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(54) **INTERACTIVE TOY AND METHOD OF CONTROL THEREOF**

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(57) **ABSTRACT**

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An electronically actuated interactive audio toy system is disclosed. According to an example embodiment of the present invention, the audio toy is a "read-along" toy that is used in conjunction with a corresponding library item such as a book, such that a user can read the text as the audio toy articulates the text. The audio toy includes a number of stored predefined audio tracks that can be played back through audio reproductive means such as a speaker within the toy. The specific audio track to be played back is selected through the use of a sensor embedded in the toy, which detects a selection identifier located on a corresponding book. The selection identifier is a coded identifier, and a control unit within the toy decodes the coded identifier and proceeds to play back the corresponding audio track. Each audio track can include articulated text, music and sound effects. The toy further includes pressure switches operable by the user to repeat segments of the audio track or advance to other segments of the audio track.

(21) Appl. No.: **10/375,255**

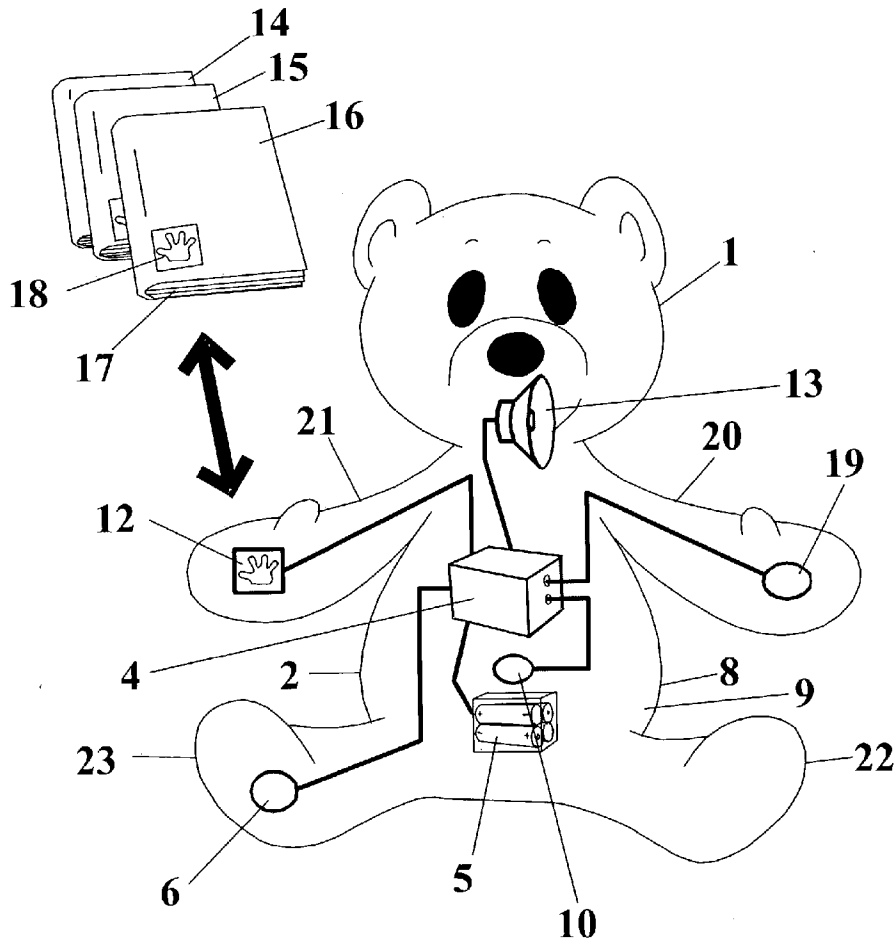
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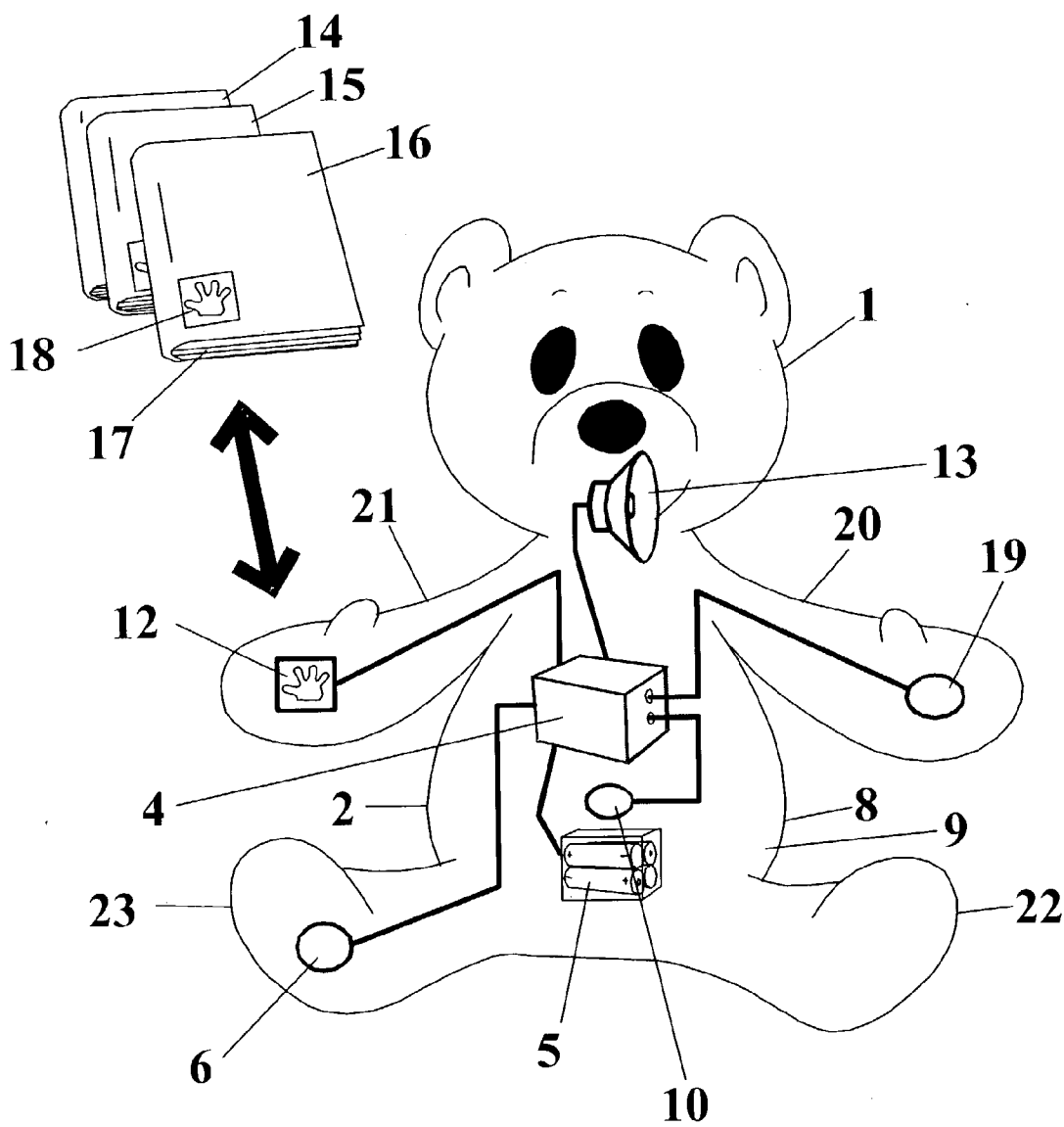


