1776 – 2026

United States of America

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The Director

of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this United States

Patent

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John A. Squires

Director of the United States Patent and Trademark Office

250

1776-2026 ★★★

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If the application for this patent was filed on or after June 8, 1995, the term of this patent begins on the date on which this patent issues and ends twenty years from the filing date of the application or, if the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121, 365(c), or 386(c), twenty years from the filing date of the earliest such application ("the twenty-year term"), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b), and any extension as provided by 35 U.S.C. 154(b) or 156 or any disclaimer under 35 U.S.C. 253.

If this application was filed prior to June 8, 1995, the term of this patent begins on the date on which this patent issues and ends on the later of seventeen years from the date of the grant of this patent or the twenty-year term set forth above for patents resulting from applications filed on or after June 8, 1995, subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b) and any extension as provided by 35 U.S.C. 156 or any disclaimer under 35 U.S.C. 253.

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Chen et al.

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(45) **Date of Patent: *Aug. 11, 2026**

(54) **INTERACTIVE ELECTRONIC TOY SYSTEM**

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(73) Assignee: **Flycatcher Corp LTD**, London (GB)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 282 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Feb. 6, 2024**

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(60) Provisional application No. 62/853,079, filed on May 27, 2019.

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A63H 33/00	(2006.01)
G06F 3/0346	(2013.01)
G09B 5/00	(2006.01)
G09B 17/00	(2006.01)
A63F 9/24	(2006.01)

(52) **U.S. Cl.**

CPC ***A63H 33/00*** (2013.01); ***G06F 3/0346*** (2013.01); ***G09B 5/00*** (2013.01); ***G09B 17/003*** (2013.01); *A63F 2009/2402* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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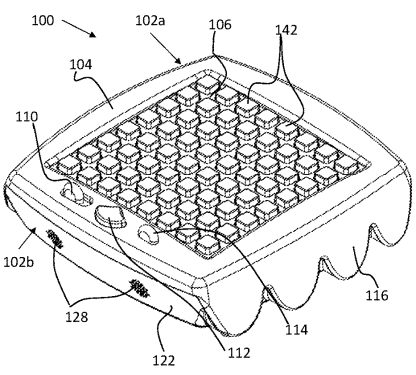
(57) **ABSTRACT**

An interactive electronic toy and a method for providing a challenge to a user using the toy. The toy includes a housing and a plurality of buttons, each button associated with at least one illuminator and with at least one pressure sensor. The method includes receiving a selection of a specific challenge, said specific challenge being selected from a challenge repository associated with the interactive electronic toy, and providing to the user instructions for completing said specific challenge. The method further includes receiving a challenge response from the user, in which the user responds to said specific challenge by at least one of moving the housing of the interactive electronic toy and depressing at least one of the plurality of buttons, providing feedback to the user, based on said received challenge response.

