PROGRAMMABLE DIGITAL LABELS FOR A MEDICINE CONTAINER

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ABSTRACT
A bottle for storing medicine that may include at least one sensor to determine an aspect about the medicine stored within the bottle. The bottle may also include a processor that receives the information from the one or more sensors. A wireless communication interface may be integrated with the bottle to communicate information.
FIG. 6
FIG. 7
FIG. 8

LOUIS VUITTON
Luxury Tracking System
PROGRAMMABLE DIGITAL LABELS FOR A MEDICINE CONTAINER

RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

The present invention relates generally to the field of digital labels and tags for products. It is typical for the manufacturer of a product to affix a label to the product which bears the manufacturer’s brand name or logo. Labels are also used to provide product information and information about the manufacturer of the product. Because labels are typically small, they can carry only a limited amount of information. Therefore, it is not at all uncommon to find two or more labels affixed to different locations of a single product. For example, a product may carry a brand label which is placed in a visible location, and interior labels to give product information. However, there is a small, finite limit to the number of labels which can be applied to a product without cluttering the product.

In the past, labels have served as merely static and passive devices to convey label information that is fixed in time, and have not been used to expand the functionality of the product. Animated designs and logos are not possible with conventional woven, printed or stamped labels. Also, conventional labels cannot display information which may change over time, or user-specific information.

SUMMARY OF THE INVENTION

The present invention is a digital label for products that can be programmed to store, process, transmit and display information including label information and user-specific information. The digital label can also store authentication data to authenticate the product. The digital label includes a processing circuit, a memory for storing label information, and a display for displaying label information. An extensible program is stored in memory and is configured to execute user-defined applications or program code to extend the functionality of the digital label. In one embodiment of the invention, the extensible program comprises an operating system program with an application interface that allows development of custom applications by the manufacturer, retailer, or user to expand the functionality of the digital label. User-defined applications enable the digital label to receive, store, and process user-specific information, and to communicate and work other devices.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a functional block diagram of an exemplary digital label.

FIG. 2 is a front view of an exemplary digital label.

FIG. 3 is a side view of an exemplary digital label contained in a secondary encasement, which is shown in section.

FIG. 4 illustrates an exemplary software architecture for the digital label.

FIG. 5 illustrates the digital label communicating with other devices in a network environment.

FIG. 6 illustrates a tag for products incorporating a digital label.

FIG. 7 illustrates a digital label with a changing serial number for authentication.

FIG. 8 illustrates a web interface for a server that provides tracking services.

FIG. 9 is a schematic drawing of a digital label incorporated in a product container and communicating with a computer.

FIG. 10 is a schematic drawing of a digital label incorporated in a product container and communicating with a computer.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings, and particularly to FIG. 1, a digital label 10 for products is shown and indicated generally by the numeral 10. For purposes of this application, the term “digital label” means a device having a display that functions principally as a means of identification that is attached or affixed to a product to designate its origin, owner, manufacturer, contents or ingredients, use, etc. The term “label” is used in the common sense to mean a device that is distinguishable from the product to which it is affixed and not a typical or inherent feature of the product. For example, a computer monitor and a display for a consumer electronic device (e.g., watch, cell phone, camera, etc.) are not considered to be “labels” as that term is used herein because the displays are inherent product features.

The digital label 10 stores and displays label information and other information as more fully described below. The term “label information” includes source information indicating the source or origin of the product, product information describing the features, contents, ingredients or use of the product, and manufacturer information that provides information about the product manufacturer. An example of source information is a brand name, logo (including animated logos), or slogan which identifies the source or origin, and authentication data for verifying the authenticity of the product. Examples of product information are instructions for the care or use of the product, and description of the contents or ingredients of the product. Examples of manufacturer information are the address (including an e-mail address) or telephone number for contacting the manufacturer, and the IP address of a web page for finding additional information about the company and its products.

The digital label may also store consumer information or user information in addition to label information, and perform custom functions for the user. Consumer information is personal user information that affects the ownership, history, usage and effectiveness of the product. Examples of personal information are registration data, such
as the name, address, contact information, weight, height, age, birth date, sex, DNA, allergies, medical and health conditions and history, scheduling information, personal preferences, diet, account information, other product usage data, etc.