Figure 1

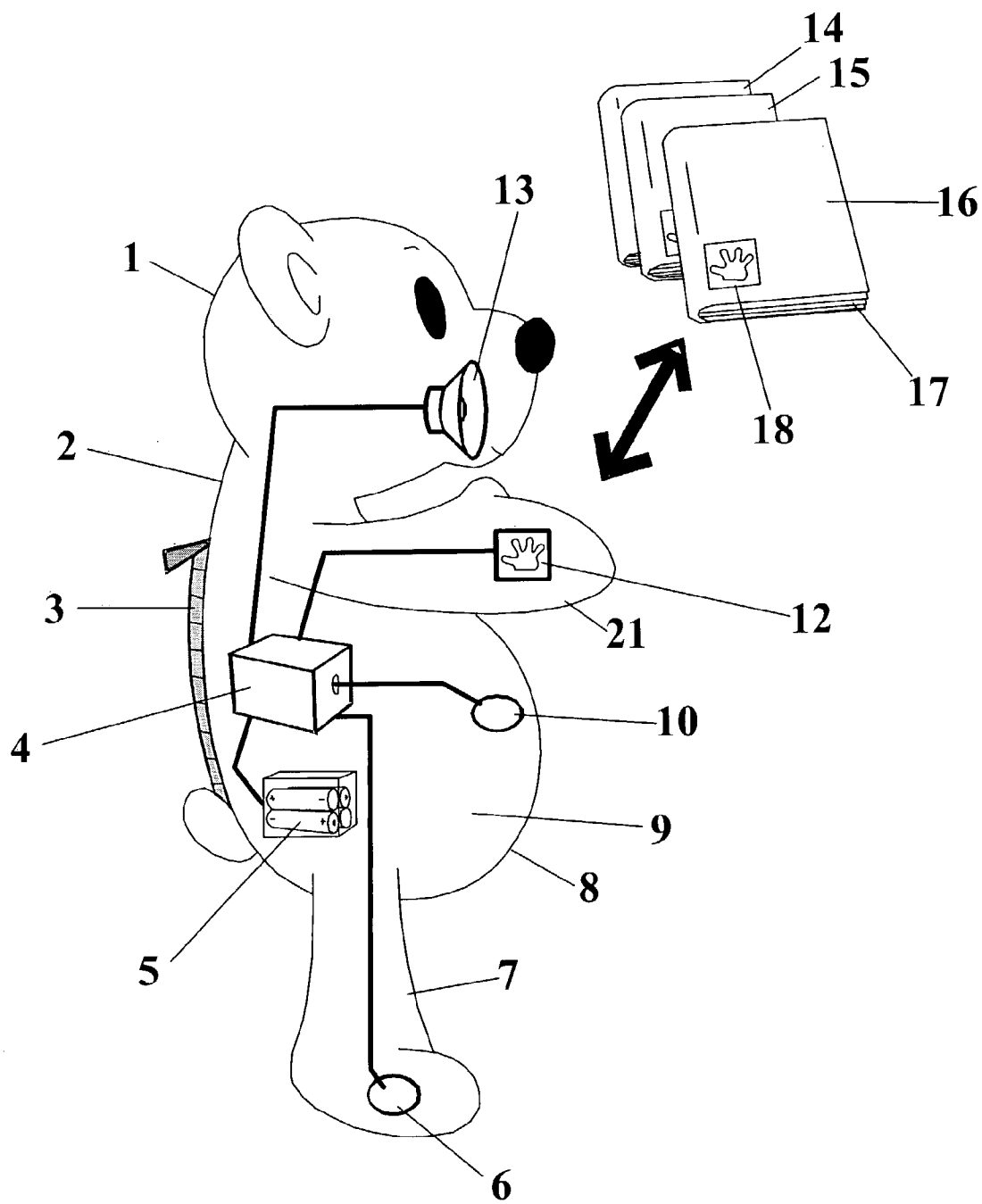


Figure 2

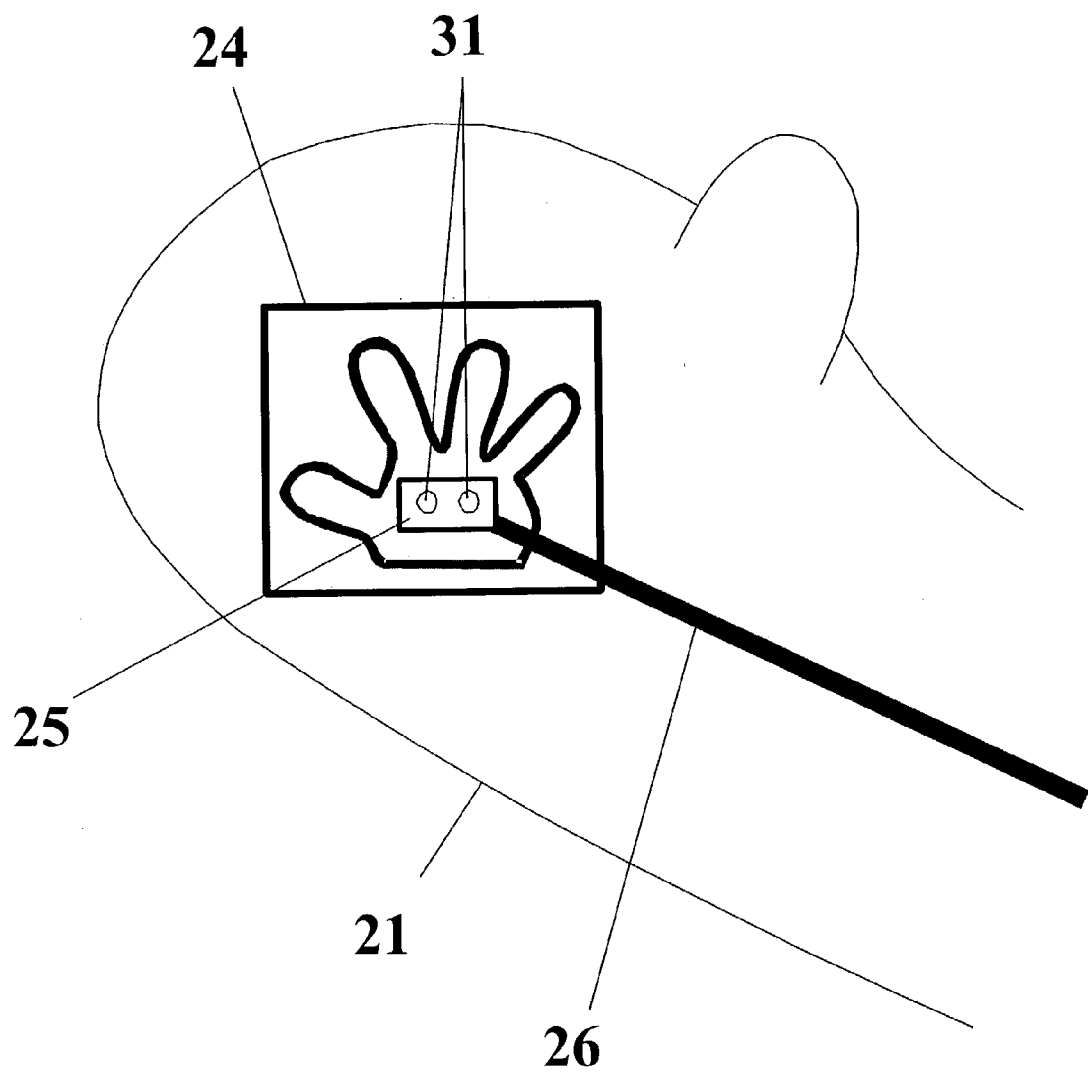


Figure 3

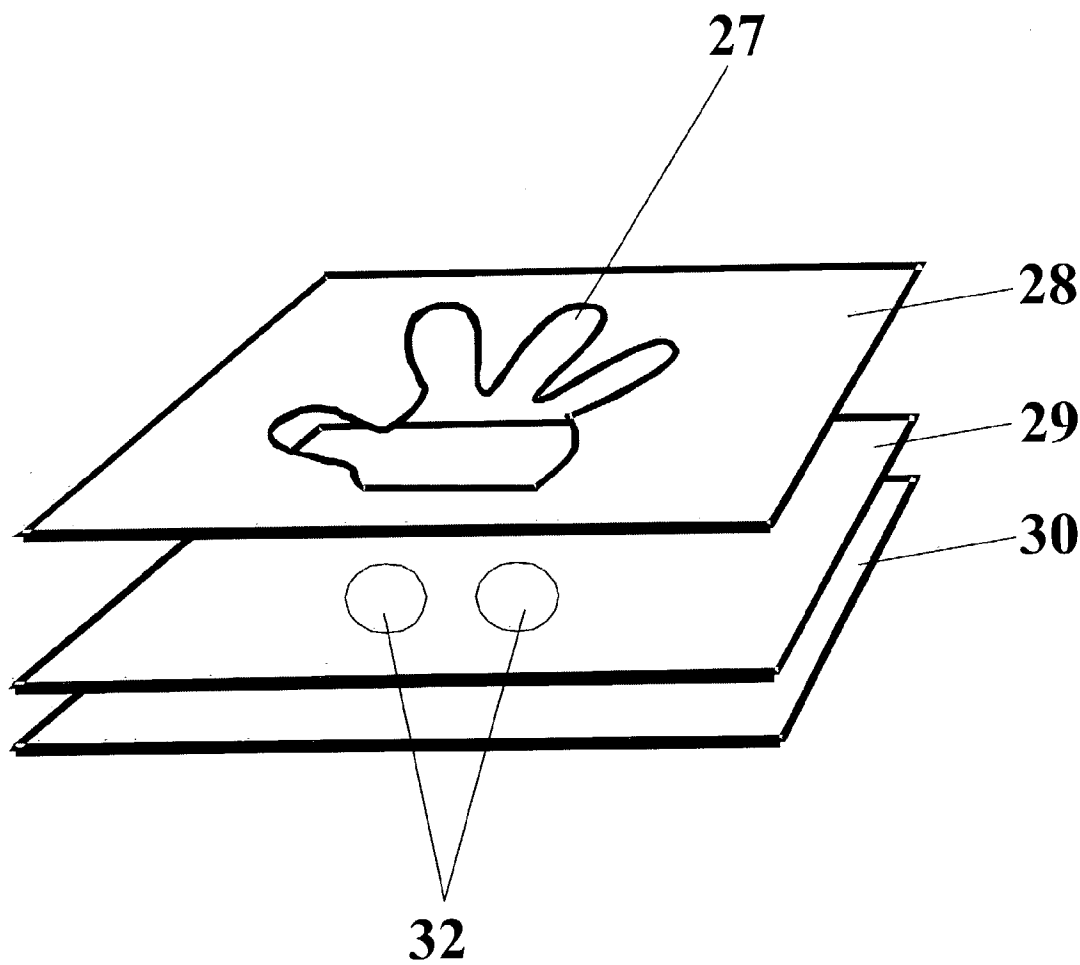


Figure 4

INTERACTIVE TOY AND METHOD OF CONTROL THEREOF

[0001] The present application claims priority from U.S. patent application Ser. No. 60/359,904, filed on Feb. 28, 2002.

FIELD OF THE INVENTION

[0002] The present invention relates in general to interactive audio toys. In particular, the present invention relates to toys that provide electronically actuated voice audio.

BACKGROUND OF THE INVENTION

[0003] It is known in the art to provide toys with a magnetic audio tape, digital media cartridge or similar media, to play audio signals which represent the text of a book. One example is to place an audio tape within a plush animal and to provide a book associated with the audio content of the tape for use by a user, typically a child. When the audio tape is played by an audio tape player in the plush animal, the child can read along with the associated book.

