computer display is to use polyhedron or a multisided object, which is displayed on a computer screen, that can be rotated to reveal a sequence of adjacent sides. While multisided, rotating interfaces have several benefits, there are also challenges to make such objects useful for user interface design, development and interaction. One such challenge involves the way developers can actually put interactive content on the faces of a rotating objects.

### Background of Related Art

The traditional graphic user interface (GUI) employs a variety of controls, such as entry fields, drop-down lists, spin-buttons, tree structures and a variety of more free-form presentation formats. These controls in themselves use valuable display space and offer limited opportunities for conveying relationships between information. Because the GUI is inherently a two-dimensional presentation form, side-by-side positioning is the primary means for visually conveying relationships. Thus, today's user interface designers work under severe constraints due to these limitations. As a result of these shortcomings and the trend towards more natural appearances on the Web, such as those resembling magazine articles and TV advertising, the GUI approach is declining in popularity, especially on the Web and for network computing applications in general.

What is needed is a methodical approach that expands the amount of presentation space available for the user while providing improved means for conveying relationships among information, all in a compelling and engaging visual format that creates a satisfying user experience.

Three-dimensional geometric shapes are simulated on a two-dimensional display to provide multiple surfaces on which information can be presented to the user. As shown in Fig. 1, the three-dimensional effect can be achieved by using two-dimensional techniques. In addition, the user is allowed to manipulate the simulated three-

dimensional objects to see other surfaces. Animation is used to simulate rotation, thus reinforcing the three-dimensional effect. In Fig. 1, the user would be allowed to rotate the triangular Directory to see the other two surfaces, which would provide even more surfaces through the use of other geometric shapes, as demonstrated in Fig. 2. The advantages of this approach are: (1) it requires a minimal amount of precious visual space while providing access to a relatively large amount of information, (2) it provides a means for grouping logically related information in a single place making it easy for the user to access, and (3) it offers an intuitive interface by using familiar geometric shapes having an obvious number of faces and requiring an obvious action.

As noted above relative to the computer interfaces, display space is limited and visual content is generally arranged in either a scrolling window or across numerous separate screens. This is especially true for network computing environments, such as the Web, and browser content where hyperlinked Web pages are only loosely associated and distributed in cyberspace. A relatively new way to present visual content on a computer display is to use polyhedron or a multisided object which is displayed on a computer screen that can be rotated to reveal a sequence of adjacent sides. While multisided, rotating interfaces have several benefits, there are also challenges to make such objects useful for user interface

design, development and interaction. One such challenge involves the way developers can actually put interactive content on the faces of rotating objects. Typically, in order to associate visual content with the sides of a three-dimensional or polyhedral object, the visual content must be rendered as part of the underlying three-dimensional model. Such visual content then becomes a static image or texture that is mapped to the coordinates of the three-dimensional model. Therefore, it is very difficult to change the visual content associated with the surfaces of an object, or to associate interactive content with those surfaces.

Described herein is a system and method for associating interactive content to the faces of a multisided user interface object. This system is particularly well suited for solutions in network computing environments such as the Web. Additionally, the method and system of the present invention can also be applied to any graphical user interface environment.

#### Summary of the Present Invention

Described herein is a system and method for associating interactive content to the faces of a multisided user interface object. This system is particularly well suited for solutions in network computing environments such as the Web. Additionally, the method and system of the present invention can also be applied to any graphical user interface environment.

### Brief Description of the Drawings

The present invention will be better understood and its numerous objects and advantages will become more apparent to those skilled in the art by reference to the following drawings, in conjunction with the accompanying specification, in which:

Fig. 1, displays how the user would be allowed to rotate the triangular Directory to see the other two surfaces, which would provide even more surfaces through the use of other geometric shapes;

Fig. 2 demonstrates the advantages of this approach which are: (1), it requires a minimal amount of precious visual space while providing access to a relatively large amount of information, (2) it provides a means for grouping logically related information in a single place making it easy for the user to access, and (3) it offers an intuitive interface by using familiar geometric shapes having an obvious number of faces and requiring and obvious action;

Fig. 3 demonstrates the indexed sides of a polyhedron 300-304 (some of these are hidden from view). The dotted lines show the corresponding interactive visual content of all of the sides, as shown as 300A to 304A, including those sides that are hidden from view;

Fig. 4 demonstrates that as the polyhedron is rotated, adjacent sides are displayed and corresponding elements are superimposed;

Fig. 5 is another example of the interactive system where card information can be seen as alternate sides of a polyhedron;

Fig. 6 represents the series of steps that describe the operation of the present invention; and

Fig. 7 is a detailed flowchart representing the operation of the present invention.