19 Claims, 4 Drawing Sheets



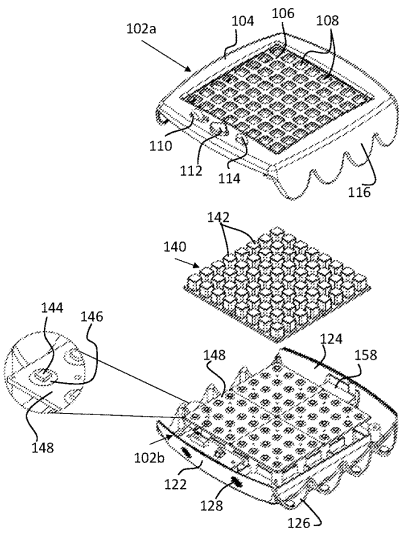


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FIG. 2A

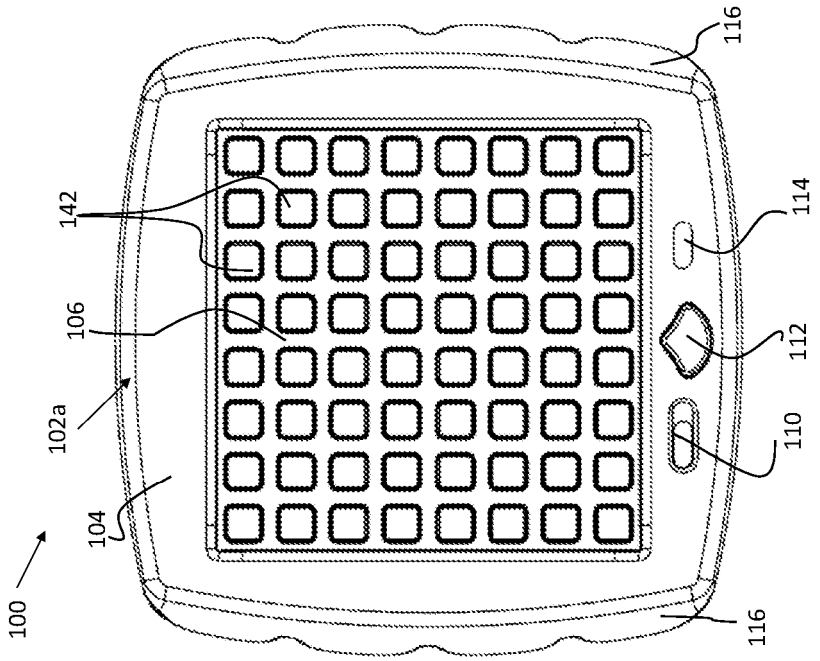
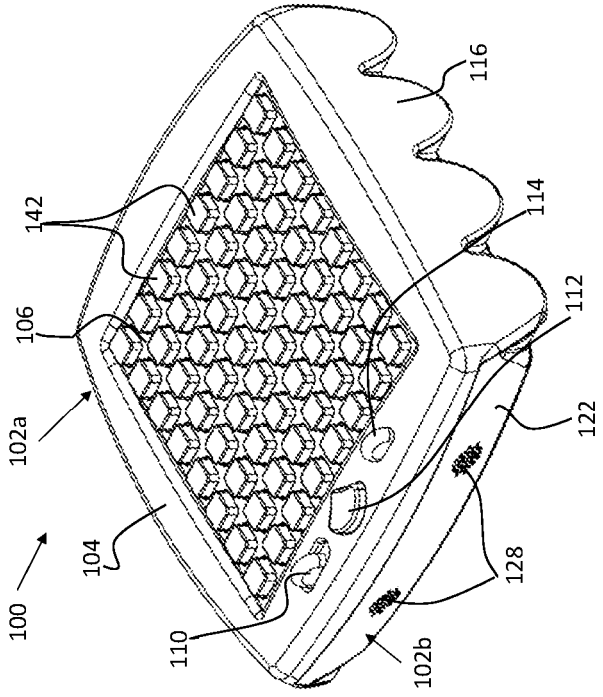