[0004] A major drawback with the prior art is the increased costs associated with producing and distributing a collection of published materials such as a library of books with accompanying tapes or alternative storage media. Furthermore, tapes and other external storage media can become separated from the associated book, without which the book can no longer be "read" by the toy. Additionally, separate storage media add external elements to the toy that can become easily damaged or lost through the course of typical childhood play. Therefore users desiring replacement tapes are inconvenienced by having to purchase a new book since the book and tape are typically sold as a bundle.

[0005] There exists, therefore, a need for a robust, low-cost interactive audio toy system that does not require audio storage media, such as audio tapes.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to obviate or mitigate at least one disadvantage of previous interactive audio toy systems. In particular, it is an object of the present invention to provide an interactive audio toy system that does not require the use of external audio storage media.

[0007] In a first aspect, the present invention provides a method of controlling an interactive toy having a plurality of predefined interactions and a selection sensor. The method includes selecting an item from a plurality of external library items, the selected item having a selection identifier for distinguishing the selected item from other items in the library, engaging the selection sensor with the selection identifier for determining an identity of the selected item, selecting a predefined interaction from the plurality of predefined interactions, the selected predefined interaction corresponding to the identity of the selected item, and performing the selected predefined interaction.

[0008] In an embodiment of the present aspect, the step of engaging includes touching the selection identifier with the selection sensor, and maintaining contact between the selection identifier and the selection sensor for a predetermined duration of time to determine the identity of the selected item.

[0009] In alternate embodiments of the present aspect, the method includes the steps of pressing a pressure switch for repeating the selected predefined interaction, pressing a pressure switch for repeating a segment of the selected predefined interaction, and pressing a pressure switch for advancing to another segment of the selected predefined interaction. In an aspect of the present embodiment, a pressure switch is pressed and held for a predetermined duration of time for performing all segments of the selected predefined interaction without pause.

[0010] In other alternate embodiments of the present aspect, the step of engaging includes measuring one of a resistance value, a capacitance value, an active inductance value, a passive inductance value, a magnetic field value, an image, infrared light, and an RF signal of the selection identifier.

[0011] In a second aspect, the present invention provides an interactive toy for use with an item selected from a plurality of external library items, where the selected item having a selection identifier for distinguishing the selected item from other items in the library. The toy includes storage means for storing a plurality of predefined interactions, a selection sensor for engagement with the selection identifier for determining the identity of the selected item, and a controller for selecting and performing one of the predefined interactions corresponding to the identity of the selected item.

[0012] In an embodiment of the present aspect, the storage means includes solid state memory such as non-volatile memory. In another embodiment, the selection identifier includes a resistance element, and the toy further includes a resistance measuring circuit for measuring the resistance value of the resistance element. The selection identifier and the selection sensor can each include a pair of dual contacts. In yet another embodiment of the present aspect, the toy includes a pressure switch for providing user input to the controller for controlling performance of the predefined interaction. The toy can alternatively include a first pressure switch for instructing the controller to repeat the predefined interaction, a second pressure switch for instructing the controller to repeat a segment of the predefined interaction, and a third pressure switch for instructing the controller to advance to another segment of the selected predefined interaction.

[0013] In a third aspect, the present invention provides an interactive audio toy system. The interactive toy system includes a library item having a resistance based selection identifier, and a toy having storage means for storing a plurality of predefined interactions, a selection sensor for measuring the resistance value of the resistance based selection identifier, and controller for selecting one of the predefined interactions corresponding to the measured resistance value, and performing the predefined interaction.

[0014] In an embodiment of the present aspect, the toy further includes a first pressure switch for instructing the controller to repeat the predefined interaction, a second pressure switch for instructing the controller to repeat a segment of the predefined interaction, and a third pressure switch for instructing the controller to advance to another segment of the selected predefined interaction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Preferred embodiments of the present invention will now be described, by way of example only, with reference to the attached Figures, wherein:

[0016] FIG. 1 is a schematic illustration of an interactive audio toy system according to an embodiment of the present invention;

[0017] FIG. 2 shows a schematic side view of the interactive audio toy system of FIG. 1;

[0018] FIG. 3 is a detailed view of the right arm of the interactive audio toy shown in FIG. 1; and

[0019] FIG. 4 is a detailed view of a selection identifier shown in FIGS. 1 and 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] An electronically actuated interactive audio toy system is disclosed. According to an example embodiment of the present invention, the audio toy is a "read-along" toy that is used in conjunction with a corresponding library item such as a book, such that a user can read the text as the audio toy articulates the text. The audio toy includes a number of stored predefined audio tracks that can be played back through audio reproductive means such as a speaker within the toy. The specific audio track to be played back is selected through the use of a sensor embedded in the toy, which detects a selection identifier located on a corresponding book. The selection identifier is a coded identifier, and a control unit within the toy decodes the coded identifier and proceeds to play back the corresponding audio track. Each audio track can include articulated text, music and sound effects. The toy further includes pressure switches operable by the user to repeat segments of the audio track or advance to other segments of the audio track.

