

PRINTER MODULE FOR PRODUCING CATEGORY BUTTONS ON INTERACTIVE PAPER

FIELD OF INVENTION

The present invention relates to generally to systems, apparatus, devices and methods for interacting with computers and in particular to a system and method for providing to a user printed information.

The invention has been developed primarily to allow a large number of distributed users to interact with networked information via printed matter and optical sensors, thereby to obtain interactive printed matter on demand via high-speed networked color printers. Although the invention will largely be described herein with reference to this use, it will be appreciated that the invention is not limited to use in this field.

CO-PENDING APPLICATIONS

Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention simultaneously with the present invention:

PCT/AU00/01273, PCT/AU00/01279, PCT/AU00/01288, PCT/AU00/01282,
PCT/AU00/01276, PCT/AU00/01280, PCT/AU00/01274, PCT/AU00/01289,
PCT/AU00/01275, PCT/AU00/01277, PCT/AU00/01286, PCT/AU00/01281,
PCT/AU00/01278, PCT/AU00/01287, PCT/AU00/01285, PCT/AU00/01284 and
PCT/AU00/01283.

The disclosures of these co-pending applications are incorporated herein by cross-reference.

Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention on 15 September 2000: PCT/AU00/01108, PCT/AU00/01110 and PCT/AU00/01111. The disclosures of these co-pending applications are incorporated herein by cross-reference.

Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention on 30 June 2000: PCT/AU00/00762, PCT/AU00/00763, PCT/AU00/00761, PCT/AU00/00760, PCT/AU00/00759, PCT/AU00/00758, PCT/AU00/00764, PCT/AU00/00765, PCT/AU00/00766, PCT/AU00/00767, PCT/AU00/00768, PCT/AU00/00773, PCT/AU00/00774, PCT/AU00/00775, PCT/AU00/00776, PCT/AU00/00777, PCT/AU00/00770, PCT/AU00/00769, PCT/AU00/00771, PCT/AU00/00772, PCT/AU00/00754, PCT/AU00/00755, PCT/AU00/00756 and PCT/AU00/00757. The disclosures of these co-pending applications are incorporated herein by cross-reference.

Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention on 24 May 2000: PCT/AU00/00518, PCT/AU00/00519, PCT/AU00/00520, PCT/AU00/00521, PCT/AU00/00522, PCT/AU00/00523, PCT/AU00/00524, PCT/AU00/00525, PCT/AU00/00526, PCT/AU00/00527, PCT/AU00/00528, PCT/AU00/00529, PCT/AU00/00530, PCT/AU00/00531, PCT/AU00/00532, PCT/AU00/00533, PCT/AU00/00534, PCT/AU00/00535, PCT/AU00/00536, PCT/AU00/00537, PCT/AU00/00538, PCT/AU00/00539, PCT/AU00/00540, PCT/AU00/00541, PCT/AU00/00542, PCT/AU00/00543, PCT/AU00/00544, PCT/AU00/00545, PCT/AU00/00547, PCT/AU00/00546, PCT/AU00/00554, PCT/AU00/00556, PCT/AU00/00557, PCT/AU00/00558, PCT/AU00/00559, PCT/AU00/00560, PCT/AU00/00561, PCT/AU00/00562, PCT/AU00/00563, PCT/AU00/00564, PCT/AU00/00565, PCT/AU00/00566, PCT/AU00/00567, PCT/AU00/00568, PCT/AU00/00569, PCT/AU00/00570, PCT/AU00/00571, PCT/AU00/00572, PCT/AU00/00573, PCT/AU00/00574, PCT/AU00/00575, PCT/AU00/00576, PCT/AU00/00577, PCT/AU00/00578, PCT/AU00/00579, PCT/AU00/00581, PCT/AU00/00580, PCT/AU00/00582, PCT/AU00/00587, PCT/AU00/00588, PCT/AU00/00589, PCT/AU00/00583, PCT/AU00/00593, PCT/AU00/00590, PCT/AU00/00591, PCT/AU00/00592, PCT/AU00/00594, PCT/AU00/00595, PCT/AU00/00596, PCT/AU00/00597, PCT/AU00/00598, PCT/AU00/00516, PCT/AU00/00517 and PCT/AU00/00511.

The disclosures of these co-pending applications are incorporated herein by cross-reference.

BACKGROUND

Paper is widely used to display and record information. Printed information is easier to read than information displayed on a computer screen. Hand-drawing and handwriting afford greater richness of expression than input via a computer keyboard and mouse. Moreover, paper doesn't run on batteries, can be read in bright light, more robustly accepts coffee spills, and is portable and disposable.

Online publication has many advantages over traditional paper-based publication. From a consumer's point of view, information is available on demand, information can be navigated via hypertext links, searched and automatically personalized.

From the publisher's point of view, the costs of printing and physical distribution are eliminated, and the publication becomes more attractive to the advertisers who pay for it because it can be targeted to specific demographics and linked to product sites.

Online publication also has disadvantages. Computer screens are inferior to paper. At the same quality as a magazine page, an SVGA computer screen displays only about a fifth as much information. Both CRTs and LCDs have brightness and contrast problems, particularly when ambient light is strong, while ink on paper, being reflective rather than emissive, is both bright and sharp in ambient light.

SUMMARY OF INVENTION

It is an object of the present invention, at least in the preferred embodiments, to overcome or substantially ameliorate one or more of these disadvantages of the prior art, or at least to provide a useful alternative.

According to a first aspect of the invention there is provided a system for providing printed information to a user that is obtained from a data base of a first party, the system including:

a user printer module for interfacing the user with the data base, the module being responsive to the user requesting first information from the data base for obtaining the first information and generating a first printed media that displays to the user the first information together with second information;

identifier means for applying an identifier to the first printed media such that designation of the second information by the user corresponds to a designation of the identifier and results in the generation of a second printed media that displays to the user third information; and

account means for applying a financial debit from the first party against a second party from whom the third information is derived.

Preferably, the debit is a predetermined periodic fee.

Preferably also, the system includes calculation means that are responsive to the module for the determining the quantum of the debit. More preferably, the calculation means is responsive to the number of times the second information is designated by the user. Even more preferably, the module is provided to the user by a third party and the calculation means determines a debit that is applied by the third party against one or both of the first party and the second party.