[0018] The digital label 10 is particularly useful for products that do not otherwise include a display or microprocessor as an inherent feature of the product, but may also be used on products with a display or microprocessor. For example, in products that include a display as a functional feature of the product, the manufacturer may still use the digital label 10 of the present invention to provide a separate, dedicated display or microprocessor for displaying and transmitting trademarks, logos, brands, slogans, or other label and product information.

[0019] The digital label 10 according to the present invention provides a platform for manufacturers, retailers and end users to develop custom applications for the digital label 10 to expand the functionality of the digital label 10. In one embodiment, a processing circuit is configured to recognize and execute the user-defined applications. As used herein, the term “user-defined” refers to users of the label and includes product manufacturers, retailers, and end users of the product. The user-defined applications allow the functionality of the digital label 10 to be expanded to perform functions for the user. Thus, the present invention extends the concept of a product label to include active devices that do more than present static information, the digital labels 10 according to various embodiments function as small computing devices that can be programmed to perform a wide variety of functions.

[0020] FIGS. 1 and 2 illustrate the main components of the digital label 10 according to one exemplary embodiment. The digital label 10 comprises a processing circuit 12, memory 14, display 16, a communications interface 18, and a battery 19 to provide power for the digital label 10. The processing circuit 12 controls the overall operation of the digital label 10 according to program instructions stored in memory 14 and may comprises one or more digital processing devices, such as microprocessors, microcontrollers, hardware, firmware, or a combination thereof. Memory 14 stores program instructions and data needed for operation. An extensible program (FIG. 4) stored in memory 14 controls the basic functions of the digital label 10. As described in greater detail below, the extensible program is configured to execute custom applications or custom program code stored in memory 14 to expand the functionality of the digital label 10. The display 16 may comprise a liquid crystal display (LCD) or an organic light emitting diode (OLED). Additionally, the display 16 may use printed electronic displays, electronic paper displays, or electronic ink technology provide a thin, flexible and durable display to enable users to view information. The communications interface 18 may comprise a short-range wireless interface, such as a BLUETOOTH interface, ZIGBEE, or WIFI interface, a long range cellular phone or satellite communications interface, or a wired interface, such as a RS 232, USB or FIREWARE interface. There may be more than one communications interface 18.

[0021] Some embodiments of the digital label 10 may additionally include one or more user input devices indicated generally by the numeral 20. User input devices 20 for the digital label 10 may comprise any known input device including buttons, keypads, touch pads, wheels, dials, mouse devices, trackballs, etc. A touch screen display could also be used for user input. Imaging systems and motion or movement systems for recognizing hand gestures, and voice recognition systems may also be used for receiving user input. In FIG. 2, three soft keys denoted by the numerals 22, 24, 26 are provided to receive user input. The soft keys 22, 24, 26 may have different functions depending on the current context. The function of the soft keys 22, 24, 26 may be displayed to the user on display 16 when the soft keys 22, 24, 26 are active. For example, the middle key 26 shown in FIG. 2 has the text MENU displayed above the key 26 on the display 16. Pressing the soft key 26 in this context will invoke an onscreen menu. In some embodiments, more sophisticated user input devices can be used to enable users to input user information.

[0022] The digital label 10 may include or receive input from one or more sensors or detectors 30 that sense environmental conditions such as temperature, pressure and humidity; or product characteristics, such as size, volume, weight of the product, or chemical changes in the product. Sensors or detectors 30 may also be used to detect product usage and/or tampering. Sensors or detectors 30 for the digital label 10 may also detect location, distance or proximity. The digital label 10 may incorporate a GPS receiver 50 or other location detector to determine location and history of locations. Clocks and counters may provide additional input to the processing circuit 12. Those skilled in the art will appreciate, however, that the processing circuit 12 may include internal clocks and counters.

