(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 May 2015 (14.05.2015)

WIPO | PCT

(10) International Publication Number
WO 2015/068177 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/IN2014/000716

(22) International Filing Date:
11 November 2014 (11.11.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
5091/CHE/2013 11 November 2013 (11.11.2013) IN

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) Title: ELECTRONIC TAG FOR MONITORING THE STATUS OF ONE OR MORE SCHEDULES AND ITS METHOD OF OPERATION

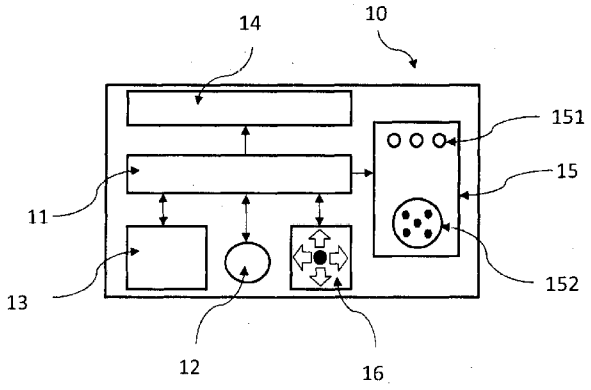

Figure 1

(57) Abstract: An electronic tag (10) for monitoring the status of one or more schedules is disclosed, said electronic tag (10) comprising at least one programmable microcontroller unit (1 1) for inputting data into the electronic tag (10); a real-time clock (12) controlled by the at least one microcontroller unit (1 1) that helps keep track of the schedule cycles of said one or more schedules; a serial input/output interface (13) to connect the electronic tag (10) with a host (18), a keyboard (16) for displaying information about the status of said one or more schedules on a LCD display (14); an alert mechanism (15) controlled by the at least one microcontroller unit (1 1); and a power source (17) for powering the electronic tag (10).

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TITLE OF THE INVENTION: ELECTRONIC TAG FOR MONITORING THE STATUS OF ONE OR MORE SCHEDULES AND ITS METHOD OF OPERATION

FIELD OF THE INVENTION

The present invention relates to an electronic tag. Particularly, the present invention relates to an electronic tag and a method for managing the schedule status of one or more schedules, such as managing the calibration status of one or more instruments/equipments. More particularly, the present invention relates to an electronic tag with a real- time clock to keep track of the schedule cycles of said schedules by monitoring the schedule status of said schedules.

BACKGROUND OF THE INVENTION

Keeping track of important dates and times of one or more schedules is important in many industries. Generally, said schedules are tracked by individuals periodically by the manual comparison of said dates with the current date. This is normally assisted by affixing printed labels or stickers (passive tags) with important dates.

Calibration of instruments/equipments is one scenario where keeping track of such schedules is important. Any organisation which has a quality certification system and uses instruments for any kind of measurement has to comply with calibration as per a pre-determined schedule. Calibration of an instrument ensures the accuracy and reliability of measurements made. It allows for faster processes which have lesser errors and greatly minimizes the chances of getting false readings that could lead to wrong conclusions. Calibration may be called for in the following cases: (i) a new instrument; (ii) after an instrument has been repaired or modified; (iii) when a specific time period has elapsed; or (iv) when a specified usage (such as operating hours) has elapsed. In the above, the third and the fourth scenarios involve tracking of time interval i.e., schedule.

In most industries, the number of instruments/equipments is very high and thus periodic monitoring of such schedules is required to be performed on every individual instrument. In some other cases, details like date of last calibration and due date of next calibration for each and every instrument are maintained in computers or record books. They may even be monitored by Laboratory Information Management Systems which send alerts. However, this

again requires manual monitoring, to keep track of the important dates and time intervals. In manual checking, the risk factor of missing important dates is very high. This leads to the use of instruments that are not accurate. This may lead to heavy losses in production, passing of a batch that may otherwise have failed and audit non-compliance.