116
142
114
106
112
102a
110
104
100
116

FIG. 1


116
142
114
106
112
122
102a
104
128
100
110
102b

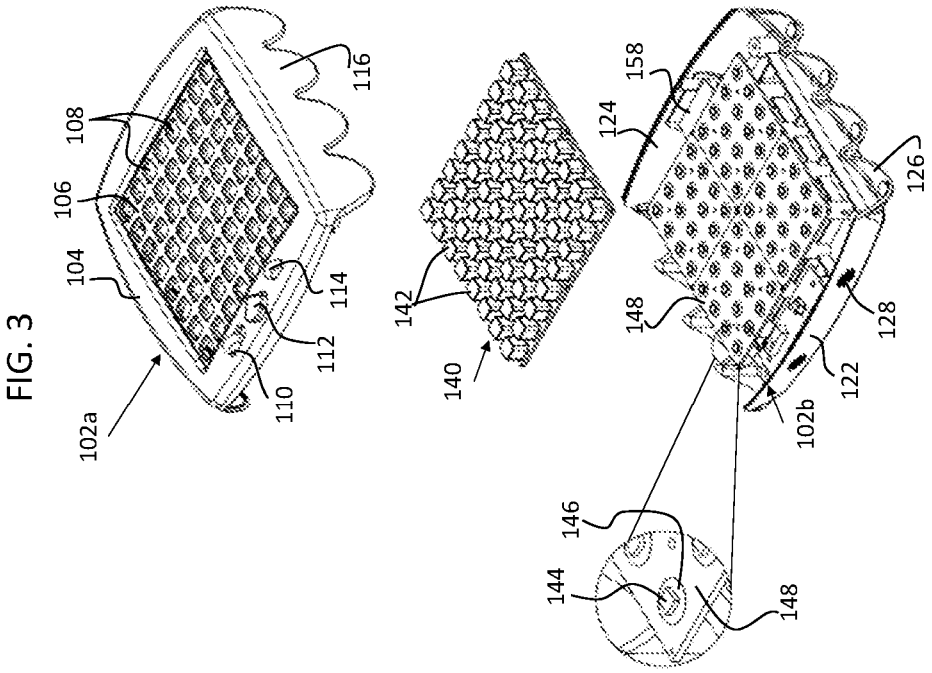


FIG. 3

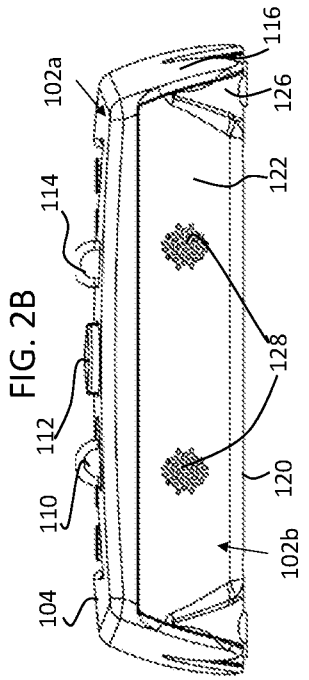


FIG. 2B

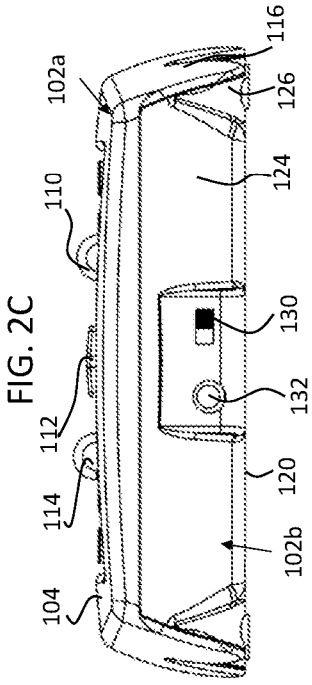


FIG. 2C

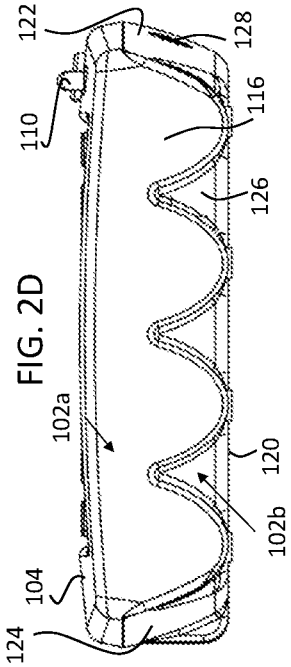


FIG. 2D

FIG. 5A

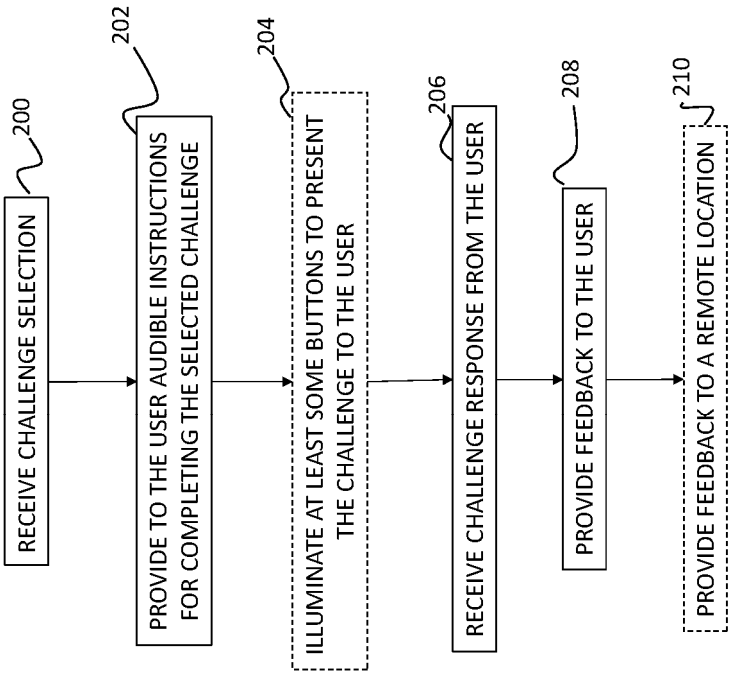

200
RECEIVE CHALLENGE SELECTION
202
PROVIDE TO THE USER AUDIBLE INSTRUCTIONS FOR COMPLETING THE SELECTED CHALLENGE
204
ILLUMINATE AT LEAST SOME BUTTONS TO PRESENT THE CHALLENGE TO THE USER
206
RECEIVE CHALLENGE RESPONSE FROM THE USER
208
PROVIDE FEEDBACK TO THE USER
210
PROVIDE FEEDBACK TO A REMOTE LOCATION