[0023] The digital label 10 may include or control one or more alerting devices 40 for alerting the user of specified events or conditions. The alerting devices 40 may comprise indicator lights that illuminate or generate lighting effects; speakers, beepers, buzzers, or other sound devices; and vibrators or other tactile devices. The digital label 10 could also play MP3 or other audio files to alert the user. The alerting devices 40 are controlled by the system processor to notify the user when predetermined events or conditions occur. The alerts can be personalized and customized by the user to distinguish the alerts. FIG. 2 illustrates an indicator lamp 42 that is used as an alerting device 40.

[0024] The digital label 10 may include a primary casing 60 to house the components of the digital label 10. The primary casing 60 is preferably waterproof or water-resistant to protect the components. The primary casing 60 should also be impact resistant and shock-resistant. The casing 60 may be constructed of plastic, rubber, metal, ceramic, or other materials or organic, environmentally friendly protein based material that is easily recycled or returned to the earth. In some embodiments, the digital label 10 can be integrated with a product or product container or product packaging. In still other embodiments, a secondary encasement 62 can also be used that allows the digital label 10 to be removed from the product as shown in FIG. 3. This can enable the user to take the digital label 10 with them to interact, monitor and control the product remotely.

[0025] Any suitable method of attaching the digital label 10 to the product may also be used. For example, the digital label 10 or secondary encasement 62 may be secured to products by adhesives, by magnets, by sewing or stitching, by sonic welding laser welding or heat welding, by VEL-CRO-type fasteners, or by mechanical fasteners such as hooks, screws, buckles, zippers, snaps, or pins. The digital label 10 could also be entrapped or retained by other features
of the product which function as the secondary encasement 62. For example, the label 10 could be designed as a cartridge which slides in a pocket or pouch on the product or snapped into the product and released by a mechanism. The digital label 10 may also be suspended from or secured to the product by means of a hanger, strap or cord that passes through an opening (not shown) in the casing 60.

FIG. 4 illustrates the relationship of the extensible program with other elements of the digital label 10. The extensible program may comprise, for example, an operating system program with an application interface (API) to enable manufacturers, retailers, and end users to develop custom applications for the digital label 10. The operating system may, for example, be an embedded operating system such as Windows CE, Symbian, QNX, or embedded Linux. A proprietary operating system could also be used. A label application for managing and displaying labeling information can be preloaded and stored in the memory 104 of the digital label 10 by the label manufacturer. Additional user-defined application programs can be input and stored to add additional functions to the digital label 10 by the product manufacturer, by retailers of the products, or by end users of the products. The custom application programs can be input via one of the communication interfaces 18. The operating system or other extensible program is able to execute the custom applications developed by the product manufacturer, retailer, or end user. The type of functions that can be performed by custom applications is virtually unlimited. For example, the application programs can perform functions such as product authentication, location tracking, scheduling, usage tracking, etc.

One advantage of the digital label 10 is its ability to communicate and share information with other devices. The digital label 10 may have its own IP address assigned so that it can communicate directly with other devices across the Internet. FIG. 5 illustrates different ways the digital label 10 can communicate with other devices. FIG. 5 illustrates a local computer 110, a web-based server system 120, and a cell phone or PDA 140. The digital label 10 communicates with the local computer 110 over a local area network. The digital label 10 may communicate with a web-based server system 120 by connecting to a web access point 130. The digital label 10 may also communicate with the cell phone or PDA 140, using a standard cellular or satellite transceiver.

The digital label 10 may store, process and communicate user information. The user information may be entered directly by the user or may be transferred over the communications interface 18 to the digital label 10. For example, the digital label 10 may collect information about the use of the product and store the information for subsequent viewing and analysis. The digital label 10 may generate history reports that can be viewed by the user on the display 16 or transferred to other devices. Also, label information stored in the digital label 10 at the time of purchase by the customer can be updated via the communications interface 18.

The variety of applications that can be developed for the digital label is virtually limitless. A few exemplary applications for the digital label 10 are described below.