Tracking of schedules is an important factor for many manufacturing industries and areas where shelf life of materials and criticality of processes or product quality may be a concern. It is also mandatory for regulated industries and entities which are related to human and animal health such as pharmaceutical, bio-pharmaceutical, biotechnology, hospitals, diagnostic centres, medical devices, chemical, food & beverages.

There is therefore a need in the art for an electronic tag for monitoring the schedule status of one or more schedules that overcomes the above mentioned drawbacks and has the below mentioned objectives.

OBJECTIVES OF THE INVENTION

An objective of the present invention is to provide an electronic tag that keeps track one or more schedules automatically.

Another objective of the present invention is to provide an electronic tag that keeps track of one or more schedules automatically and alerts a user visually and/ or audibly.

Yet another objective of the present invention is to provide an electronic tag that keeps track of one or more schedules automatically and alerts a user visually and/ or audibly based on the data stored programmatically on it.

Still another objective of the present invention is to provide an electronic tag that keeps track of one or more schedules automatically, alerts a user visually and/ or audibly based on the data stored programmatically on it and is reprogrammable and reusable.

SUMMARY OF THE INVENTION

In order to overcome the drawbacks in the prior art and achieve the above mentioned objectives, a first of its kind comprehensive solution for manufacturing, quality control and research laboratories for keeping track of one or more schedules is disclosed, with

centralized database management and hardware tags (an electronic tag). This electronic tag is programmable and comprises a real-time clock to keep track of the schedule cycles, a LCD display, and an alert mechanism comprising three or more LED indicators and a buzzer. The tag will find applications in any environment where schedule tracking is extremely important, such as equipment(s) and instrument(s) used in strict quality controlled/audited environments (like ISO certified manufacturing, GMP, GLP, Pharmaceutical, Bio-pharmaceutical, Biotechnology, chemical and Health care domains). The method of operation of the tag is also disclosed.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows a high level architecture diagram of an electronic tag.

Figure 2 depicts the host features, database, and power source, in addition to the electronic tag.

DETAILED DESCRIPTION OF THE INVENTION

Throughout this specification, the use of the words "comprise" and "include" and variations such as "comprises", "comprising", "includes", and "including" may imply the inclusion of an element or elements not specifically recited.

As depicted by Figure 1, an electronic tag (10) comprises at least one microcontroller unit (11), a LCD/LED or any other appropriate display (14), a serial input/output interface (13) (e.g., a USB or any other appropriate port), a real-time clock (12), a keyboard (16), and an alert mechanism (15), said alert mechanism (15) comprising three or more LED, or any other appropriate light indicators (151) and/ or a buzzer, or any other appropriate audio device (152). The microcontroller unit (11) generates controlling signals and is responsible for operation of the electronic tag (10) as per a user's specifications. The microcontroller (11) is programmable to adjust the electronic tag's (10) parameters as per a user's requirement and also controls the real-time clock (12) and the alert mechanism (15).

The real-time clock (12) helps keep track of one or more schedules. It consumes low power and further it is equipped with a battery backup feature so that time will not be lost or reset in the event of a power loss. The real-time clock (12) has a built-in power sense feature which detects power failures and automatically switches to the battery supply. The real-time clock

(12) counts seconds, minutes, hours, date, month, day of the week and year with leap year compensation. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including for leap year corrections. Said clock operates either in 24-hour format or 12-hour format with AM/PM indicator.

The real-time clock (12) is synchronized with the time of a host (18) to which the electronic tag (10) is connected; said host (18) may be a computer, a laptop, a tablet, a smartphone or any other similar equipment having at least one serial input/output interface(181) (e.g., a USB port) and a user interface (182). The features of the host (18) are depicted in Figure 2. As shown in Figure 2, the electronic tag (10) is powered by a suitable power source (17).

Input to the electronic tag (10) is programmed into the microcontroller (11) by connecting the electronic tag (10) with the host (18), and the output is viewed on a LCD display (14). Each operation of the keyboard (16) will display information about the status of one or more schedules on the LCD display (14).