[0021] FIG. 1 illustrates the components of the interactive audio toy system according to a preferred embodiment of the present invention. The interactive audio toy system includes a toy and a library of external items such as books. The interactive toy reproduces any one of a number of predefined interactions, preferably playing back a pre-recorded audio track corresponding to the text of any one of the books in the external library.

[0022] In FIG. 1, the toy, commonly called a "teddy bear", is shown in a partial phantom, frontal view. The toy is preferably a portable toy provided with an interior region 9 surrounded by a shell 8 made of any suitable material, but preferably constructed of cotton, polyester, or other plush material. As indicated in FIG. 1, the toy is preferably provided with a head 1, a body 2, a left arm 20, a right arm 21, a left leg 22, and a right leg 23. The three books shown in FIG. 1 are examples of books from a library of books available for use with the toy of the interactive audio toy system of the present embodiment.

[0023] A description of the toy shown in FIG. 1 is now described in further detail.

[0024] As shown in FIG. 1, a selection sensor 12 is provided in the paw of the right arm 21 of the toy. The selection sensor 12 is connected to a controller such as control unit 4 by wires. In this particular embodiment, the

selection sensor 12 is a resistance sensor that measures the resistance between a pair of sensor nodes. Details of the selection sensor 12 are shown later in FIG. 3. The control unit 4 is coupled to a power source such as battery pack 5. The battery pack 5 preferably holds 4 AA batteries, but can be any suitable source of power for the control unit 4. The toy also includes a speaker 13, and actuators such as pressure switches 6, 10, and 19. The pressure switches 6, 10, and 19 serve as user control inputs to the control unit 4, and are described in further detail later.

[0025] The control unit 4 is configured, as is known in the art, to provide a signal which travels to a speaker 13 through wires to create a sound. Control unit 4 includes commercially available audio circuits, such as digital signal processors and application specific integrated circuits, that can provide this functionality. The speaker 13 is shown in contact with the shell of the toy to provide maximum signal strength. The speaker 13 is placed in the head 1, but can be placed in any desired area of the toy.

[0026] The control unit 4 includes storage means (not shown), preferably a ROM integrated circuit, for storing a plurality of predefined interactions, such as audio tracks, and a microcontroller which interprets the stored digital data and converts it to an analog signal for speaker output. Control unit 4 also controls other functions of the toy. In the present embodiment the storage means is a solid state memory such as a read only memory (ROM) chip, but the storage means can be other types of non-volatile storage memory such as flash memory, EEPROM and EPROM, or non-volatile media such as magnetic or optical disc drives. Of course, the storage means can be external to the control unit, while located within the toy.

[0027] A description of the books 14, 15 and 16 shown in FIG. 1 now follows.

[0028] As shown in the first book 16, each is provided with a cover and a plurality of pages 17. The cover of book 16 has a selection identifier 18 affixed to it, and this identifier is unique to that title within the library of books. It is understood, of course, that the library can contain any number of books. Each book 14, 15 and 16 includes a corresponding selection identifier affixed to its cover, where the selection identifier represents a code associated with a corresponding audio track. In the present embodiment, each selection identifier is a resistor element having a predetermined resistance value. Alternative means of identifying the selection identifier using electronic circuits and components are also possible.

[0029] In FIG. 2, the toy of FIG. 1 is shown in a partial phantom, right side view. This side view illustrates the use of a releasable fastener 3 such as Velcro™, to allow servicing or replacement of battery pack 5. The same numbered elements have been previously described for FIG. 1.

[0030] FIG. 3 is a detailed view of the right arm 21 of the toy shown in FIGS. 1 and 2. As shown in FIG. 3, the selection sensor 12 includes a resistance sensor 25, with metallic contact nodes 31, which measure the value of a resistor between them. Wires 26 couple contact nodes 31 to the control unit 4. The location and orientation of the selection sensor is designated by a symbol 24 on the toy for the convenience of the user.

[0031] FIG. 4 shows construction details of the selection identifiers of the books shown in FIGS. 1 and 2. As shown

in detail in **FIG. 4**, the selection identifier of the present embodiment consists of three component layers. The first layer **30** contains adhesive, such as glue, to affix the selection identifier **18** to the book surface. The second layer **29** includes metallic contact points **32** with a resistor, or equivalent, between them. The third layer **28** is a surface, such as paper or plastic, with a cut out or printed symbol corresponding to that of the selection sensor symbol **24** located on the right arm **21** of the toy. The third layer **28** includes an opening **27** to expose the metallic contact nodes **32** of the second layer **29**. The resistance value between the contact nodes **32** is different for different books.

[0032] The operation of the interactive audio toy system shown in **FIGS. 1 and 2** is discussed below.

[0033] As previously mentioned, the control unit **4** of the toy, and in particular the storage means, includes an audio track for each book of a library of associated books. Furthermore, each audio track includes a set of audio responses corresponding to each selection identifier **18** in the library of associated books.