#### Detailed Description of the Preferred Embodiment

The system, as shown in Fig. 7, of the present invention includes a pre-rendered graphical polyhedron, combined with programmed properties and behavior, at 701, as described in the copending application. The properties, at 702, include a variable number of surfaces, each of which is indexed as an addressable position for the rotation of the polyhedron. The behavior, at 703, supports many visual representations, including the rotation of the polyhedron around a central axis, at 704, by which adjacent sides or surfaces are sequentially displayed at 705.

The method for associating interactive content with the surfaces of the object involves creating an array of elements which are indexed in correspondence to the indexed surfaces. The array of elements can include interactive controls, or Web objects such as HTML layers (HTML layers can, themselves, contain other controls, as well).

At this point, it would be appropriate to define the terms that will be employed in the description of the present invention, specifically "HTML".

"HTML" is an acronym for Hypertext Markup Language used for documents on the Web. HTML is an application of Standard Generalized Markup Language (SGML) that uses tags to mark elements, such as text and graphics, in a document to indicate how Web browsers should display these elements to the user and should respond to user actions, such as activation of a link by means of a key press or mouse click. HTML 2.0, defined by the Internet Engineering Task Force, includes features of HTML common to all Web browsers as of 1995, and was the first version of HTML widely used on the Web. Future HTML development will be carried out by the Web consortium (W3C) HTML 3.2, the largest proposed standard, incorporates features widely implemented as of 1996. Most Web browsers, notably Netscape Navigator and Internet Explorer, recognize HTML tags beyond those included in the present standard.

Returning to the current invention, the instant system keeps track of which surface is currently displayed and renders the corresponding element, superimposed over the visual surface. The positioning of the superimposed layer, or element, may be set by default, or specified by the designer, and the precise coordinates are read into the system at start-up. As the polyhedron is rotated, the system displays the adjacent

surfaces with the corresponding elements superimposed according to the indexed positions.

This invention has solved the previously outlined problems as follows. It allows for interactive visual content to be associated with the sides or surfaces of a rotating three-dimensional object separate from the modeling of the object, and without the use of three-dimensional modeling tools. The interactive visual content can be easily designed, developed and modified.

Additionally, it is particularly useful for Web content, because such content is very visual, interactive, modified frequently and there is a need to provide a lot of related information in a compact and effective manner.

Fig. 6 demonstrates the logic path employed in the use of the current invention. The path starts at Fig. 6, 601. The Base State is displayed at 602 and then to 603 where the Face state is equal to 0 and then on to 604 where the face content is displayed. Then onto 604A from which the process moves to position 605 where the user clicks on a hotspot (areas responsive to point events).

The user next clicks on the hotspot at 605 and then the user is queried as to which hotspot, 606. At position 606 the user decides in which direction he wants the transition images to go. Assuming it is to the left, the process moves to 607 where N is equal to the number of frames in the transanimation and I is equal to the number of variations. The process then calls for the

display transition image I at 608. Then 609 shows an increase to 2 and then to 610, where the query is raised as to whether I is greater than the number of frames in the transanimation.

If the answer to 610 query is no, then the process shows that it is still in the middle of transition and it returns to 608. If the answer to 610 is yes, then the process moves to 611 where the Base State is Displayed and the process then moves to 612 where the number of faces are the number of faces plus 1 and then on to 613 where the query is raised to the number of Faces less than 1. If the answer is no, then the process calls for display of the face content. If the answer to 613 is yes, then we move to 614 where the number of Faces equal the number of faces. The process goes to 615 display face content and then back to 604A to wait until used again, by clicking on another hotspot. If there is no other hotspot 606, the process moves to 627 where the query is raised as to whether this is the end. If the answer is yes, the process ends at 626. If the answer is no, then the process moves to 616 which indicates that the process input is obtained as usual and the process then again moves to 604A to wait until used again, by clicking on another hotspot.

Returning to query at 606, if the user chose to move to the right hotspot direction, 617 where I is equal to N to 1 where I is the number of variations. The process then moves to 618 which calls for Displaying transition

image I, and then on to 619 where I is I minus 1. The query is then raised in 620 as to whether I is less than 1. If the answer is no, then the process returns to 618 which again calls for Display transition image I. If the answer to 620 is yes, then the system calls for displaying the base state and the process then moves to 622 where the number of Faces are the number of Faces plus 1 and then on to 623 where the query is raised to the number of Faces less than 0. If the answer is no, then the process calls for display of the face content. If the answer to 623 is yes, then we move to 624 where the number of Faces equal the number of faces. The process goes to 625 display face content and then back to 604A to wait until used again, by clicking on another hotspot.