FIG. 4

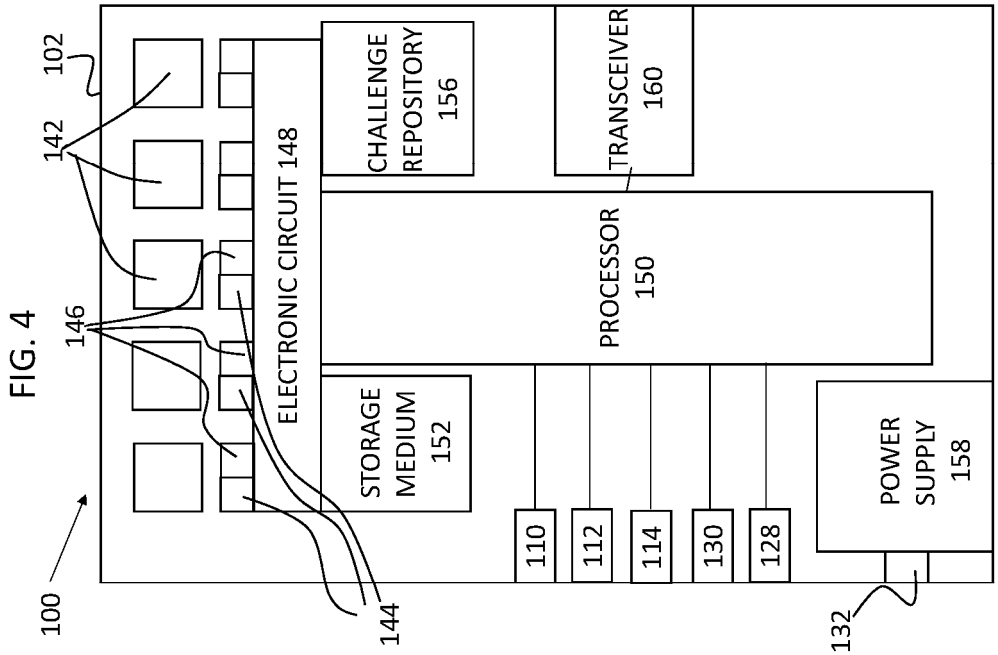
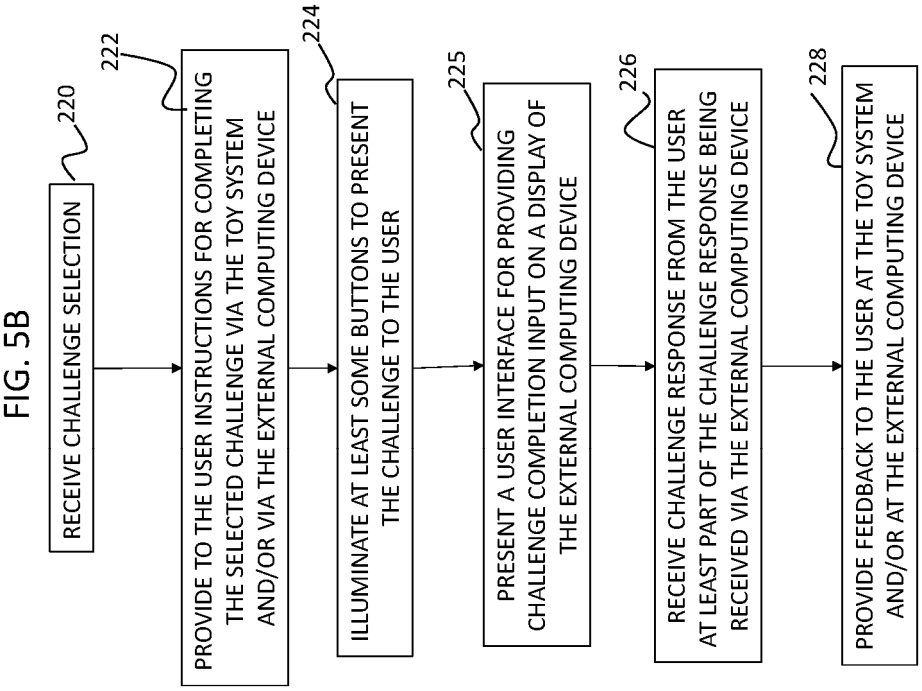

100
102
142
146
144
ELECTRONIC CIRCUIT 148
CHALLENGE REPOSITORY 156
TRANSCEIVER 160
PROCESSOR 150
STORAGE MEDIUM 152
110
112
114
130
128
POWER SUPPLY 158
132