**EXAMPLE 1**

Tag For Authentication and Product Tracking

A recurring problem with branded and successful goods, such as designer and luxury clothing, handbags, accessories, jewelry, luggage, medication, liquor, and replacement parts, is the prevalence of counterfeit goods. As noted above, the digital label 10 of the present invention may store authentication data that enables purchasers of such goods to verify the authenticity of the products they purchase. The authentication data may comprise, for example, a serial number or code that can be used by the purchaser to authenticate genuine products. In some exemplary embodiments, the authentication data may be encrypted with a secret code to prevent counterfeiters from duplicating digital labels 10. The authentication data may also change over time to make it more difficult to mimic. The digital label 10 may also include a GPS receiver to enable tracking of the product in case that the product is lost or stolen.

FIG. 6 illustrates a tag including a digital label 10 for products such as luggage, handbags, and brief cases. The digital label 10 stores an authentication number or serial number in memory 14 to enable users to authenticate genuine goods. The memory 14 for storing the authentication data may be a secure, tamper-proof memory to prevent tampering. The serial number may also be encrypted by the manufacturer with a secret key. For example, the serial number may be encrypted or signed with the manufacturer’s private key and can be verified by the user by decrypting the serial number using the manufacturer’s corresponding public key, which can be obtained from the manufacturer’s web site. If the authentication data is successfully decrypted, the user can be confident that the product is a genuine product so long as the manufacturer’s private key has not been compromised. The user can also verify the authenticity of the product by sending the serial number to the manufacturer during product registration for verification. The authentication number could be read by the user from the digital label 10, or could be transmitted from the digital label 10 to the user’s computer or other device. In some embodiments, the digital label 10 could transmit the authentication number via the Internet to a server maintained by the manufacturer for verification.

The digital label 10 can be programmed to change or update the serial number at a predetermined interval to make it more difficult to mimic. FIG. 7 illustrates a digital label 10 that has a changing serial number. In this embodiment, the digital label 10 may include an algorithm for generating the authentication number that is known only to the product manufacturer. For example, the algorithm may comprises a function that generates an authentication code based on the current time and a secret key that is stored in a secure, tamper-proof memory.

The tag or digital label may include a GPS system 50 to enable tracking of the product. The global positioning system in the digital label 10 can determine and record the product’s location periodically. This feature can be activated, for example, when the user is traveling to keep a history of the product’s movement. The product manufacturer may maintain the web-based server to track products for its registered customers. An application program in the digital label 10 can report the current position of the product to the server at predetermined time intervals or in response to predetermined events or conditions. FIG. 8 illustrates an interface for a web-based tracking system that can be accessed by the user via the Internet to track the product.
EXAMPLE 2

Product Container For Medications

[0034] FIGS. 9 and 10 illustrate a pharmaceutical container 100 for medications including a digital label 10 according to one embodiment of the invention. The pharmaceutical container 100 comprises a bottle 102 and a cap 104. The digital label 10 is embedded in the walls of the bottle 102. The digital label 10 includes three buttons 22, 24 and 26 for receiving user input. Buttons 22 and 24 are used to navigate on-screen menus and to scroll through information on the display 16. The center button 26 is used to invoke the on-screen menu and make menu selections. The digital label 10 includes an indicator lamp 42 and weight sensor 32, which are integrated with the bottle 102. The indicator lamp 42 functions as an alerting device 40 for alerting the user when it is time to take medication as described more fully below. The weight sensor 32 located in the bottom of the product container 100 is used to detect the amount of remaining medication in the pharmaceutical container. The digital label 10 also includes a wireless communications interface 18 for communicating with remote devices, such as a computer 150.

[0035] The digital label 10 stores and displays prescription data customized for the user as well as detailed drug data. The prescription data and drug data may be uploaded from a computer 150 to the digital label 10 by the manufacturer, pharmacist, doctor, or end user. In this example, the prescription data includes the medication, patient’s name, and dosage information. Drug data may include information about medications, such as ingredients and chemical composition, possible side effects and drug interactions, precautions, warnings, government regulations, legal notices, disclaimers and disclosures, notifications, medication updates, recalls, etc. Such information is typically too voluminous to print on a conventional printed label, but can be easily stored and displayed on the digital label 10. Drug information including updates could also be transmitted to a computer 150 over the communications interface 18 for viewing or printing. The digital label 10 could also communicate with a web-based server, cell phone, personal digital assistant, etc., to transmit and receive information.