[0034] To operate the present invention, the selection identifier **18** affixed to a book, is touched momentarily to the selection sensor **12** of the toy “teddy bear” paw on its right arm **21** so that contacts **31** of the selection sensor **12** engage the contacts **32** of the selection identifier. The user is guided to the correct orientation for contact by the matching symbols on the selection identifier **18** and the selection sensor **12**. As is well known to those of skill in the art, the matching symbols can take on any desired shape. Alternatively, different types of contact shapes can be used such that the orientation between the selection identifier and the selection sensor is not important. For example, the contacts of the selection identifier and the selection sensor can be configured as a pair of concentric rings. Contact between the selection sensor **12** and selection identifier **18** is preferably maintained for a duration of time sufficient to allow proper measurement of the selection identifier resistance value.

[0035] When the selection sensor **12** engages the selection identifier **18**, for example by momentary physical contact, the selection sensor **12** senses the resistance value of the selection identifier **18**. A resistance measuring circuit can be located near the selection sensor **12** for measuring the resistance and providing a digital signal corresponding thereto. The resistance detected is correlated to a range of values representing a specific book, in this case the first book **16**. For example, a resistance between 0.5K Ohm and 1.5K Ohm indicates the first book **16**, 2.5K Ohm to 3.5K Ohm resistance represents the second book **15**, and 7.5K Ohm to 8.5K Ohm resistance represents the third book **14**. Alternatively, the control unit **4** can include a resistance measuring circuit that converts the measured resistance into a digital signal corresponding to a specific audio track.

[0036] The selection sensor **12** passes information to the control unit **4**, allowing the control unit **4** to actuate the audio response stored in memory that corresponds to the selected book **16**. An audio signal is sent to the speaker **13**, which provides an audible output of the triggered response. For example, the toy may read from the text of the book “Once upon a time . . .”, comment on the material “Stories like this are fun!”, and make a related comment “Can you see the princess in the picture?”.

[0037] Of course, the interactions are defined by the information stored in the storage means. For clarity, the

expression “storage of a predefined interaction” includes the storage of the information used to define the interaction as well as the interaction itself. For example, a sound such as the word “Hello” has a digital or analog representation. Similarly the song “Happy Birthday” can be represented digitally or by analog means. The interaction is the reproduction of the song “Happy Birthday” by the toy. Reference to a predefined interaction includes the representation of that interaction stored in memory, With the meaning being clear by context.

[0038] In another example, if the book selected represented lyrics for a song, the toy could sing the song while the child follows along with the text and pictures. As any audio can be included in the memory of the toy, it is apparent that any desirable audio interpretation can be triggered for a specific book in the library.

[0039] According to an alternate embodiment of the present invention, the pressure switches **6, 10, and 19** provide additional control over the control unit **4**. As shown in **FIG. 1**, the right foot **23** is provided with a pressure switch **6**, connected by a wire to the control unit **4**, which triggers a reset of the control unit **4**, for example, to start reading the story again. A second pressure switch **19** is provided in the left hand **20**, connected by a wire to the control unit **4**, to trigger a repeat of the last action, or segment of the audio track performed by the control unit **4**, for example, to read that page again. A third pressure switch **10** is provided in the torso **2** of the toy, also connected by a wire to the control unit **4**. If the child wishes to advance to actions, or segments, related to the currently selected library item, for example reading the next page of a story or singing a new verse, the pressure switch **10** in the torso **2** is activated, for example, by giving the toy a hug. If the child wishes to continue with all remaining actions, or segments related to the currently selected library item, for example reading all remaining pages of the story without pause or singing all remaining verses of a song without pause, pressure switch **10** in the torso **2** is activated for a preset length of time. Although only three pressure switches are shown, any number of pressure switches and corresponding functions can be used in alternate embodiments.

[0040] Although the invention has been described with respect to a preferred embodiment, it is to be understood that it is not to be so limited, since changes and modifications can be made therein which are within the intended scope of this invention as defined by the appended claims.

[0041] For example, it is contemplated that the selection identifier can contain multiple resistors, and the selection sensor can include multiple points of contact, to increase the number of unique resistance values. It is further anticipated that methods of identification other than resistance can be applied to the selection sensor and selection identifier. For example a capacitance sensor, active inductive sensor, passive inductive sensor, magnetic sensor, image sensor, infrared sensor, RF tag or other methods could equally be applied for detection of different library items.

[0042] It is also contemplated that the selection identifier need not be affixed to the library items, but can be attached through methods other than by adhesion. It is further contemplated that the functional equivalent to the selection identifier can be provided by other embodiments, such as conductive inks or by embedding the resistor elements in the cover or pages of the books.

[0043] It is to be understood that the library of media associated with the toy need not consist of books, but can instead be one or more sheets of material such as a song sheet or flash cards for example. The library can also be other media such as compact disks, video tapes or other toys. It is also to be understood that the library can consist of any number of media items. It is additionally contemplated that the responses programmed in the toy could be updated to reflect a new library by replacing or augmenting the storage means.