FIG. 5B


RECEIVE CHALLENGE SELECTION
220
PROVIDE TO THE USER INSTRUCTIONS FOR COMPLETING THE SELECTED CHALLENGE VIA THE TOY SYSTEM AND/OR VIA THE EXTERNAL COMPUTING DEVICE
222
ILLUMINATE AT LEAST SOME BUTTONS TO PRESENT THE CHALLENGE TO THE USER
224
PRESENT A USER INTERFACE FOR PROVIDING CHALLENGE COMPLETION INPUT ON A DISPLAY OF THE EXTERNAL COMPUTING DEVICE
225
RECEIVE CHALLENGE RESPONSE FROM THE USER AT LEAST PART OF THE CHALLENGE RESPONSE BEING RECEIVED VIA THE EXTERNAL COMPUTING DEVICE
226
PROVIDE FEEDBACK TO THE USER AT THE TOY SYSTEM AND/OR AT THE EXTERNAL COMPUTING DEVICE
228

INTERACTIVE ELECTRONIC TOY SYSTEM

FIELD AND BACKGROUND OF THE INVENTION

The invention, in some embodiments, relates to the field of electronic toys, and more specifically to an interactive electronic toy system having randomizable challenges, games and activities.

Many electronic toys exist, where there are multiple buttons, and each button the child presses causes something to occur. For example, such toys exist for teaching children animal sounds, instrument sounds, and the like. However, one disadvantage of these toys is that each time the child presses a button, the result is always the same. After a short play-time, the child typically gets bored with the toy, because he already knows exactly what will happen when each button is pressed, and/or where he needs to press to provide the correct answer to a question asked by the toy.

As such, there is a need in the art for an interactive electronic toy wherein play is less predictable, requiring the child to continue learning even during extended play, and as a result keeping the child's attention for a longer time.

SUMMARY OF THE INVENTION

In accordance with an embodiment of the teachings herein, there is provided an interactive electronic toy system, including:

a challenge repository storing a plurality of challenges or games to be completed by a user using the interactive electronic toy system;

a housing, including first and second housing portions attached to one another, such that a hollow is defined therebetween;

a plurality of buttons, each of the buttons being selectively depressible and being accessible from an exterior of the housing, each of the buttons being at least partially transparent;

a plurality of illuminators disposed within the hollow, such that each specific button of the plurality of buttons has at least one corresponding illuminator of the plurality of illuminators disposed thereunder, such that illumination of the at least one corresponding illuminator is visible through the specific button;

a plurality of pressure sensors disposed within the hollow, each pressure sensor of the plurality of pressure sensors being disposed under, and being associated with, a corresponding one of the buttons, and is adapted to provide an electrical signal when the corresponding one of the buttons is depressed or released;

a processor, functionally associated with the challenge repository, the plurality of illuminators, and the plurality of sensors;

a non-transitory computer readable storage medium storing software modules including instructions to be executed by the processor, the non-transitory computer readable storage medium having stored:

instructions to receive a selection of a specific challenge;

instructions to provide to the user instructions for completing the specific challenge;

instructions to receive a challenge response from the user, in which the user responds to the specific challenge by at least one of moving the housing and depressing at least one of the plurality of buttons; and

instructions to provide feedback to the user, based on the received challenge response; and

at least one power supply adapted to provide power to the plurality of illuminators, the plurality of pressure sensors, and the processor.

In some embodiments, the challenge repository includes a memory component disposed within the hollow of the housing. In some embodiments, the housing includes a slot for receiving a removable memory component, and wherein the challenge repository includes a removable memory component adapted to be inserted into the slot for association with the processor. In some embodiments, the interactive electronic toy system further includes a transceiver, and the challenge repository is remote from the housing and is in communication with the processor via the transceiver.

In some embodiments, the first housing portion includes a plurality of openings, each of the openings adapted to receive one of the plurality of buttons and to enable access thereto. In some other embodiments, the first housing portion includes at least one opening, adapted to receive at least two of the plurality of buttons and to enable access thereto.

In some embodiments, each button of the plurality of buttons is independently depressible, without affecting other buttons of the plurality of buttons.

In some embodiments, each of the plurality of illuminators is adapted to provide illumination in a plurality of colors. In some such embodiments, each of the plurality of buttons is associated with a single one of the plurality of illuminators, and each of the plurality of illuminators is associated with a single one of the plurality of buttons.

In some embodiments, each of the plurality of buttons has a group of illuminators of the plurality of illuminators disposed thereunder, each illuminator in the group of illuminators adapted to illuminate in a different color.

In some embodiments, the interactive electronic toy system further includes an orientation sensor, adapted to provide information regarding a three dimensional orientation of the housing. In some such embodiments, the instructions to receive the challenge response include instructions to receive at least one signal from the orientation sensor, indicative of the orientation of the housing as the user's response to the selected challenge.