[0036] An application program stored in the digital label 10 alerts the user when it is time to take medications, provides instructions on how to take medications, and records dosages taken by the user. The application program may also keep track of the remaining amount of medication and alert the user when it is time to refill medications. The amount of remaining medication may be determined from the input of the weight sensor 32. Alternatively, the user may manually input usage information when the user takes medication to record such event. The user can be alerted to take or refill medication by activating the indicator lamp 42 and displaying a message to the user on the display 16 as shown in FIG. 10. The digital label 10 may also, if desired, send a message to the user’s cell phone or computer when it is time to take or refill medications. For example, the application may send an email or text message to the user’s cell phone or computer. When it is time to refill medications, the digital label 10 may also send a notification to the user’s pharmacist to avoid the need for calling in prescriptions in advance.

[0037] The application program may also collect and store usage information, such as the date and time that the medication is taken, the amount taken, the location, and environmental conditions (temperature, humidity, altitude, etc.) at the time medication is taken. Usage information may be determined based on input from the weight, temperature, humidity and other sensors 32. Alternatively, the user can manually enter and record usage information using the available user input devices 20. The usage information may be output to the display 16 or transmitted to a computer 150 or other external device, or processed along with information from other digital labels and products to coordinate multiple usage and consumption.

[0038] The application program in the digital label 10 may cooperate with or integrate with medication management software on computer 150 or other device, such as a cell phone, PDA, or web-based server system. The digital label 10 can exchange prescription data, drug data and/or user data with the computer 150 or other device. The medication management software on the computer 150 can thus keep track of all medications being taken by the user and alert the user to potential problems and provide updates to the digital label 10 when necessary. The medication management software may include a database of pharmaceutical products. The medication management software can alert the user of potentially adverse drug interactions and side effects due to combinations of medications being taken. The medication management software may also include scheduling algorithms for suggesting times to take different medications to minimize drug interactions and maximize efficacy. A medication schedule can then be generated and transferred to the digital label 10 by the medication management software.

The medication management software can also store information concerning the user’s diet and suggest foods and beverages that should be used or avoided. Usage information indicating the dosages taken by the user can be transferred from the digital label 10 to the medication management software for evaluation and/or storage. This medication history may be transferred or uploaded to a physician. Alternatively, the digital label 10 can store medication history for later transfer to a computer at a physician’s office.

Provisional Patent Application No. 60/660,500

[0039] Aspects of the system were originally disclosed in U.S. Provisional Application Ser. No. 60/660,500 filed Mar. 10, 2005, entitled “Transmittable Digital Product and Label Data.” This provisional patent application was incorporated by reference through the family of patents/applications to the present application. The text of this incorporated provisional patent application is reproduced below.


[0041] Current labels affixed to any thing, product or object, etc. is printed. Objects and products can also have an embedded RFID micro-chip which only contains a code of numbers that can be transmitted through radio frequency signals to and from the chip (which is attached to object or product). The code is not actual product, labeling, personal or any kind of real information. The code that transmits back and forth from the RFID chip is a reference code that is matched in a computer system that identifies the product, object or thing it is attached onto.

[0042] A “digital labeling device” is a compact electronic device that contains in the micro-chip or processor or memory actual product, labeling, personal or any kind of actual information programmed into and transmitted to and
from the device by the manufacturers, end users, retailers or advertisers or any person or organization that has access to the digital labeling device. This device can have any appearance and any combination of electronic components depending upon the end use application and specification.

[0043] The innovation and novelty is the actual digitized product, labeling, personal, custom or any type of information in any spoken or written human language that can be saved in the device that is affixed or attached or programmed to or into the actual product or object and displayed from the device and transmitted to and from the device to a larger computer (s) or computer system (s) or any electronic device such as a cell phone, PDA, game console, digital camera, etc. This is different from current technology where an RFID chip embedded onto a product or object contains and transmits only a code or rather a reference number. It does not contain, transmit or display or output any actual product, label, object or personal information. An RFID chip and its code is useless to the end user or consumer or everyday person because it is a code or identification number used in logistical and inventory computer systems used by manufacturers and retailers. Product information is crossed referenced or accessed only by matching the code to the product information in a separate computer system and not immediately on the actual product.