In a preferred form, the first party is an on-line publisher and the first data base contains the on-line publication. More preferably, the first information is the content of the on-line publication and the second information is a textual or graphical device of a generic category button. Even more preferably, the second party is an advertiser and the third information is specific marketing information of the advertiser.

Preferably, the advertiser is a merchant of goods and/or services which are offered for sale on-line. More preferably, the calculation means is responsive the user purchasing one or more of those goods and/or services for determining the financial debit applied by the first party against the second party.

In a preferred form, the second information includes a plurality of generic category buttons which are associated with a corresponding plurality of respective second parties.

According to a second aspect of the invention there is provided a system for providing printed information to a user that is obtained from a data base of a first party, the system including:

a user printer module for interfacing the user with the data base, the module being responsive to the user requesting first information from the data base for obtaining the first information and generating a first printed media that displays to the user the first information together with second information;

an applicator for applying an identifier to the first printed media such that designation of the second information by the user corresponds to a designation of the identifier and results in the generation of a second printed media that displays to the user third information; and

an account server for applying a financial debit from the first party against a second party from whom the third information is derived.

According to another aspect of the invention there is provided a method for providing printed information to a user that is obtained from a data base of a first party, the method including the steps of:

interfacing the user with the data base via a user printer module, the module being responsive to the user requesting first information from the data base for obtaining the first information and generating a first printed media that displays to the user the first information together with second information;

applying an identifier to the first printed media such that designation of the second information by the user corresponds to a designation of the identifier and results in the generation of a second printed media that displays to the user third information; and

applying a financial debit from the first party against a second party from whom the third information is derived.

BRIEF DESCRIPTION OF DRAWINGS

Preferred and other embodiments of the invention will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic of a the relationship between a sample printed netpage and its online page description;

Figure 2 is a schematic view of a interaction between a netpage pen, a netpage printer, a netpage page server, and a netpage application server;

Figure 3 is a schematic view of a high-level structure of a printed netpage and its online page description;

Figure 4a is a plan view showing a structure of a netpage tag;

Figure 4b is a plan view showing a relationship between a set of the tags shown in Figure 4a and a field of view of a netpage sensing device in the form of a netpage pen;

Figure 5a is a plan view showing an alternative structure of a netpage tag;

Figure 5b is a plan view showing a relationship between a set of the tags shown in Figure 5a and a field of view of a netpage sensing device in the form of a netpage pen;

Figure 5c is a plan view showing an arrangement of nine of the tags shown in Figure 5a where targets are shared between adjacent tags;

Figure 5d is a plan view showing the interleaving and rotation of the symbols of the four codewords of the tag shown in Figure 5a;

Figure 6 is a schematic view of an advertising fee payment protocol;

Figure 7 is a schematic view of a click-through fee payment protocol;

Figure 8 is a schematic view of a sales commission payment protocol;

Figure 9 is a schematic view of an advertising fee commission payment protocol;

Figure 10 is a schematic view of a click-through fee commission payment protocol; and

Figure 11 is a schematic view of a sales commission commission payment protocol.

DETAILED DESCRIPTION OF PREFERRED AND OTHER EMBODIMENTS

Note: Memjet™ is a trademark of Silverbrook Research Pty Ltd, Australia.

In the preferred embodiment, the invention is configured to work with the netpage networked computer system, a summary of which is given below and a detailed description of which is given in our earlier applications, including in particular applications PCT/AU00/00569 (docket no. NPT002), PCT/AU00/00565 (docket no. NPS001), PCT/AU00/00561 (docket no. NPP003), PCT/AU00/00519 (docket no. NPA002) and PCT/AU00/00578 (docket no. IJ52). It will be appreciated that not every implementation will necessarily embody all or even most of the specific details and extensions described in these applications in relation to the basic system. However, the system is described in its most complete form to assist in understanding the context in which the preferred embodiments and aspects of the present invention operate.

In brief summary, the preferred form of the netpage system employs a computer interface in the form of a mapped surface, that is, a physical surface which contains references to a map of the surface maintained in a computer system. The map references can be queried by an appropriate sensing device. Depending upon the specific implementation, the map references may be encoded visibly or invisibly, and defined in such a way that a local query on the mapped surface yields an unambiguous map reference

both within the map and among different maps. The computer system can contain information about features on the mapped surface, and such information can be retrieved based on map references supplied by a sensing device used with the mapped surface. The information thus retrieved can take the form of actions which are initiated by the computer system on behalf of the operator in response to the operator's interaction with the surface features.

In its preferred form, the netpage system relies on the production of, and human interaction with, netpages. These are pages of text, graphics and images printed on ordinary paper or other media, but which work like interactive web pages. Information is encoded on each page using ink which is substantially invisible to the unaided human eye. The ink, however, and thereby the coded data, can be sensed by an optically imaging pen and transmitted to the netpage system.

In the preferred form, active buttons and hyperlinks on each page can be clicked with the pen to request information from the network or to signal preferences to a network server. In one embodiment, text written by hand on a netpage is automatically recognized and converted to computer text in the netpage system, allowing forms to be filled in. In other embodiments, signatures recorded on a netpage are automatically verified, allowing e-commerce transactions to be securely authorized.

As illustrated in Figure 1, a printed netpage 1 can represent a interactive form which can be filled in by the user both physically, on the printed page, and "electronically", via communication between the pen and the netpage system. The example shows a "Request" form containing name and address fields and a submit button. The netpage consists of graphic data 2 printed using visible ink, and coded data 3 printed as a collection of tags 4 using invisible ink. The corresponding page description 5, stored on the netpage network, describes the individual elements of the netpage. In particular it describes the type and spatial extent (zone) of each interactive element (i.e. text field or button in the example), to allow the netpage system to correctly interpret input via the netpage. The submit button 6, for example, has a zone 7 which corresponds to the spatial extent of the corresponding graphic 8.

As illustrated in Figure 2, the netpage pen 101, a preferred form of which is described in our earlier application PCT/AU00/00565 (docket no. NPS001), works in conjunction with a netpage printer 601, an Internet-connected printing appliance for home, office or mobile use. The pen is wireless and communicates securely with the netpage printer via a short-range radio link 9.