The alert mechanism (15) comprises three or more LED, or any other appropriate light indicators (151) and/ or a buzzer, or any other appropriate audio device (152). The LED indicators (151) provide a visual alert while the buzzer (152) provides an audio alert. The LED indicators may be of any colour available in the market. In a preferred embodiment, the electronic tag (10) has three LED indicators (151)- a first LED indicator of red colour, a second LED indicator of yellow colour (or amber colour), and a third LED indicator of green colour.

Alternative embodiments of the disclosed electronic tag (10) include use of a wireless interface instead of the serial input/output interface (13) to connect with the host (18), using a LED display instead of the LCD display (14), using one or more push buttons in place of the keyboard (16), using a speaker in addition to/ in place of the buzzer (152) and using only audio and/or visual alerts without using any LED/LCD displays. For example, the electronic tag (10) may comprise a snooze button instead of the keyboard (16).

In operation, the electronic tag (10) can be operated in one of the following modes:

1. Programming mode: In this mode, the electronic tag (10) is connected to the host (18) using the serial input/output interface (13). This mode is used when the electronic tag (10) is installed for the first time or when the programmable fields are

being upgraded/changed using software, or during testing operations. In this mode, the alert mechanism (15) is programmed to indicate various states of programming.

2. Monitoring Mode: This is the active monitoring state of the electronic tag (10). In this mode, the LED indicators (151) are used to indicate status of the monitored instrument(s) to which the electronic tag (10) is associated with to a user. In a preferred embodiment, the signals are one of the following: "Out of Schedule" (red colour), "Schedule Due" (yellow colour or amber) or "In Schedule" (green colour). The LED indicators (151) can be programmed to blink as required. The buzzer (152) is used in combination with the LED indicators (151) to alert a user of an upcoming schedule.

3. Data Transfer Mode: In this mode of working, the alert mechanism (15) can be appropriately programmed to indicate the state of data transfers between the electronic tag (10) and a database (19) via a database interaction interface (183) in the host (18) (Figure 2).

In the above said modes of operation, the LCD display (14) can be used to view the program history at any point of time. The LCD display (14) substitutes the conventional paper tag giving many details such as the person in charge, date of last schedule, and schedule due date. The LCD display (14) is a very useful feature of the electronic tag (10) to augment more human readable information to the alert mechanism (15), on the tag status.

Preferably, the disclosed tag is used in monitoring the calibration status of one or more equipments/instruments. However, the disclosed electronic tag can also be used for other applications, including but not restricted to preventive maintenance cycles and other cases wherever time monitoring/tracking and scheduling/ rescheduling is required.

It will be apparent to a person skilled in the art that the above description is for illustrative purposes only and should not be considered as limiting. Various modifications, additions, alterations, and improvements without deviating from the spirit and the scope of the invention may be made by a person skilled in the art. For example, an individual electronic tag can be used for keeping track of multiple schedules, or every individual schedule can be tracked by a respective individual tag.

LIST OF REFERENCE NUMERALS

10 - Tag

11 - Microcontroller

12 - Real Time Clock (RTC)

13 - Serial Input/ Output interface

14 - Liquid Crystal Display (LCD)

15 - Alert Mechanism

151 - Visual Indicator (LED)

152 - Audible Indicator

16 - Keyboard

17 - Power Source

18 - Host

181 - Serial Input/ Output interface in Host

182 - User Interface in Host

183 - Database Interaction interface in Host

19 - Database

We claim:

1. An electronic tag (10) for monitoring the status of one or more schedules, comprising:

a) at least one programmable microcontroller unit (11) for inputting data into the electronic tag (10);

b) a real-time clock (12) controlled by the at least one microcontroller unit (11) that helps keep track of the schedule cycles of said one or more schedules, wherein the real-time clock (12) counts seconds, minutes, hours, day, month and year, with leap year compensation and automatic adjustment for months with fewer than 31 days, said real-time clock (12) having a built-in power sense feature for detecting power failures and automatically switching to a backup battery mode;

c) a serial input/output interface (13) to connect the electronic tag (10) with a host (18), said host (18) having at least one serial input/output interface (181), a user interface (182) and a database interaction interface (183) that facilitates data transfer between a database (19) of the host (18) and the electronic tag (10), wherein the real-time clock (12) is synchronized with the time of the host (18);

d) a keyboard (16) for displaying information about the status of said one or more schedules on a LCD display (14);

e) an alert mechanism (15) controlled by the at least one microcontroller unit (11), wherein the alert mechanism (15) comprises three or more visual light indicators (151); and

f) a power source (17) for powering the electronic tag (10).

2. An electronic tag (10) for monitoring the status of one or more schedules, comprising:

a) at least one programmable microcontroller unit (11) for inputting data into the electronic tag (10);

b) a real-time clock (12) controlled by the at least one microcontroller unit (11) that helps keep track of the schedules cycles of said one or more schedules, wherein the real-time clock (12) counts seconds, minutes, hours, day, month and year, with leap year compensation and automatic adjustment for months with fewer than 31 days, said real-time clock (12) having a built-in power sense feature for detecting power failures and automatically switching to a backup battery mode;

c) a serial input/output interface (13) to connect the electronic tag (10) with a host (18), said host (18) having at least one serial input/output interface (181), a user interface (182) and a database interaction interface (183) that facilitates data transfer between a database (19) of the host (18) and the electronic tag (10), wherein the real-time clock (12) is synchronized with the time of the host (18);

d) a keyboard (16) for displaying information about the status of said one or more schedules on a LCD display (14);

e) an alert mechanism (15) controlled by the at least one microcontroller unit (11), wherein the alert (15) mechanism comprises an audible indicator (152); and

f) a power source (17) for powering the electronic tag (10).

3. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the serial input/output interface (13) to connect the electronic tag (10) with the host (18) is a USB port.

4. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the serial input/output interface (13) to connect the electronic tag (10) with the host (18) is a wireless interface.

5. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the host (18) is a computer.

6. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the host (18) is a laptop.

7. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the host (18) is a tablet.

8. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the host (18) is a smartphone.

9. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1, wherein the alert mechanism (15) comprises three LED light indicators.

10. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 9, wherein the alert mechanism (15) comprises a first LED indicator of red colour to indicate "Out of Schedule" status, a second LED indicator of yellow colour to indicate

"Schedule Due" status, and a third LED indicator of green colour to indicate "In Schedule" status.

11. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1, further comprising an audible indicator (152).

12. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 11, wherein the audible indicator (152) is a buzzer.

13. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the real-time clock (12) displays time in 24-hour format.

14. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the at least one serial input/output interface (181) in the host (18) is a USB port.

15. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the electronic tag (10) is capable of operating in:

a) a programming mode when the electronic tag (10) is being installed for the first time or when the input data is being changed;
b) a monitoring mode when the electronic tag (10) is in an active state; or
c) a data transfer mode when data is being transferred between the database (19) of the host (18) and the electronic tag (10).

16. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, further comprising one or more push buttons, wherein the keyboard (16) is dispensed with.

17. The electronic tag (10) for monitoring the status of one or more schedules as claimed in claim 1 or claim 2, wherein the LCD display (14) is dispensed with.