[0044] It is also contemplated that toys could be produced with varying configurations of limbs, and that the pressure switches and speaker provided may be located in any desirable position throughout the toy.

[0045] It is further contemplated that actions other than audio can be triggered by selecting a library item. For example, the toy can include mechanical actuators to move the toy with dance type motions if a book about ballet or dancing is selected. It is further contemplated that the function of the switches can be altered, allowing the toy to receive input based on the selected library item. For example, the toy could ask a "Yes" or "No" question about the library item selected, with the appropriate answer chosen by receiving input from a user, for example, by using the pressure switches or a microphone.

[0046] With the interactive audio toy system according to embodiments of the present invention, copies of external audio storage media are no longer required for sale with the associated published material. Published material with the additional selection identifier, such as books, can be sold separately from the toy without a significant cost increase to the books. Further cost savings can be obtained because external tapes or storage media are not required. Thus an economic advantage can be realized by the publishing and toy industries.

[0047] The above-described embodiments of the invention are intended to be examples of the present invention. Alterations, modifications and variations may be effected the particular embodiments by those of skill in the art, without departing from the scope of the invention which is defined solely by the claims appended hereto.

We claim:

1. A method of controlling an interactive toy having a plurality of predefined interactions and a selection sensor, the method comprising:

- (a) selecting an item from a plurality of external library items, the selected item having a selection identifier for distinguishing the selected item from other items in the library;
- (b) engaging the selection sensor with the selection identifier for determining an identity of the selected item;
- (c) selecting a predefined interaction from the plurality of predefined interactions, the selected predefined interaction corresponding to the identity of the selected item; and
- (d) performing the selected predefined interaction.

2. The method of claim 1, wherein the step of engaging includes touching the selection identifier with the selection sensor.

3. The method of claim 2, wherein the step of touching includes maintaining contact between the selection identifier and the selection sensor for a predetermined duration of time to determine the identity of the selected item.

4. The method of claim 1, further including the step of pressing a pressure switch for repeating the selected predefined interaction.

5. The method of claim 1, further including the step of pressing a pressure switch for repeating a segment of the selected predefined interaction.

6. The method of claim 1, further including the step of pressing a pressure switch for advancing to another segment of the selected predefined interaction.

7. The method of claim 6, further including the step of pressing and holding a pressure switch for a predetermined duration of time for performing all segments of the selected predefined interaction without pause.

8. The method of claim 1, wherein the step of engaging includes measuring a resistance value of the selection identifier.

9. The method of claim 1, wherein the step of engaging includes measuring a capacitance value of the selection identifier.

10. The method of claim 1, wherein the step of engaging includes measuring an active inductance value of the selection identifier.

11. The method of claim 1, wherein the step of engaging includes measuring a passive inductance value of the selection identifier.

12. The method of claim 1, wherein the step of engaging includes measuring a magnetic field value of the selection identifier.

13. The method of claim 1, wherein the step of engaging includes scanning an image of the selection identifier.

14. The method of claim 1, wherein the step of engaging includes measuring infrared light from the selection identifier.

15. The method of claim 1, wherein the step of engaging includes measuring an RF signal from the selection identifier.

16. An interactive toy for use with an item selected from a plurality of external library items, the selected item having a selection identifier for distinguishing the selected item from other items in the library, the toy comprising:

storage means for storing a plurality of predefined interactions;

a selection sensor for engagement with the selection identifier for determining the identity of the selected item; and,

a controller for selecting and performing one of the predefined interactions corresponding to the identity of the selected item.

17. The interactive toy of claim 16, wherein the storage means includes solid state memory.

18. The interactive toy of claim 17, wherein the solid state memory includes non-volatile memory.

19. The interactive toy of claim 16, wherein the selection identifier includes a resistance element.

20. The interactive toy of claim 19, further including a resistance measuring circuit for measuring the resistance value of the resistance element.

21. The interactive toy of claim 20, wherein the selection identifier and the selection sensor each include a pair of dual contacts.

22. The interactive toy of claim 16, further including a pressure switch for providing user input to the controller for controlling performance of the predefined interaction.

23. The interactive toy of claim 16, further including

a first pressure switch for instructing the controller to repeat the predefined interaction,

a second pressure switch for instructing the controller to repeat a segment of the predefined interaction, and

a third pressure switch for instructing the controller to advance to another segment of the selected predefined interaction.

24. An interactive audio toy system comprising:

a library item having a resistance based selection identifier; and,

a toy having

storage means for storing a plurality of predefined interactions,

a selection sensor for measuring the resistance value of the resistance based selection identifier, and

a controller for selecting one of the predefined interactions corresponding to the measured resistance value, and performing the predefined interaction.

25. The interactive audio toy system of claim 24, wherein the toy further includes

a first pressure switch for instructing the controller to repeat the predefined interaction,

a second pressure switch for instructing the controller to repeat a segment of the predefined interaction, and

a third pressure switch for instructing the controller to advance to another segment of the selected predefined interaction.

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