The netpage printer 601, preferred forms of which are described in our earlier application PCT/AU00/00561 (docket no. NPP003) and our co-filed application PCT/AU00/1281 (docket no. NPS024), is able to deliver, periodically or on demand, personalized newspapers, magazines, catalogs, brochures and other publications, all printed at high quality as interactive netpages. Unlike a personal computer, the netpage printer is an appliance which can be, for example, wall-mounted adjacent to an area where the morning news is first consumed, such as in a user's kitchen, near a breakfast table, or near

the household's point of departure for the day. It also comes in tabletop, desktop, portable and miniature versions.

Netpages printed at their point of consumption combine the ease-of-use of paper with the timeliness and interactivity of an interactive medium.

As shown in Figure 2, the netpage pen 101 interacts with the coded data on a printed netpage 1 and communicates, via a short-range radio link 9, the interaction to a netpage printer. The printer 601 sends the interaction to the relevant netpage page server 10 for interpretation. In appropriate circumstances, the page server sends a corresponding message to application computer software running on a netpage application server 13. The application server may in turn send a response which is printed on the originating printer.

The netpage system is made considerably more convenient in the preferred embodiment by being used in conjunction with high-speed microelectromechanical system (MEMS) based inkjet (Memjet™) printers, for example as described in our earlier application PCT/AU00/00578 (docket no. IJ52). In the preferred form of this technology, relatively high-speed and high-quality printing is made more affordable to consumers. In its preferred form, a netpage publication has the physical characteristics of a traditional newsmagazine, such as a set of letter-size glossy pages printed in full color on both sides, bound together for easy navigation and comfortable handling.

The netpage printer exploits the growing availability of broadband Internet access. The netpage printer can also operate with slower connections, but with longer delivery times and lower image quality. The netpage system can also be enabled using existing consumer inkjet and laser printers, although the system will operate more slowly and will therefore be less acceptable from a consumer's point of view. In other embodiments, the netpage system is hosted on a private intranet. In still other embodiments, the netpage system is hosted on a single computer or computer-enabled device, such as a printer.

Netpage publication servers 14 on the netpage network are configured to deliver print-quality publications to netpage printers. Periodical publications are delivered automatically to subscribing netpage printers via pointcasting and multicasting Internet protocols. Personalized publications are filtered and formatted according to individual user profiles.

A netpage printer can be configured to support any number of pens, and a pen can work with any number of netpage printers. In the preferred implementation, each netpage pen has a unique identifier. A household may have a collection of colored netpage pens, one assigned to each member of the family. This allows each user to maintain a distinct profile with respect to a netpage publication server or application server.

A netpage pen can also be registered with a netpage registration server 11 and linked to one or more payment card accounts. This allows e-commerce payments to be securely authorized using the netpage pen. The netpage registration server compares the signature captured by the netpage pen with a previously registered signature, allowing it to authenticate the user's identity to an e-commerce server. Other biometrics can also be used to verify identity. A version of the netpage pen includes fingerprint scanning, verified in a similar way by the netpage registration server.

Although a netpage printer may deliver periodicals such as the morning newspaper without user intervention, it can be configured never to deliver unsolicited junk mail. In its preferred form, it only delivers periodicals from subscribed or otherwise authorized sources. In this respect, the netpage printer is unlike a fax machine or e-mail account which is visible to any junk mailer who knows the telephone number or e-mail address.

Each object model in the system is described using a Unified Modeling Language (UML) class diagram. A class diagram consists of a set of object classes connected by relationships, and two kinds of relationships are of interest here: associations and generalizations. An association represents some kind of relationship between objects, i.e. between instances of classes. A generalization relates actual classes, and can be understood in the following way: if a class is thought of as the set of all objects of that class, and class A is a generalization of class B, then B is simply a subset of A. Each class is drawn as a rectangle labelled with the name of the class. It contains a list of the attributes of the class, separated from the name by a horizontal line, and a list of the operations of the class, separated from the attribute list by a horizontal line. In the class diagrams which follow, however, operations are never modelled. An association is drawn as a line joining two classes, optionally labelled at either end with the multiplicity of the association. The default multiplicity is one. An asterisk (*) indicates a multiplicity of "many", i.e. zero or more. Each association is optionally labelled with its name, and is also optionally labelled at either end with the role of the corresponding class. An open diamond indicates an aggregation association ("is-part-of"), and is drawn at the aggregator end of the association line. A generalization relationship ("is-a") is drawn as a solid line joining two classes, with an arrow (in the form of an open triangle) at the generalization end. When a class diagram is broken up into multiple diagrams, any class which is duplicated is shown with a dashed outline in all but the main diagram which defines it. It is shown with attributes only where it is defined.

Netpages are the foundation on which a netpage network is built. They provide a paper-based user interface to published information and interactive services. A netpage consists of a printed page (or other surface region) invisibly tagged with references to an online description of the page. The online page description is maintained persistently by a netpage page server. The page description describes the visible layout and content of the page, including text, graphics and images. It also describes the input elements on the page, including buttons, hyperlinks, and input fields. A netpage allows markings made

with a netpage pen on its surface to be simultaneously captured and processed by the netpage system.

Multiple netpages can share the same page description. However, to allow input through otherwise identical pages to be distinguished, each netpage is assigned a unique page identifier. This page ID has sufficient precision to distinguish between a very large number of netpages.

Each reference to the page description is encoded in a printed tag. The tag identifies the unique page on which it appears, and thereby indirectly identifies the page description. The tag also identifies its own position on the page. Characteristics of the tags are described in more detail below.

Tags are printed in infrared-absorptive ink on any substrate which is infrared-reflective, such as ordinary paper. Near-infrared wavelengths are invisible to the human eye but are easily sensed by a solid-state image sensor with an appropriate filter.

A tag is sensed by an area image sensor in the netpage pen, and the tag data is transmitted to the netpage system via the nearest netpage printer. The pen is wireless and communicates with the netpage printer via a short-range radio link. Tags are sufficiently small and densely arranged that the pen can reliably image at least one tag even on a single click on the page. It is important that the pen recognize the page ID and position on every interaction with the page, since the interaction is stateless. Tags are error-correctably encoded to make them partially tolerant to surface damage.