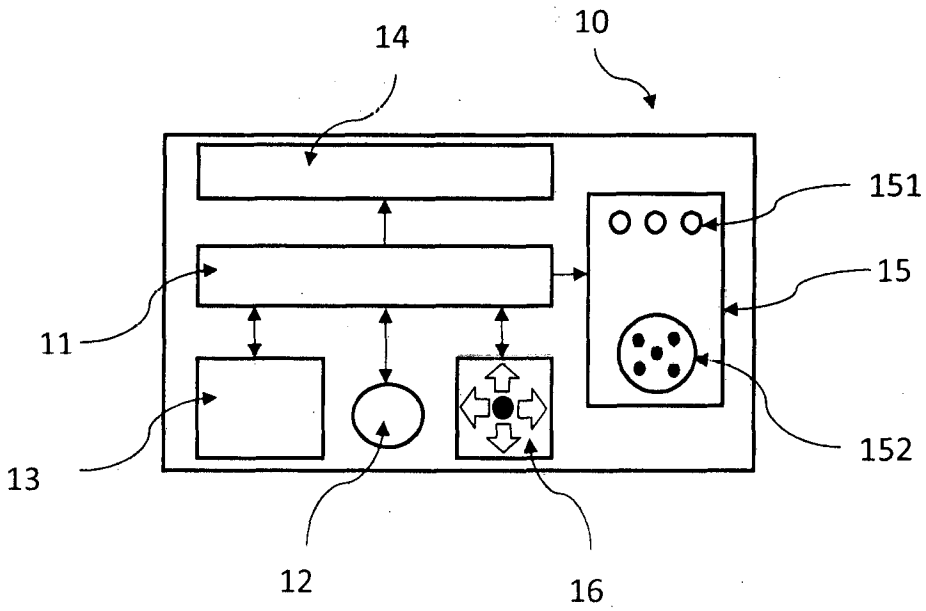

Figure 1

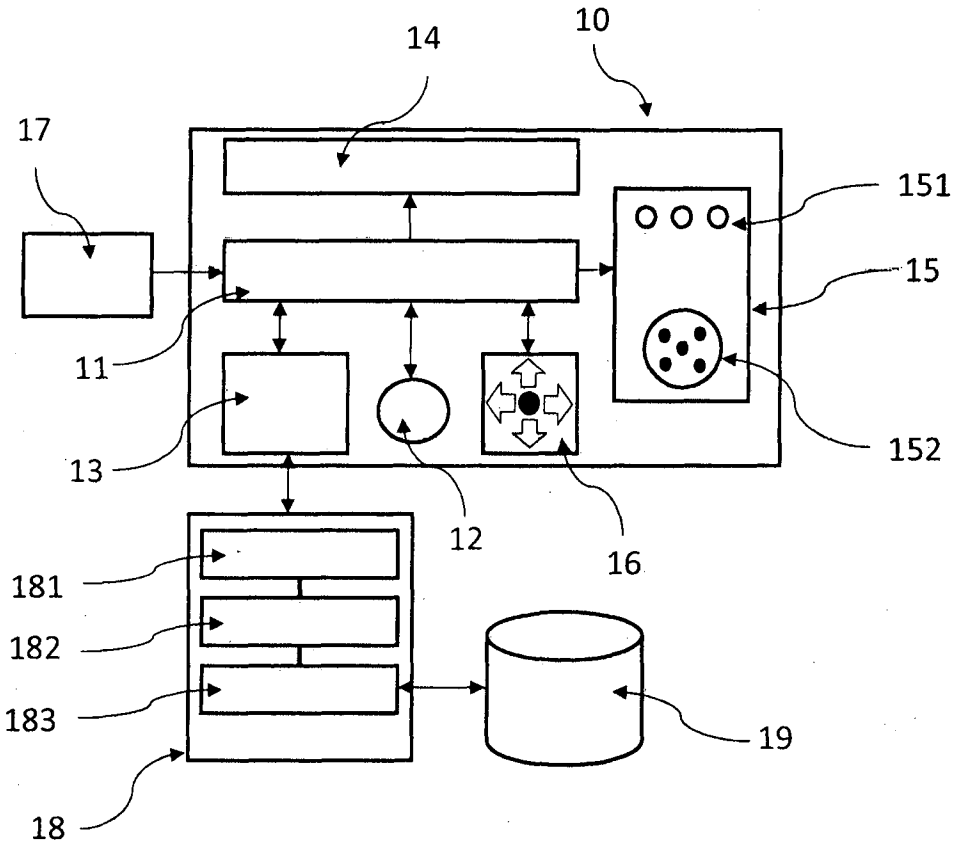

Figure 2