[0044] Modern product and labeling information is dynamic and literally interconnected to supporting products and services. How and when the user interacts with the product or object affects the product and labeling information. Product life, product performance and its recorded history of interaction and usage affects the value of the object and product. For example, a car’s value is based upon its usage, care and service. Typically there is a paper trail of service and performance records. With digital labeling, all of that data can be stored in digital label where the digital label can monitor, maintain and transmit the digital product data to other computer systems. And when time to resell the car, all of this digital product data can transmit to a computer with internet connection and the car can be sold online. Or another example is a luxury good such as a luxury purse can constantly update its digital product data with its digital label. The digital label can transmit the data to a personal computer where the owner/user can catalog all goods owned. This example computer system utilizes product and label data sent from digital labels to catalog all products and objects in use by a user or users. The computer system can further analyze, track, monitor, maintain, manage all products/objects performance, data, value, history etc. Based upon custom software, settings, functions, etc. the computer system can transmit and send product data to and from product/objects with digital labels and to other computer systems for selling, further analysis, maintenance, service, etc.

[0045] Example Applications

[0046] For example, instead of reading pages of fine print or instructions, warranties, diagrams, etc on any product packaging, all this information in a digital label can be transmitted to any other device or computer and filed and stored digitally onto a computer system and be further sent through other electronic means such as email and over the internet, cellular, satellite, RF, etc. Another example application would be a prescription medication with a digital label that stores precise diagrams and instructions and dosages of how to use the medicine; warnings, cautions, when best to take the medication, what not to mix the medication, alarms when to take it, authentic medication, illustrations and animations on how it works, etc. all displayed for the user on a display screen and can be wirelessly sent to the user’s own computer system to keep track of all the medication, products, food the user is consuming. The pharmaceutical manufacturer can program the data into the label at the factory or the pharmacists can program “blank” digital labels with the proper prescription data for each customer/end user. Most of this important medical information for drug use is in very small text and designed not to be read. Digital drug product data can be displayed on the digital label on the actual medicine where the data as either text or instructional diagrams or animations can be enlarged for older patients/users or transmitted to a computer system for further organization (with other medications) and print out on standard paper for easier reading. The digital label can send a reminder to take the medication to the user’s cell phone if the user has skipped a dosage. These are examples of features and functionalities, they illustrate the conceptual possibilities yet it does not limit further possibilities for more and unseen features and functionality.

[0047] Example Digital Product and Label Information

[0048] The information can be any information relating to the object or product the digital labeling device is affixed, attached or integrated to; some examples are but not limited to are: name, product style, information, product info, color, care, content, material, ingredients, volume, weight, size, descriptions, performance data, research data, recycling info, manufacturing info, regulation info, origin, authentication, design, notes, coupons, discounts, marketing, advertisements, promotions, endorsements, signatures, product reviews, trials, clinical trials, astrological effects of product to user, website addresses and links, email addresses, customer service info, company and product contact info, nutritional info, medical data, pharmaceutical info, dosage, warnings, cautions, side effects, data from the government, patent info, trademark info, copyright info, FDA approval, recommended daily allowances, diet info, chemical composition, scientific data, disease info, instructions, opening instructions, illustrations, diagrams, warranty, authorization, owner’s or owners’ name or names, record and history of ownership, biographies, provenance, value, history and record of value, guarantee, legal info, rights, disclaimers, storage information, user names, passwords, security, safety, warnings, precautions, cautions, hazards, emergency, rescue, recycling info, video, movie clips, moving graphics, sound, sounds, audio, music, jingles, sound bytes, recordings, ring tones, lyrics, art, artist info, production credit, credits, management info, times, dates, inception dates, expiration dates, ship dates, manufacture dates, shelf life, product life, alarms, animated logos and branding, graphics, animated presentations, personal information, allergies, seals of approvals, awards, restrictions, stories, calculations, global positioning of product, location record and history, product history and story, company history and story, brand history and story, merchandising info, catalog of goods, matching goods, goods that accessorize with product, retail info and contact data, in any or all languages, etc. all pre-programmed at manufacture or custom programmed by the end user or transmitted from advertisers, retailers or anyone who has access to the device.
Example Digital Label Device Hardware/Electronic Composition