The netpage page server maintains a unique page instance for each printed netpage, allowing it to maintain a distinct set of user-supplied values for input fields in the page description for each printed netpage.

The relationship between the page description, the page instance, and the printed netpage is shown in Figure 3. The printed netpage may be part of a printed netpage document 45. The page instance is associated with both the netpage printer which printed it and, if known, the netpage user who requested it.

In a preferred form, each tag identifies the region in which it appears, and the location of that tag within the region. A tag may also contain flags which relate to the region as a whole or to the tag. One or more flag bits may, for example, signal a tag sensing device to provide feedback indicative of a function associated with the immediate area of the tag, without the sensing device having to refer to a description of the region. A netpage pen may, for example, illuminate an "active area" LED when in the zone of a hyperlink.

In a preferred embodiment, each tag contains an easily recognized invariant structure which aids initial detection, and which assists in minimizing the effect of any warp induced by the surface or by the sensing process. The tags preferably tile the entire page, and are sufficiently small and densely arranged that the pen can reliably image at least one tag even on a single click on the page. It is important

that the pen recognize the page ID and position on every interaction with the page, since the interaction is stateless.

In a preferred embodiment, the region to which a tag refers coincides with an entire page, and the region ID encoded in the tag is therefore synonymous with the page ID of the page on which the tag appears. In other embodiments, the region to which a tag refers can be an arbitrary subregion of a page or other surface. For example, it can coincide with the zone of an interactive element, in which case the region ID can directly identify the interactive element.

Each tag typically contains 16 bits of tag ID, at least 90 bits of region ID, and a number of flag bits. Assuming a maximum tag density of 64 per square inch, a 16-bit tag ID supports a region size of up to 1024 square inches. Larger regions can be mapped continuously without increasing the tag ID precision simply by using abutting regions and maps. The distinction between a region ID and a tag ID is mostly one of convenience. For most purposes the concatenation of the two can be considered as a globally unique tag ID. Conversely, it may also be convenient to introduce structure into the tag ID, for example to define the x and y coordinates of the tag. A 90-bit region ID allows 2^{90} ($\sim 10^{27}$ or a thousand trillion trillion) different regions to be uniquely identified. Tags may also contain type information, and a region may be tagged with a mixture of tag types. For example, a region may be tagged with one set of tags encoding x coordinates and another set, interleaved with the first, encoding y coordinates.

In one embodiment, 120 bits of tag data are redundantly encoded using a (15, 5) Reed-Solomon code. This yields 360 encoded bits consisting of 6 codewords of 15 4-bit symbols each. The (15, 5) code allows up to 5 symbol errors to be corrected per codeword, i.e. it is tolerant of a symbol error rate of up to 33% per codeword. Each 4-bit symbol is represented in a spatially coherent way in the tag, and the symbols of the six codewords are interleaved spatially within the tag. This ensures that a burst error (an error affecting multiple spatially adjacent bits) damages a minimum number of symbols overall and a minimum number of symbols in any one codeword, thus maximising the likelihood that the burst error can be fully corrected.

Any suitable error-correcting code can be used in place of a (15, 5) Reed-Solomon code, for example a Reed-Solomon code with more or less redundancy, with the same or different symbol and codeword sizes; another block code; or a different kind of code, such as a convolutional code (see, for example, Stephen B. Wicker, *Error Control Systems for Digital Communication and Storage*, Prentice-Hall 1995, the contents of which are herein incorporated by cross-reference).

One embodiment of the physical representation of the tag, shown in Figure 4a and described in our earlier application PCT/AU00/00569 (docket no. NPT002), includes fixed target structures 15, 16, 17 and variable data areas 18. The fixed target structures allow a sensing device such as the netpage pen

to detect the tag and infer its three-dimensional orientation relative to the sensor. The data areas contain representations of the individual bits of the encoded tag data. To maximise its size, each data bit is represented by a radial wedge in the form of an area bounded by two radial lines and two concentric circular arcs. Each wedge has a minimum dimension of 8 dots at 1600 dpi and is designed so that its base (its inner arc), is at least equal to this minimum dimension. The height of the wedge in the radial direction is always equal to the minimum dimension. Each 4-bit data symbol is represented by an array of 2×2 wedges. The fifteen 4-bit data symbols of each of the six codewords are allocated to the four concentric symbol rings 18a to 18d in interleaved fashion. Symbols are allocated alternately in circular progression around the tag. The interleaving is designed to maximise the average spatial distance between any two symbols of the same codeword.

In order to support “single-click” interaction with a tagged region via a sensing device, the sensing device must be able to see at least one entire tag in its field of view no matter where in the region or at what orientation it is positioned. The required diameter of the field of view of the sensing device is therefore a function of the size and spacing of the tags. Assuming a circular tag shape, the minimum diameter of the sensor field of view 193 is obtained when the tags are tiled on an equilateral triangular grid, as shown in Figure 4b.

The tag structure just described is designed to allow both regular tilings of planar surfaces and irregular tilings of non-planar surfaces. Regular tilings are not, in general, possible on non-planar surfaces. In the more usual case of planar surfaces where regular tilings of tags are possible, i.e. surfaces such as sheets of paper and the like, more efficient tag structures can be used which exploit the regular nature of the tiling.

An alternative tag structure more suited to a regular tiling is shown in Figure 5a. The tag 4 is square and has four perspective targets 17. It is similar in structure to tags described by Bennett et al. in US Patent 5,051,746. The tag represents sixty 4-bit Reed-Solomon symbols 47, for a total of 240 bits. The tag represents each one bit as a dot 48, and each zero bit by the absence of the corresponding dot. The perspective targets are designed to be shared between adjacent tags, as shown in Figures 5b and 5c. Figure 5b shows a square tiling of 16 tags and the corresponding minimum field of view 193, which must span the diagonals of two tags. Figure 5c shows a square tiling of nine tags, containing all one bits for illustration purposes.

Using a (15, 7) Reed-Solomon code, 112 bits of tag data are redundantly encoded to produce 240 encoded bits. The four codewords are interleaved spatially within the tag to maximize resilience to burst errors. Assuming a 16-bit tag ID as before, this allows a region ID of up to 92 bits. The data-bearing dots 48 of the tag are designed to not overlap their neighbors, so that groups of tags cannot produce structures which resemble targets. This also saves ink. The perspective targets therefore allow detection

of the tag, so further targets are not required.

