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Rhoads

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(54) **LINKING OF COMPUTERS BASED ON OPTICAL SENSING OF DIGITAL DATA**

(75) Inventor: **Geoffrey B. Rhoads**, West Linn, OR (US)

(73) Assignee: **Digimarc Corporation**, Tualatin, OR (US)

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(51) Int. Cl.^{7} **G06F 13/00**

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(58) **Field of Search** 709/217, 219, 709/227, 230, 250, 313, 328, 329; 380/4, 9, 49

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Primary Examiner—Viet D. Vu

(74) *Attorney, Agent, or Firm*—William Y. Conwell; Digimarc Corporation

(57)   **ABSTRACT**

A printed object, such as an item of postal mail, a book, printed advertising, a business card, product packaging, etc., is steganographically encoded with plural-bit data. When such an object is presented to an optical sensor, the plural-bit data is decoded and used to establish a link to an internet address corresponding to that object.

23 Claims, 2 Drawing Sheets
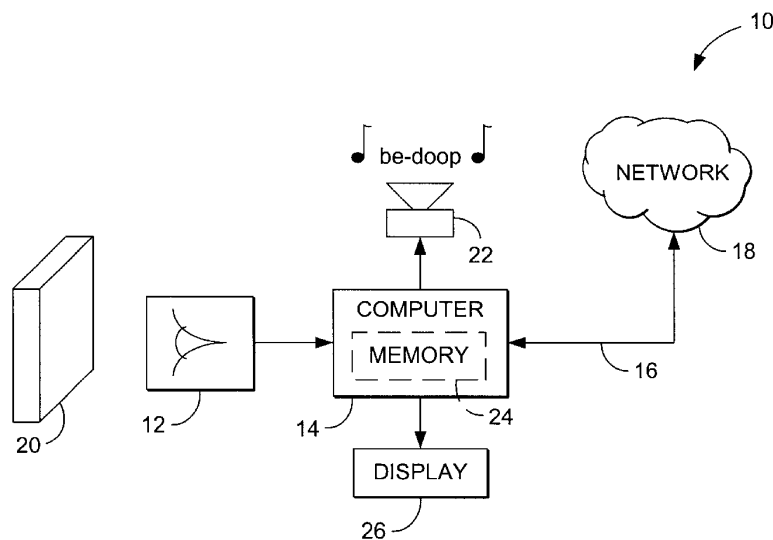
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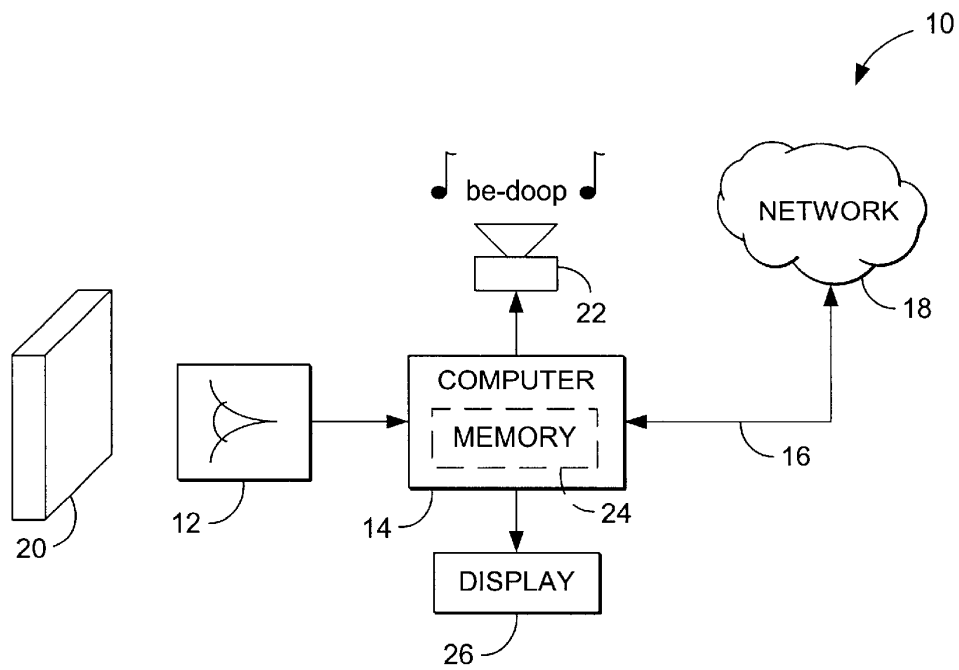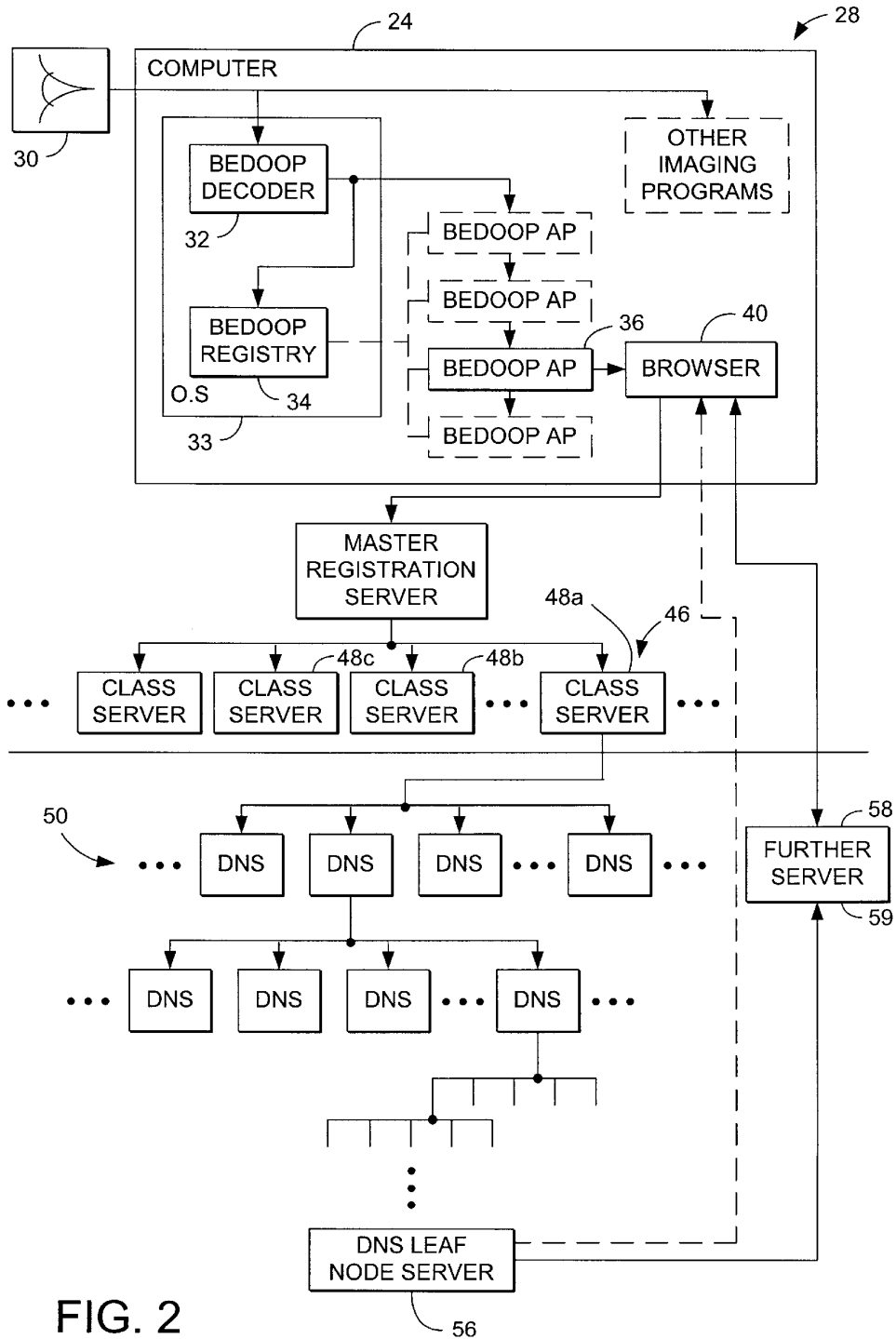
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FIG. 1

FIG. 2

LINKING OF COMPUTERS BASED ON OPTICAL SENSING OF DIGITAL DATA

RELATED APPLICATION DATA

This application is a continuation-in-part of copending application Ser. No. 09/130,624, filed Aug. 6, 1998, which is a continuation of application Ser. No. 08/508,083 filed on Jul. 27, 1995, (now U.S. Pat. No. 5,841,978). This application is also a continuation-in part of copending application Ser. No. 09/314,648, filed May 19, 1999 (attached as Appendix A). This application is also a continuation-in-part of copending provisional application 60/134,782, also filed May 19, 1999 (attached as Appendix B). This application is also a continuation-in-part of copending application Ser. No. 09/292,569, filed Apr. 15, 1999, which claims priority to application Ser. No. 60/082,228, filed Apr. 16, 1998.