In some embodiments, the interactive electronic toy system further includes a selection switch adapted for selection of a game to be played or of a challenge to be presented. In some embodiments, the interactive electronic toy system further includes a progress button adapted to enable progress between steps of a game or between levels. In some embodiments, the interactive electronic toy system further includes a volume control selector. In some embodiments, the interactive electronic toy system further includes an activation switch adapted to activate and deactivate the toy.

In some embodiments, the interactive electronic toy system further includes at least one audio speaker, functionally associated with the processor. In some embodiments, the instructions to provide to the user instructions for completing the specific challenge include instructions to provide audio instructions to the user, via the at least one audio speaker. In some embodiments, the instructions to provide feedback to the user include instructions to provide audio feedback to the user, via the at least one audio speaker.

In some embodiments, the instructions to provide to the user instructions for completing the specific challenge include instructions to present the specific challenge to the user by illuminating at least one of the illuminators.

In some embodiments, the instructions to provide feedback to the user include instructions to provide visual

feedback to the user, via at least one of the illuminators. In some such embodiments, the visual feedback includes illumination of at least one of the illuminators. In some such embodiments, the visual feedback includes deactivation of at least one of the illuminators.

In some embodiments, the interactive electronic toy system further includes a transceiver. In some such embodiments, the instructions to receive the selection of the specific challenge include instructions to receive the selection from a second device, remote from the housing, via the transceiver. In some such embodiments, the instructions to provide feedback include instructions to provide the feedback to a second device, remote from the housing, via the transceiver.

In some embodiments, the specific challenge is selected from the group consisting of color identification challenges; shape identification challenges; letter identification challenges; number identification challenges; writing challenges; memory challenges; maze challenges; language challenges; math challenges; emotional intelligence challenges; music challenges; and coding challenges.

In some embodiments, the instructions to provide the specific challenge include instructions to randomize at least one aspect of the specific challenge.

In accordance with another embodiment of the teachings herein, there is provided a method of providing a challenge to a user using an interactive electronic toy including a housing and a plurality of buttons, each button associated with at least one illuminator and with at least one pressure sensor, the method including:

receiving a selection of a specific challenge, the specific challenge being selected from a challenge repository associated with the interactive electronic toy;

providing to the user instructions for completing the specific challenge;

receiving a challenge response from the user, in which the user responds to the specific challenge by at least one of moving the housing of the interactive electronic toy and depressing at least one of the plurality of buttons; and

providing feedback to the user, based on the received challenge response.

In some embodiments, receiving the selection includes receiving the selection from a challenge repository formed as a removable memory component inserted into a corresponding slot in the housing of the interactive electronic toy. In some embodiments, the challenge repository is remote from the interactive electronic housing and receiving the selection includes receiving the selection from the remote challenge repository via a transceiver forming part of the interactive electronic toy.

In some embodiments, receiving the challenge response includes receiving a signal from at least one pressure sensor corresponding to the at least one of the plurality of buttons depressed by the user. In some embodiments, receiving the challenge response includes receiving an orientation signal from an orientation sensor forming part of the housing, the orientation signal indicative of an orientation of the housing as the user's response to the selected challenge.

In some embodiments, the method further includes receiving a selection of a game to be played or a challenge to be presented using a selection switch forming part of the housing. In some embodiments, the method further includes progressing between steps or levels of a game using a progress button forming part of or installed in the housing.

In some embodiments, providing to the user instructions for completing the specific challenge includes providing audio instructions to the user, via at least one audio speaker forming part of the interactive electronic toy. In some embodiments, providing feedback to the user includes providing audio feedback to the user, via the at least one audio speaker.

In some embodiments, the method further includes presenting the specific challenge to the user by illuminating at least one of the illuminators, prior to the receiving the challenge response.

In some embodiments, providing the feedback to the user includes providing visual feedback to the user, via at least one of the illuminators, the visual feedback including illuminating at least one of the illuminators or deactivating at least one of the illuminators.

In some embodiments, the interactive electronic toy is functionally associated with a second device, remote therefrom, and wherein providing the feedback includes providing the feedback to the second device via a transceiver.

In some embodiments, the specific challenge is selected from the group consisting of: color identification challenges; shape identification challenges; letter identification challenges; number identification challenges; writing challenges; memory challenges; maze challenges; language challenges; math challenges; emotional intelligence challenges; music challenges; and coding challenges.

In some embodiments, providing the specific challenge includes randomizing at least one aspect of the specific challenge.

BRIEF DESCRIPTION OF THE FIGURES

Some embodiments of the invention are described herein with reference to the accompanying figures. The description, together with the figures, makes apparent to a person having ordinary skill in the art how some embodiments of the invention may be practiced. The figures are for the purpose of illustrative discussion and no attempt is made to show structural details of an embodiment in more detail than is necessary for a fundamental understanding of the invention. For the sake of clarity, some objects depicted in the figures are not to scale.