Although the tag may contain an orientation feature to allow disambiguation of the four possible orientations of the tag relative to the sensor, it is also possible to embed orientation data in the tag data. For example, the four codewords can be arranged so that each tag orientation contains one codeword placed at that orientation, as shown in Figure 5d, where each symbol is labelled with the number of its codeword (1-4) and the position of the symbol within the codeword (A-O). Tag decoding then consists of decoding one codeword at each orientation. Each codeword can either contain a single bit indicating whether it is the first codeword, or two bits indicating which codeword it is. The latter approach has the advantage that if, say, the data content of only one codeword is required, then at most two codewords need to be decoded to obtain the desired data. This may be the case if the region ID is not expected to change within a stroke and is thus only decoded at the start of a stroke. Within a stroke only the codeword containing the tag ID is then desired. Furthermore, since the rotation of the sensing device changes slowly and predictably within a stroke, only one codeword typically needs to be decoded per frame.

It is possible to dispense with perspective targets altogether and instead rely on the data representation being self-registering. In this case each bit value (or multi-bit value) is typically represented by an explicit glyph, i.e. no bit value is represented by the absence of a glyph. This ensures that the data grid is well-populated, and thus allows the grid to be reliably identified and its perspective distortion detected and subsequently corrected during data sampling. To allow tag boundaries to be detected, each tag data must contain a marker pattern, and these must be redundantly encoded to allow reliable detection. The overhead of such marker patterns is similar to the overhead of explicit perspective targets. One such scheme uses dots positioned at various points relative to grid vertices to represent different glyphs and hence different multi-bit values (see Anoto Technology Description, Anoto April 2000).

Decoding a tag results in a region ID, a tag ID, and a tag-relative pen transform. Before the tag ID and the tag-relative pen location can be translated into an absolute location within the tagged region, the location of the tag within the region must be known. This is given by a tag map, a function which maps each tag ID in a tagged region to a corresponding location. A tag map reflects the scheme used to tile the surface region with tags, and this can vary according to surface type. When multiple tagged regions share the same tiling scheme and the same tag numbering scheme, they can also share the same tag map. The tag map for a region must be retrievable via the region ID. Thus, given a region ID, a tag ID and a pen transform, the tag map can be retrieved, the tag ID can be translated into an absolute tag location within the region, and the tag-relative pen location can be added to the tag location to yield an absolute pen location within the region.

The tag ID may have a structure which assists translation through the tag map. It may, for example, encoded cartesian coordinates or polar coordinates, depending on the surface type on which it appears. The tag ID structure is dictated by and known to the tag map, and tag IDs associated with different tag maps may therefore have different structures.

Two distinct surface coding schemes are of interest, both of which use the tag structure described earlier in this section. The preferred coding scheme uses "location-indicating" tags as already discussed. An alternative coding scheme uses "object-indicating" (or "function-indicating") tags.

A location-indicating tag contains a tag ID which, when translated through the tag map associated with the tagged region, yields a unique tag location within the region. The tag-relative location of the pen is added to this tag location to yield the location of the pen within the region. This in turn is used to determine the location of the pen relative to a user interface element in the page description associated with the region. Not only is the user interface element itself identified, but a location relative to the user interface element is identified. Location-indicating tags therefore trivially support the capture of an absolute pen path in the zone of a particular user interface element.

An object-indicating (or function-indicating) tag contains a tag ID which directly identifies a user interface element in the page description associated with the region (or equivalently, a function). All the tags in the zone of the user interface element identify the user interface element, making them all identical and therefore indistinguishable. Object-indicating tags do not, therefore, support the capture of an absolute pen path. They do, however, support the capture of a relative pen path. So long as the position sampling frequency exceeds twice the encountered tag frequency, the displacement from one sampled pen position to the next within a stroke can be unambiguously determined. As an alternative, the netpage pen 101 can contain a pair or motion-sensing accelerometers, as described in our earlier application PCT/AU00/00565 (docket no. NPS001).

With either tagging scheme, the tags function in cooperation with associated visual elements on the netpage as user interactive elements in that a user can interact with the printed page using an appropriate sensing device in order for tag data to be read by the sensing device and for an appropriate response to be generated in the netpage system.

BUSINESS IMPLEMENTATION PROCEDURES

The netpage system accommodates a large variety of business implementation procedures for allowing users and providers of the technology to leverage off and to profit from their participation in the netpage system. To best understand the system the following description of the business implementation procedures and equipment should be read in conjunction with the description in the specification of the available hardware and software options, including printers, communication protocols, protocols for

payment, determining account balances and the like.

The usual parties to the netpage system are:

An online publisher 41 who provides an online publication that is accessible via the netpage network.

One or more online advertisers 42 who wish to place advertising in the online publication.

A number of users 40, each of which is accesses the online publication with a printer module 45. Preferably, the modules are provided by a printer module provider 72 to the users at no cost, or at a cost that is subsidised by the advertisers or the publisher. However, in some cases the user purchases the module at its market value.

A storage provider who maintains one or more data bases which store the information required to allow the system to operate.

These parties interact to provide a structure that facilitates online dissemination of information and commerce. While the following embodiments illustrate specific ones of the many possible interactions it will be appreciated by those skilled in the art that other interactions are possible and are intended to fall within the scope of the claims.

It will also be appreciated by those skilled in the art that all the above named roles need not necessarily be performed by different entities. For example, in some cases the storage provider and the publisher are the same entity, while in other cases the printer provider and the publisher are the same entity.

Reference is also made in the description to “interactive paper”. This is reference to paper that contains tags or other markings, visible or otherwise, that interact with the netpage system to allow identification of the page and, preferably, identification of the position on the page. Examples of these tags are described elsewhere in this specification and it will be understood that many other tags or identifiers can be used in a variety of configurations to achieve the same result.

Other terms used include “a printer using interactive paper” and “an on-demand printer”. This is reference to a printer for interacting with the netpage system to apply the tags and/or interacting with the user to determine which tag the user has designated. A variety of alternative printer configurations are available, some of which have been described in more detail elsewhere in the specification.