FIELD OF THE INVENTION

The present invention relates optical user interfaces that sense digitally-encoded objects. The invention further relates to systems using such optical interfaces to control computers, and to navigate over or act as portals on networks.

BACKGROUND AND SUMMARY OF THE INVENTION

"Bedoop." That might be the sound that someone might hear as they lazily place a magazine advertisement in front of their desktop camera. Magically, the marketing and sales web site associated with the ad is displayed on their computer. More information? Want to buy now? Look at the full product line? No problem.

"Bedoop." That might be the same sound when that same someone places their credit card in front of their desktop camera. Instantly, the product displayed on the web page is purchased. Behind the scenes, a secure purchase link is initiated, transmitting all requisite information to the vendor. Twist the credit card clockwise and the purchaser chooses overnight delivery.

So goes an exemplary embodiment of the invention further described in this application. Though this example is rather specific, it nevertheless alludes to an indescribably vast array of applications possible when a digital camera or other optical sensing device is turned into a general purpose user interface device with an intuitive power that very well might rival the mouse and the keyboard.

The centerpiece of the invention is that an object or paper product so-scanned contains digital information that can be quickly read and acted upon by an appropriately configured device, computer or appliance. The preferred embodiment envisions that this digital information is aesthetically hidden on objects. These objects have been previously and pro-actively marked with the digital information, using any of the broad ranges of printing and processing techniques which are available on the market and which are widely described in the open literature and patent literature surrounding digital watermarking.

Be this as it may, though the invention concentrates on flat object applications wherein the digital information is often imperceptibly integrated into the object, it is certainly not meant to be so limited. Objects can be three dimensional in nature and the information more visually overt and/or pre-existing (i.e., not "pro-actively" embedded, or not even be "digital," per se). Different implementation considerations attach to these variants. Likewise, though the bulk of this

disclosure concentrates on objects which have some form of digital message attached thereto, some aspects of the invention may apply to objects which have no such thing, where the prior arts of pattern recognition and gestural input can be borrowed in combination with this invention to effect yet a broader array of applications.

"Bedoop." The sound that a refrigerator might make, outfitted with a simple camera/processor unit/net connection, as the ten year old holds up the empty milk carton and a ping goes out to the local grocery store, adding the item to an accumulating delivery list. The sound that might be heard echoing over and over inside Internet cafes as heretofore computerphobes take their first skeptical steps onto the world wide web. The sound heard at the fast food counter as the repeat customer holds up their sandwich card ticking off their latest meal, hoping for the sirens to go off for a $500 prize given to the lucky customer of the week. Blue sky scenarios abound.

This invention is therefore about powerful new user interfaces to computers involving optical input. These new user interfaces extend into the everyday world in ways that a mouse and keyboard never could. By enabling everyday objects to communicate their identities and functions to ever-attendant devices, not only will the world wide web be given an entirely new dimension, but basic home and office computing may be in store for some fundamental advances as well.

These and a great many other features of the present invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing one embodiment of the present invention.

FIG. 2 is another block diagram showing an embodiment of the present invention.

DETAILED DESCRIPTION

Basically, the technology detailed in this disclosure may be regarded as enhanced systems by which users can interact with computer-based devices. Their simple nature, and adaptability for use with everyday objects (e.g., milk cartons), makes the disclosed technology well suited for countless applications.

Due to the great range and variety of subject matter detailed in this disclosure, an orderly presentation is difficult to achieve. As will be evident, many of the topical sections presented below are both founded on, and foundational to, other sections. For want of a better rationale, the sections are presented below in a more or less random order. It should be recognized that both the general principles and the particular details from each section find application in other sections as well. To prevent the length of this disclosure from ballooning out of control, the various permutations and combinations of the features of the different sections are not exhaustively detailed. The inventors intend to explicitly teach such combinations/permutations, but practicality requires that the detailed synthesis be left to those who ultimately implement systems in accordance with such teachings.

Basic Principles—Refrigerators and Clutter

Referring to FIG. 1, a basic embodiment 10 of the present invention includes an optical sensor 12, a computer 14, and a network connection 16 to the internet 18. The illustrated optical sensor 12 is a digital camera having a resolution of

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