As note above, Fig. 3 demonstrates the indexed sides of a polyhedron at 300-304 (303 and 304 are hidden from view). The dotted lines show the corresponding interactive visual content of all of the sides as shown in 300A to 304A, including those sides, 303 and 304, that are hidden from view. Seen on the left hand side of this Fig. 3 is the representation of the polyhedral, each of the five sides, A through E, exhibits, for example, weather information for a different city in the United States. Side A at 300 is for New York City, Side B is for Chicago, Side C at 302 is for Los Angeles, Side D at 303 (hidden from view) is for Baltimore. Side E 304 (hidden from view) is for Austin, Texas. The content of

these five interactive sides (i.e. representing, for example, the weather in five different cities) is clearly shown via a dotted line to the corresponding 300A, 301A, 302A, 303A and 304A, on the left hand side of Figure 3.

In Fig. 4 we demonstrate the effect of the rotation of the polyhedron. We observe that adjacent sides are displayed and corresponding elements are superimposed. Fig. 4 at 401 reveals one side and 402 reveals the other side. In the A position for example, the information on, for example, Chicago, is seen on top at 403. Upon rotation, the Chicago information is then on side 403B.

Represented in Fig. 5 is yet another example of the interactive system where business card information can be seen as alternate sides of a polyhedron and available on an interactive basis.

While the invention has been shown and described with reference to particular embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and detail may be made therein without departing from the spirit and scope of the invention.



Claims

1. A computer based system for associating interactive content to the faces of a polyhedral interface object comprising:

means for interactive visual content to be associated with or placed on, the sides or faces of rotating three-dimensional objects;

means for placing said visual content on, said sides or faces of said rotating three-dimensional object, which is separate from the modeling of said object;

means for eliminating the use of a three-dimensional modeling tool when placing said visual content on, said sides or faces of said rotating three-dimensional object.

2. The system of claim 1 wherein said system can be employed for World Wide Web.

3. The system of claim 1 wherein said system can be applied to any graphical user interface environment.

4. The system of claim 1, wherein the content is visual and interactive, can be modified as often as desired, where a need exists to provide related information.

5. The system of claim 1 wherein the polyhedral can have preferably between 3 to 12 surfaces.



6. The system of claim 5 wherein the polyhedral have an infinite number of surfaces from three or more.

7. A computer based method for associating interactive content to the faces of a polyhedral interface object comprising the steps of:

associating or placing said interactive visual content on, the sides or faces of rotating three-dimensional objects;

placing said visual content on, said sides or faces of said rotating three-dimensional object, which is separate from the modeling of said object;

eliminating the use of a three-dimensional modeling tool when placing said visual content on, said sides or faces of said rotating three-dimensional object.

8. The method of claim 7 wherein said system can be employed for the World Wide Web.

9. The method of claim 7 wherein said system can be applied to any graphical user interface environment.

10. The method of claim 7, wherein the content is visual and interactive, can be modified as often as desired, where a need exists to provide related information.



11. The method of claim 7 wherein the polyhedral can have preferably between 3 to 12 surfaces.
12. The method of claim 11 wherein the polyhedral have an infinite number of surfaces from three or more.
13. A computer readable program having data structures included on a computer readable medium which causes the display on a data processor controlled display of a system for associating interactive content to the faces of a polyhedral, comprising:
  - means for interactive visual content to be associated with or placed on, the sides or faces of rotating three-dimensional objects;
  - means for placing said visual content on, said sides or faces of said rotating three-dimensional objects, which is separate from the modeling of said object;
  - means for eliminating the use of a three-dimensional modeling tool when placing said visual content on, said sides or faces of said rotating three-dimensional object.
14. The computer program of claim 13 wherein said system can be employed for World Wide Web.
15. The computer program of claim 13 wherein said system can be applied to any graphical user interface environment.



16. The computer program of claim 13 wherein the content is visual and interactive, can be modified as often as desired, where a need exists to provide related information.

17. The computer program of claim 13 wherein the polyhedral can have preferably between 3 to 12 surfaces.

18. The computer program of claim 13 wherein the polyhedral have an infinite number of surfaces from three or more.

19. A computer based system for associating interactive content to the faces of a polyhedral interface object comprising:

mechanism for interactive visual content to be associated with or placed on, the sides or faces of rotating three-dimensional object;

mechanism for placing said visual content on, said sides or faces of said rotating three-dimensional object, which is separate from the modeling of said object;

mechanism for eliminating the use of a three-dimensional modeling tool when placing said visual content on, said sides or faces of said rotating three dimensional object.