In the Figures:

FIG. **1** is a perspective view illustration of an interactive electronic toy according to an embodiment of the teachings herein;

FIGS. **2**A, **2**B, **2**C, and **2**D are, respectively, top, front, back, and side plan view illustrations of the interactive electronic toy of FIG. **1**;

FIG. **3** is a partially exploded view of the interactive electronic toy of FIG. **1**;

FIG. **4** is a schematic block diagram of an interactive electronic toy according to embodiments of the teachings herein; and

FIGS. **5**A and **5**B are flowcharts of two embodiments of exemplary methods of using the interactive electronic toys of FIGS. **1** to **4**.

DESCRIPTION OF SOME EMBODIMENTS OF THE INVENTION

The invention, in some embodiments, relates to the field of electronic toys, and more specifically to an interactive electronic toy system having randomizable challenges, games and activities.

The principles, uses and implementations of the teachings herein may be better understood with reference to the accompanying description and figures. Upon perusal of the

description and figures present herein, one skilled in the art is able to implement the invention without undue effort or experimentation.

Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its applications to the details of construction and the arrangement of the components and/or methods set forth in the following description and/or illustrated in the drawings and/or the Examples. The invention can be implemented with other embodiments and can be practiced or carried out in various ways. It is also understood that the phraseology and terminology employed herein is for descriptive purpose and should not be regarded as limiting.

The system and method described herein are intended to provide an interactive environment in which a user, typically a child, plays by pressing buttons on an electronic device. However, during each challenge or game, or each use of the device, different requirements are presented to the user, and different buttons have different effects. The effects of the buttons, and the specific locations the user must press, may be randomized.

For example, the interactive electronic toy may include a challenge in which the user is instructed to press all the buttons that appear green. The interactive electronic toy may then present a plurality of green buttons in a first set of locations on the device, and wait to sense that the user has pressed all the correct buttons. The challenge may then restart, only the green buttons will be in a second set of locations on the device, different from the first set of locations. As such, the user would not be able to remember which buttons he has to press, but rather would need to once again find the locations of the green buttons. Additional examples are provided hereinbelow.

Reference is now made to FIG. **1**, which is a perspective view illustration of an interactive electronic toy **100** according to an embodiment of the teachings herein, to FIGS. **2**A, **2**B, **2**C, and **2**D, which are, respectively, top, front, back, and side plan view illustrations of the interactive electronic toy **100**, to FIG. **3**, which is a partially exploded view of the interactive electronic toy **100**, and to FIG. **4**, which is a schematic block diagram of an interactive electronic toy according to embodiments of the teachings herein.

As seen in FIGS. **1**, **3** and **4**, interactive electronic toy **100** includes a housing **102** (FIG. **4**), typically including an upper housing portion **102***a* and a lower housing portion **102***b*, which form a hollow therebetween.

Upper housing portion **102***a* includes an upper surface frame **104**, which has disposed therein a button receiving surface **106**, which includes a grid of openings **108** for receiving buttons as described hereinbelow. Disposed on a front side of upper surface frame **104** is a selector switch **110** adapted for selection of a game to be played, or of a challenge to be presented, a progress button **112**, adapted to enable a user to progress between steps of a game, or between levels of a game, and a volume control **114**. For example, in a game in which the user is required to identify numbers, progress button **112** may be used to skip the lower numbers with which the user is already familiar, and bring the user directly to identification of higher numbers (e.g. 6, 7, 8) which the user still needs to master.

Extending downwardly from upper surface frame **104**, on two opposing sides thereof, are side surfaces **116**. In some embodiments, the side surfaces are shaped and configured such that the toy **100** has a specific appearance, for example that of an animal. In such embodiments, a lower end of side surfaces **116** may have a specific contour, selected for creating the specific appearance. In the illustrated embodiment, the specific contour is wavy, such that the shape of the entire toy **100** is reminiscent of that of a caterpillar.

Lower housing portion **102***b* includes a bottom surface **120**. A front surface **122** and a back surface **124** extend upwardly from bottom surface **120**, toward upper surface frame **104**. Extending sideway from bottom surface **120**, and in some embodiments partially upward, are side bases **126**, configured to engage side surfaces **116** of upper housing portion **102***a*. As seen in FIG. **1**, when upper housing portion **102***a* is connected to lower housing portion **102***b*, a closed structure is formed, preventing the user from accessing the interior of the housing.

Front surface **122** of lower housing portion **102***b* includes at least one audio speaker **128**, here illustrated as a pair of audio speakers. Audio speakers **128** are adapted to provide audio instructions to the user, as explained in further detail hereinbelow.