It will be understood that the term “printed medium” is used for convenience and can be substituted with the term “printed media”. That is the former term is intended to broadly encompass a printed product, whether this product includes one or more printed sheets, documents or the like.

To assist understanding of the preferred embodiments of the business implementation

procedures and equipment use is made of diagrams, which follow, to illustrate the interactions between the various participant roles in a business procedure. Each participant is shown as a pair of overlapping rectangles. The front rectangle is labelled with the name of the participant and the back rectangle is used as the source and/or target of actions. Each action is shown as an arrow joining a subject participant with an object participant. Each action arrow is labelled with a description of the action. Actions are spatially arranged so that time proceeds from top to bottom and left to right. "Later" actions may coincide with, but never be earlier than, "earlier" actions.

Any action is understood to be "caused" by the immediately prior action which the subject of the action was an object of. In the absence of a prior action, the action is understood to be spontaneous.

Respective reference numerals are used to label certain actions and participants to assist the reader's understanding of the embodiment being described.

The following preferred embodiments are separately described to facilitate understanding of the invention. However, it will be appreciated that more complex embodiments are obtained through the combination of these different embodiments to achieve advantageous results for specific circumstances. Accordingly, the combination of different embodiments to form a hybrid system is intended to fall within the scope of the present invention and the following claims which define that invention.

NETPAGE PUBLISHER

In broad terms, this embodiment includes a system for providing a user with a printed publication from a first party who is an online publisher. The system includes a publication source in the form of a computer based storage server for storing publication data representative of the publication. The publication data includes first information about a second party who is an advertiser in the online publication. A user printer module, in the form of an on-demand interactive printer, interfaces the user with the publication server and is responsive to the user requesting the printed publication for reproducing the printed publication on a printed medium for viewing by the user. Identifier means, in the form of a printer head and associated hardware and software contained within the printer, applies an identifier to the printed medium. Upon designation of the identifier by the user the printer generates a second printed medium that displays to the user second information. This second information is usually further information about the goods and/or services being offered for sale by the advertiser, or an order form for the specific goods and/or services contained in the advertisement, or a hyperlink to the advertiser's site. Calculation means, in the form of the publication server, is responsive to the printer for determining a payment that is made by the advertiser to the publisher.

In other embodiments the calculation means is the storage server. In other embodiments, the calculation means is an account server separate from but linked to the other servers.

The payment is calculated in one of a number of alternative methods which are agreed on in advance. For example, payment may be based upon:

The number of copies of the online publication that are requested.

The number of requests that are made for the third information.

The sales of the goods and/or services that are achieved by hits on the advertisement.

The payment may be in addition to an agreed flat fee for a given period of time. For example, in one embodiment, the advertiser pays a flat fee for each month that their advertisement is included, plus a payment based upon the number of copies of the publication that are requested by users of the system. That is, the system allows the advertiser to pay for the circulation that the publication achieves when including the desired advertising material, unlike the prior art systems which are based upon past circulation figures.

The system includes a plurality of modules associated with corresponding users and the calculation means, in whatever form it takes, is responsive to the number of printed media generated that display one of: the first information; the second information; and the third information. That is, the first information is usually the editorial or other content of the publication, the second information is usually the advertisement, and the third information is either further information about the goods and/or services being offered for sale and/or an order form for those goods and/or services. Preferably, the calculation means is responsive to the number of printed media generated that display two or more of: the first information; the second information; and the third information. That is, the system allows a combination fee structure to be utilised, as required.

In the preferred embodiments, use is made of account means, usually in the form of an account server that is linked to the information server and one or more electronic bank accounts, for receiving the payment from the second party and for providing the payment to the first party.

Where the second party is a supplier of goods and/or services and the second information or the third information allows the user to purchase those goods and/or services at respective predetermined purchase prices, it is preferred that the calculation means is responsive to the monetary value of the purchases completed by the users for determining the payment. That is, the system provides a variety of options for calculating the payment including a combination of: a flat fee for each purchase; a fixed proportion of the purchase price for the goods and/or services that are purchased; and a proportion of the purchased price of the goods and/or services that are purchased, where that proportion is different for particular goods and/or services.

It will be appreciated that the system accommodates a plurality of second parties and a plurality of respective second information and third information that is derived from those parties.

Preferably, the quantum of the payments made by the respective second parties is contingent upon one or more of the following characteristics of the second party: geographic location; quantity of purchases completed in a given time period; and relative geographic location with respect to the user.

As briefly foreshadowed above, it is preferred that the identifier is a tag although, in practice, it is usually embodied as a plurality of tags spaced apart on the respective printed medium. In other embodiments, however, the identifier is a character string that the user provides to the module to obtain the third information. In this case, the string preferably includes a sequence of numbers that are manually keyed into the module. However, in alternative embodiments the string is scanned by sensor means that are manually operated by the user.

In some embodiments, the account server automates the payments and provides the parties to the transactions with all the necessary reporting and summaries to substantiate the quantum of the payments. Preferably, the account server generates a disable signal if the payment calculated as payable by the second party is not made available or paid within a predetermined time, where the generation of the disable signal prevents the module from obtaining the first or the second information which is derived from that second party. That is, an automated debtor system is applied. Preferably, all parties to the transaction have electronic bank accounts that are accessible to the account server for effecting the necessary transactions.

The system also allows the parties, and importantly the second party or the advertiser, to obtain an indication of the success of the advertising by monitoring one or more of the following:

the number of times that the users designate the second information;

the number and/or value of sales that are achieved through the users designating the second information; and

the cost savings gained through the use of online selling over that of shop front retailing.

Where the second information is a link to a third party, the identifier is related to that second information such that designation by the user of the second information results in designation of the identifier which, in turn, ensures that the third information includes either or both of further information about the goods and/or services being offered for use and/or sale by the third party or instructions as to how the user should proceed to effect that use and/or a purchase of those goods and/or services of the third party. Preferably, the second party obtains an indication of the success of the link by monitoring one or more of: the number or proportion of users selecting the click-through; and the number or proportion of users purchasing or making use of the goods and/or services of the third party.

It will be appreciated that the monitoring allows the parties to accurately estimate the cost/benefit achieved by the advertising and, hence to plan for future promotions or advertising

campaigns.