A "digital labeling device" comprises of a microchip(s) or processor(s) in various forms: flexible, silicon, printed, organic or chemical; powered or not powered by electricity from conduction, static electricity or from a battery in any various forms: button watch cell, battery pack, rechargeable, flexible, plastic battery, printable, organic, solar, etc.; and may or may not have a display in any various forms: flexible, LCD, OLED, LED, chemical organic, holographic, projected, etc backlit or non-backlit display; or output by any means such as speech, sound, alarms, magnetic resonance, sonic codes, secret codes, scent, etc; encased in any type of sealed casing made from any type of sealed casing either hard or soft along with or without memory chips, RAM chips, or micro hard drive or external memory card capabilities; wireless communication chips: RF, two way RF, or any wireless transmission technique, or wired data ports: USB; USB II, Firewire, Ethernet, modem or any custom port; the device can be affixed or attached to any object or product or packaging or any shape or size by any means such as any type of adhesion, chemical attachment, bonding, sonic welding, welded, soldered, Velcro, glue, double stick tape, any type of tape, sewn, hung, hooked, magnetic attachment, snapped, buttoned, zipped, slotted in, snapped on, twisted on, screwed onto, riveted, squeezed in pressure, suction, static electricity, etc. The digital labeling device can also be integrated into existing product or object and utilize the product or object's power, display or electronics to display or transmit digital product and labeling info and data. Input methods for the label include touch screen, button, keyboard, wired and wireless transmission, speech, movement, hand gestures, etc. in any size, shape or form.

The device may also feature electronic sensors that monitor the product or object against external, and or internal conditions, environment and all other data that will affect the product's or object's original product or labeling data. The sensors either electronic, digital or analog will monitor, gauge, calculate, record temperature, location, volume, size, dosage, weight, activity, shape, movement, proximity to anything else, users, security, authentication, tampering, etc. (i.e. all the types and examples of data listed previously for product and labeling information).

In essence, the digital labeling device hardware, or electronic composition is the CPU (central processing unit) for digitized label and product data. With the combination of hardware, electronic features, functions, OS (operation system), sensors, software etc, the digital labeling device will provide users with enhanced product usage through advanced digital product and label management, display and functionality.

Operating System and Software

For the digital labeling device, an “operating system” or primary device program/code will enable manufacturers, advertisers, retailers, end users and anyone with access to the digital labels to create software (digital code instructions) for the digital labeling device. Digital labeling software will instruct the device to perform custom product, object and label data functions that can monitor and perform tasks that affect product and label data. Operating system code manages the standard operations of the labeling device such as on/off, internal clock, processing of data and management of communication, sensors and other hardware.

The OS also manages the various software programs that create, run and process product and labeling data that create functionality and advanced features for the user.

For example, if the product such as perishable good or blood or organ reaches an expiration temperature then the sensors will notify the OS in which the OS will send a warning signal to another computer, system or device. The display will show a warning with full detail and sound an audio alarm. It can also activate or send instructions to another device or call for help in an emergency. Further, if a product or object is tampered with the device can activate an alarm and send a signal to the user’s cell phone and to the authorities. Yet another example is if a patient forgets to take medicine the digital label on the medicine bottle will note the prescribed dosage time, sensors will read the weight of the bottle and realize that the dosage was not taken at prescribed time and will send a reminder to the patient/user’s cell phone kindly reminding the patient to take the prescribed dosage. On the digital label, a beeping alarm will sound and a reminder will appear on the display. The patient will take the dosage and the digital label will note the dosage taken at x time and will send an update to computer systems (patient, pharmacist, doctor and manufacturer computer systems) noting the dosage taken, date and time. All of these examples are just examples of software instructing the operating system of the digital label to perform monitoring and function tasks based upon changes in product and labeling data, product performance and functionality. The “label operating system” of the digital labeling device provides the device with an “open platform” for end user software that programs or instructs the device to perform custom tasks.

