METHOD AND SYSTEM FOR THREE-DIMENSIONAL TOPOGRAPHICAL MODELING

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates in general to interface devices, and in particular to an improved three-dimensional topographical model for a data processing system. Still more particularly, the present invention relates to a method and system for providing a tactile-detectable graphical representation and a visual graphical representation of a graphical output.

2. Description of the Related Art

Data processing systems typically rely on at least one if not multiple independent peripheral devices in order to receive inputs and/or transmit outputs to provide human-computer interactions. In general, data processing systems rely on a pointing device and a data entry device for receiving inputs and a display device for outputting data in a visual manner.

Presently, typical display devices include, for example, a display monitor, an overhead projection monitor, or other alternate device by which data may be displayed in a visual manner from a data processing system. These display devices may be utilized to convey a wide range of information, however are typically limited to two-dimensional display. While graphical achievements have been made in order to display a virtually three-dimensional object, the three-dimensional world is still limited to two-dimensional visual representation with typical display devices.

Another area of development in interface devices is in providing tactile-detectable surfaces that convey information to a user. Hyper-braille readers are an example of such an interface device, allowing seeing-impaired users to detect braille letters from a tactile-detectable surface. In U.S. Pat. No. 5,736,978, a tactile graphics display for braille reading is provided. The tactile graphics display combines a Braille character-like display and a planar absolute position sensor. While hyper-braille readers provide a needed interface for entering and reading braille letters, they are limited to the area.

A device that attempts to merge a display device with a tactile-detectable surface is proposed as a three-dimensional display in U.S. Pat. No. 5,717,423. FIG. **10** of the present application depicts a prior art illustration of a three-dimensional display that provides a device for displaying objects both visually and three-dimensionally. Multiple types of display shapes, such as a display shape **210** are controlled by actuators to provide a block-like three-dimensional representation of a display. Visual display devices are included on the display shapes to provide a visual three-dimensional representation of a display. A sensing system detects when a user touches a display shape and responds accordingly. However, the sensing system does not provide for detecting the magnitude of force from user input and responding with force feedback. In addition, three-dimensional modeling of physical characteristics of graphical objects and scanning of three-dimensional objects is not provided in the prior art.

Developed in parallel with display devices, typical data entry devices include, for example, a keyboard, a keypad, or other alternate device through which data in the form of control indicia or other symbol may be input. Data entry devices, such as the keyboard are limited in that they receive input in relation to fixed control indicia.

Developed to supplement data entry devices are scanner devices. Scanners provide an optical input device that utilizes light-sensing equipment to capture an image on paper or some other subject. The image is then translated into a digital signal that can then be manipulated by optical character recognition software or graphics software. Most scanners are limited in that only a two-dimensional image is captured. Advances in laser technology have led to scanners that can detect a three-dimensional image, however, these three-dimensional scanners do not detect physical characteristics such as temperature, texture and resiliency.

In view of the foregoing, it would be preferable to provide for three-dimensional topographical modeling of data. In providing three-dimensional topographical modeling, it would be preferable to model physical characteristics of graphical objects such as temperature, texture and resiliency. Moreover, it would be preferable to model three-dimensional objects in true form. In addition, it would be preferable to provide a technique for scanning three-dimensional objects. In addition, it would be preferable to scale both input and output. The three-dimensional topographical modeling is preferably rendered by a topographical interface device that provides three-dimensional tactile-detectable display and visual display.

SUMMARY OF THE INVENTION

In view of the foregoing, it is therefore one object of the present invention to provide an improved interface device.

It is another object of the present invention to provide a method and system for three-dimensional topographical modeling of a graphical image.

It is yet another object of the present invention to provide a method and system for modeling a graphical image with associated physical characteristics and adjusting the model when external force is applied thereto.

In accordance with a preferred embodiment of the method and system of the present invention, a control surface that is adjustable provides a tactile-detectable graphical representation of a three-dimensional graphical image and associated physical characteristics. A sensitivity element detects the magnitude and direction of external force applied to the control surface. A controller then adjusts the tactile-detectable graphical representation to model the associated physical characteristics of the three-dimensional graphical image when external force is applied to the control surface.

Objects, features, and advantages of the present invention will become apparent in the following detailed written description.

DESCRIPTION OF THE DRAWINGS

The invention itself, as well as a preferred mode of use, further objects, and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIG. **1** depicts a block diagram of a typical computer system that may utilize a preferred embodiment of the present invention;

FIGS. **2***a*–**2***b* illustrates a pictorial diagram of a topographical modeling system in accordance with a preferred embodiment of the method and system of the present invention;