In other embodiments the first information includes advertising derived from a third party and the calculation means determines the quantum of a payment that is made by the third party to the first party. In some cases the advertising is solicited by the user, while in others the advertising is unsolicited.

The system also allows the first party to preferentially display of the advertising to the user.

While in the above embodiments the printed media are generated by the user's printer module, as an alternative, or in addition to this, the printed media are selectively generated at a remote printer and subsequently provided to the user for viewing.

Some more specific examples follow and are described with reference to Figures 1 to 3.

Advertising Fees

This embodiment allows the publisher, who publishes to the on-demand printers, to receive advertising fees on advertising placed within the publication. This provides a profitable role for the publisher, and allows the publisher to attract readers by being able to provide them with subsidised or free publications.

In some embodiments the publisher automatically delivers the publication to a subscribing user's printer on a periodic basis. For example, in the case of the publisher being an online newspaper, an updated publication is provided to the user's printer each weekday morning at a predetermined time. This time will default to a non-peak processing time for the publisher. However, the user can specify the time, and may be coordinated with the normal rising time of the user.

In other embodiments, the publication is delivered to a user's printer ad hoc at the user's request.

Preferably, the publication is printed as interactive paper.

As illustrated in Figure 6, this embodiment operates as follows:

The advertiser, which is indicated generally by reference numeral 42, places an advertisement 501 with the publisher 41.

The publisher 41 eventually prints the advertisement, as represented by arrow 502, on the user's on-demand printer 44. This printing occurs typically as part of one of the publisher's publications and results in one or more printed pages 1 that contain the publication, including the advertising.

The publisher 41 charges the advertiser 42 an agreed advertising fee, as represented by arrow 503.

The advertiser pays the publisher the advertising fee, as represented by arrow 504.

For practical purposes, advertising fees are negotiated, invoiced and settled in bulk. In some embodiments the fees are part of a wider advertising agreement.

Click-Through Fees

This embodiment allows a publisher who publishes on interactive paper to receive click-through fees on advertising placed within its publications. This provides a profitable role for a publisher who publishes on interactive paper, and allows the publisher to attract readers by being able to provide them with subsidised or free publications.

As illustrated in Figure 7, the embodiment operates as follows:

An advertiser 42 places a hyperlink 505 with a publisher 41.

The publisher 41 eventually prints the hyperlink, as represented by arrow 506, and typically as part of one of the publisher's publications. The result is one or more printed pages 1 being created that contain the publication, including the hyperlink.

When a user 40 selects the hyperlink, as represented by arrow 507, for example to request a linked document from the advertiser, the advertiser 42 is notified, as represented by arrow 508.

The advertiser 42 pays the publisher 41 an agreed click-through fee 509.

For practical purposes, click-through fees are negotiated, invoiced and settled in bulk. In some embodiments the fees are part of a wider advertising agreement.

Sales Commissions

This embodiment allows a publisher who publishes on interactive paper to receive commissions on sales initiated through advertising placed within its publications. This provides a profitable role for a publisher who publishes on interactive paper, and allows the publisher to attract readers by being able to provide them with subsidised or free publications.

As illustrated in Figure 8, this embodiment operates as follows:

A merchant 43 places a hyperlink, as represented by arrow 510, with a publisher 41.

The publisher 41 eventually prints the hyperlink, as represented by arrow 511, typically as part of one of the publisher's publications. The result is one or more printed pages 1 being created that contain the publication, including the hyperlink.

When a user 40 clicks on the hyperlink to request a linked document from the merchant 43, the merchant is notified.

When the user 40 eventually makes an online purchase via the linked document (or via a

document obtained via the linked document), the merchant 43 is notified.

The merchant 43 pays the publisher 41 an agreed commission on the sale.

Preferably, the sales commission is a fixed fee. However, other embodiments make use of a commission that is based on the value of the sale. For practical purposes, sales commissions are negotiated, invoiced and settled in bulk, and are often part of wider advertising agreements.

Category Buttons

A publisher may choose to include within a publication a set of “category” buttons, each of which is specific to a particular category of product or service, but none of which is ostensibly specific to a particular merchant or service provider.

These category buttons are typically placed prominently in the publication, e.g. on the front page. Because of their generic nature and prominent placement, they typically attract customers who are not yet committed to a particular merchant or service provider.

Category buttons may include, by way of example, Books, Clothing, Electronics, Entertainment, Finance, Groceries, Health, House and Garden, Looking Good, Music, Restaurants, Special Offers, Sports, Travel, and Emergency.

Advertisers whose goods or services relate to the category of a particular button may buy, from the publisher, the right to be linked to that button. Several levels of linking are possible. An advertiser may buy the entire link, so that the button leads directly to the advertiser’s page. Or the advertiser may join a directory of advertisers who are linked to the button, so that the advertiser’s page is linked to a (usually small) directory which is linked to the button. The publisher chooses how to deploy each button category and each button instance. The publisher can segment the button space of their subscriber base in arbitrary ways, for example by demographics, location, or simply proportionally to satisfy advertisers who wish to purchase a subset of the space without being forced to appear in a directory.

Certain category buttons, such as “Emergency”, can link to non-advertising information specific to the user’s location, and are provided as a service by the publisher.

NETPAGE PRINTER PROVIDER

In broad terms, this embodiment includes a system for providing to a user printed information obtained from a remote source in the form of the online publication. The system includes a user module in the form of an interactive printer for interfacing the user with the online publication. The module is responsive to the user requesting first information from the publication, which may be the publication itself, for generating a first printed medium that displays to the user the first information together with

second information. The second information is the advertising information that is derived from the advertiser. Identifier means, in the form of the printer module, applies an identifier to the first printed medium such that designation of the identifier by the user results in the module generating a second printed medium that displays to the user third information. Calculation means, in the form of the online publisher's server, is responsive to the module for determining a payment to be made by the advertiser to the printer provider. In practice, the advertiser would pay the online publisher and, in the case where the printer provider was different to the publisher, the publisher would provide a payment to the printer provider.

As a default, the payment is a predetermined function of the number of reproductions of the printed publication that are generated. That is, where the second party is an advertiser in the publication the payment is a predetermined function of the circulation achieved by the publication. This allows the advertiser to pay for the actual circulation achieved, and the publisher to be rewarded for increasing that circulation.