Several examples of the invention have been described. However, the present invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

1. (canceled)
2. A device configured to be affixed to a medical container, the device comprising:
   a label comprising first and second sides, the first side configured to be attached to an outer surface of the medical container, the label further comprising a processing circuit and a memory circuit;
   the processing circuit configured to execute instructions stored in said memory circuit to output signals containing information related to contents of the medical container; and
   an output device to generate audible sounds based on the signals to convey the information related to the contents of the medical container.
3. The device of claim 2, wherein the processing circuit is further configured to communicate with a remote device to receive data related to the contents of the medical container.
4. The device of claim 3, further comprising a wireless communications interface operatively coupled to said label to communicate with the remote device.
5. The device of claim 2, further comprising a display on the second side of the label, the display configured to display the information related to the contents of the medical container.

6. The device of claim 5, wherein the display is configured to display video of the information related to the contents of the medical container.

7. The device of claim 2, further comprising an adhesive on the first side of the label, the adhesive configured to attach the label to the outer surface of the medical container.

8. The device of claim 2, wherein the information related to the contents of the medical container is stored in said memory circuit prior to being output on the output device.

9. The device of claim 2, wherein the information related to the contents of the medical container that are output through the output device comprises a dosage amount.

10. The device of claim 5, wherein the display is configured to display instructions and a diagram on how to use the contents of the medical container.

11. The device of claim 2, further comprising a battery to supply power to the processing circuit.

12. A device configured to be affixed to a medical container, the device comprising:

   a label comprising first and second sides, the first side configured to be attached to an outer surface of the medical container, the label further comprising a processing circuit and a memory circuit; and

   an input device configured to receive speech instructions from a user;

   the processing circuit configured to execute the speech instructions received by the input device.

13. The device of claim 12, wherein the processing circuit is configured to execute the speech instructions and cause information to be output to the user, the information comprising data related to the contents of the medical container.

14. The device of claim 13, further comprising the information that is output to the user being audible sounds.

15. The device of claim 13, further comprising a display on the second side of the label, the display configured to display information related to the contents of the medical container.

16. The device of claim 15, wherein the processing circuit is configured to display a dosage amount on the display.

17. The device of claim 12, wherein the processing circuit is further configured to communicate with a remote device to receive data related to the contents of the medical container.

18. The device of claim 17, further comprising a wireless communications interface operatively coupled to said label to communicate with the remote device.

19. The device of claim 12, wherein the information related to the contents of the medical container is stored in said memory circuit prior to being output on the output device.

20. The device of claim 12, wherein the information related to the contents of the medical container that are output through the output device comprises a dosage amount.

21. A device configured to be affixed to a medical container, the label device comprising:

   a label comprising first and second sides, the first side configured to be attached to the medical container, the label further comprising a processing circuit and a memory circuit;

   one or more sensors configured to monitor contents that are stored in the medical container;

   the processing circuit configured to execute instructions stored in said memory circuit to receive signals from the one or more sensors and determine an amount of the contents that are stored in the medical container.

22. The device of claim 21, further comprising a display on the second side of the label, the display configured to display information related to the contents of the medical container.

23. The device of claim 22, wherein the display is configured to display video of the information related to the contents of the medical container.

24. The device of claim 22, wherein the display is configured to display instructions and a diagram on how to use the contents stored in the medical container.

25. The device of claim 21, wherein the processing circuit is further configured to communicate with a remote device to receive data related to the contents of the medical container.

26. The device of claim 25, further comprising a wireless communications interface operatively coupled to said label to communicate with the remote device.

27. The device of claim 21, wherein the information related to the contents of the medical container is stored in said memory circuit prior to being output on the output device.

28. The device of claim 21, wherein the information related to the contents of the medical container that are output through the output device comprises a dosage amount.

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