The payment includes, in some embodiments, another component in addition to or as a substitute for the above. For example, where the second information is associated with the second party the payment is a predetermined function of the number of second printed media generated. So, where the second party is an advertiser the payment is increased for successful hits on their specific advertising.

The payment is, in other embodiments, a predetermined function of both the number of printed publications generated that display the first information and the number of second printed media generated that display the second information.

Where the second party is a supplier of goods and/or services, the first information or the second information is usually arranged to allow the user to purchase those goods and/or services at a predetermined purchase price. In turn, the payment is calculated as a predetermined function of the purchase price of the goods and/or services actually purchased by the user.

For some items the user will desire to obtain further information about the goods and/or services prior to proceeding further. Accordingly, in some embodiments the module is responsive to the designation of the identifier by the user for accessing advertising, technical or other information about particular goods and/or services of the second party. In these embodiments the calculation means is responsive to the designation of the identifier for determining the payment. If required, however, the calculation means is responsive only to the designation of the identifier for determining the payment such that the advertiser pays the publisher only for successful links to the advertising information.

Some more specific examples follow and are described with reference to Figures 4 to 6.

Commissions on Advertising Fees

In this embodiment the provider of an interactive printer receives a percentage of advertising fees earned directly through the printer. This provides a profitable role for a provider of interactive printers, and allows the provider to attract users by partially or fully subsidising the capital and running costs of each user's printer.

As illustrated in Figure 9, the system is operates as follows:

A printer provider 72 provides a user with a printer 45. While in this embodiment the provider 72 retains ownership of the printer, in other embodiments that ownership resides with the respective users.

An advertiser 42 places an advertisement, as represented by arrow 520, with a publisher 41.

The publisher 41 eventually prints the advertisement on the printer 45, typically as part of one of the publisher's publications. The result is one or more printed pages 1 being created that contain the publication, including the advertisement.

The publisher 41 charges the advertiser 42 an agreed advertising fee, as represented by arrow 523.

The advertiser 42 pays the publisher 41 the advertising fee, as represented by arrow 524.

The publisher 41 pays the printer provider 72 an agreed commission on the advertising fee, as represented by arrow 525.

Commissions on Click-Through Fees

In another embodiment, the provider of an interactive printer receives a percentage of click-through fees earned directly through the printer. This provides a profitable role for the provider of interactive printers, and allows the provider to attract users by partially or fully subsidising the capital and running costs of each user's printer.

As illustrated in Figure 10, the system operates as follows:

The printer provider 72 provides the user 40 with a printer 45.

An advertiser 42 places a hyperlink with a publisher 41.

The publisher eventually prints the hyperlink, typically as part of one of the publisher's publications. The result is one or more printed pages 1 being created that contain the publication, including the hyperlink.

When the user 40 clicks on the hyperlink, as it is represented on the interactive paper, for example to request a linked document from the advertiser 42, the advertiser is notified.

The advertiser 42 pays the publisher 41 an agreed click-through fee.

The publisher 41 pays the printer provider 72 an agreed commission on the click-through fee.

Commissions on Sales Commissions

This embodiment allows the provider of an interactive printer to receive a percentage of sales commissions earned directly through the printer. This provides a profitable role for the provider of interactive printers, and allows the provider to attract users by partially or fully subsidising the capital and running costs of each user's printer.

As illustrated in Figure 11, this embodiment operates as follows:

The printer provider 72 provides the user 40 with a printer 45.

An advertiser in the form of a merchant 43 places a hyperlink with a publisher 41.

The publisher 41 eventually prints the hyperlink, typically as part of one of the publisher's publications. The result is one or more printed pages 1 being created that contain the publication, including the hyperlink.

When the user 40 clicks on the hyperlink to request a linked document from the merchant 43, the merchant is notified. The "click" occurs through use of the interactive paper.

When the user 40 eventually makes an online purchase via the linked document (or via a document obtained via the linked document), the merchant 43 is notified.

The merchant 43 pays the publisher 41 an agreed commission on the sale.

The publisher 41 pays the printer provider 72 an agreed commission on the sales commission.

CONCLUSION

The present invention has been described with reference to a preferred embodiment and number of specific alternative embodiments. However, it will be appreciated by those skilled in the relevant fields that a number of other embodiments, differing from those specifically described, will also fall within the spirit and scope of the present invention. Accordingly, it will be understood that the invention is not intended to be limited to the specific embodiments described in the present specification, including documents incorporated by cross-reference as appropriate. The scope of the invention is only limited by the attached claims.

CLAIMS

1. A printer module for interfacing a user with a data base of a first party, the printer module being responsive to the user requesting first information from the data base for obtaining the first information and generating a first printed media that displays to the user the first information together with second information;

the printer module further being responsive to designation of the second information by the user to cause the generation of a second printed media that displays to the user third information;

the printer module further interfacing with account means for applying a financial debit from the first party against a second party from whom the third information is derived.

2. A printer module according to claim 1 wherein the debit is a predetermined periodic fee.

3. A printer module according to claim 1 wherein the printer module interfaces with calculation means that are responsive to the module for the determining the quantum of the debit.

4. A printer module according to claim 3 wherein the calculation means is responsive to the number of times the second information is designated by the user.

5. A printer module according to claim 4 wherein the module is provided to the user by a third party and the calculation means determines a debit that is applied by the third party against one or both of the first party and the second party.

6. A printer module according to claim 5 wherein the first party is an on-line publisher and the first data base contains the on-line publication.

7. A printer module according to claim 6 wherein the first information is the content of the on-line publication and the second information is a textual or graphical device of a generic category button.

8. A printer module according to claim 7 wherein the second party is an advertiser and the third information is specific marketing information of the advertiser.

9. A printer module according to claim 8 wherein the advertiser is a merchant of goods and/or services which are offered for sale on-line.
10. A printer module according to claim 9 wherein the calculation means is responsive to the user purchasing one or more of those goods and/or services for determining the financial debit applied by the first party against the second party.
11. A printer module according to claim 1 wherein the second information includes a plurality of generic category buttons which are associated with a corresponding plurality of respective second parties.