Back surface **124** of lower housing portion **102***b* includes an activation switch **130** adapted to activate and deactivate the toy, as well as a port **132** for connection of toy **100** to an external power source, such as an electric socket, either for powering of toy **100** or for charging of a battery thereof, as explained in further detail hereinbelow. In some embodiments, switch **130** may be a three step switch including an "off" position, an "on low volume" position, and an "on high volume" position. In some such embodiments, volume control **114** may be obviated.

A button surface **140** is disposed within the hollow of toy **100**, and includes a plurality of depressible buttons **142**. In some embodiments, such as the illustrated embodiments, there may spaces between buttons **142**. As seen in FIG. **1**, button surface **140** is arranged such that each of buttons **142** extends through a corresponding opening **108** of button receiving surface **106**. In some embodiments, not illustrated, the buttons **142** may be very close to each other, or even touching each other, provided that the buttons **142** can each be depressed individually without impacting adjacent buttons. In some such embodiments, button receiving surface **106** may include a single large opening **108**, such that all the buttons together are disposed within the single large opening **108**.

Disposed beneath each one of buttons **142** is at least one corresponding illuminator **144**, such as an LED light. The buttons **142** are at least partially transparent, such that, during operation of a specific illuminator **144** beneath a specific button **142**, the button appears illuminated. In some embodiments, each illuminator **144** is adapted to provide illumination in a plurality of colors. In other embodiments, each button **142** has a plurality of illuminators disposed thereunder, each of the plurality of illuminators adapted to illuminate in a different color. In some embodiments, each one of illuminators **144** corresponds to a single button **142**, such that a one-to-one relationship exists between each illuminator **144** and a button **142**. In other embodiments, or in some play modes, the illuminators **144** may be decoupled from the buttons **142**.

Disposed beneath each one of buttons **142** is also at least one corresponding sensor **146**, such as a pressure sensor adapted to provide an electric signal when the overlying button **142** is depressed. Each one of sensors **146** corresponds to a single button **142**, such that a one-to-one relationship exists between each sensor **146** and a button **142**.

An electronic circuit **148** is disposed within the hollow of toy **100** and has illuminators **144** and sensors **146** disposed thereon. Electronic circuit **148** also connects audio speakers **128** and switches **110**, **112**, **114**, and **130** to a processor **150**,

shown clearly in FIG. **4**, which may be mounted onto electronic circuit **148** or onto a dedicated printed circuit board (not explicitly shown). Processor **150** is adapted to control operation of toy **100**, as explained in further detail hereinbelow with respect to FIGS. **5**A and **5**B. Processor **150** is functionally associated with a non-transitory computer readable storage medium **152**, shown clearly in FIG. **4**, storing software modules including instructions to be executed by the processor **150**. Storage medium **152** may be disposed on electronic circuit **148**, on a separate printed circuit board also holding processor **150**, or on a dedicated printed circuit board (not explicitly shown).

Toy **100** further includes, or is functionally associated with, at least one challenge repository **156** storing challenges and/or games to be implemented by processor **150** and present to the user via audio speakers **128** and buttons **142**.

The challenge repository **156** may be any suitable storage element for storing digital data, such as a database, a computer memory, or a buffering memory. The challenge repository **156** may be local to toy **100**. For example, the challenge repository **156** may be in the form of a data storage element, such as a removable memory card inserted into a dedicated slot (not shown) in toy **100** or a database or memory component built into toy **100**. For example, storage repository **156** may be mounted onto electronic circuit **148**, or onto another printed circuit board (for example the circuit board holding processor **150**). In some embodiments, the challenge repository **156** may be remote from toy **100**. For example, challenge repository **156** may be a database located remotely from toy **100** and communicating therewith, for example with processor **150**, via a network.

In some embodiments, the challenge repository **156** is adapted to store, at least temporarily, large amounts of data, in the range of 5 MB to 500 MB. In embodiments in which the challenge repository **156** is local to toy **100**, it enables toy **100** to operate even when not in communication with a network or with another remote device. The challenge repository **156** may be volatile or non-volatile memory, such as a flash memory device, retaining the stored data, even when the power is switched off and on, thus accelerating the device start up time.

In some embodiments, toy **100** further includes at least one orientation sensor (not explicitly shown), such as an accelerometer. The orientation sensor is adapted to provide to processor **150** information regarding a three dimensional spatial orientation of toy **100** (for example in terms of roll, pitch, and yaw), which information may be used to determine whether or not the user has met a specific challenge or completed a specific game, as explained in further detail hereinbelow.

One or more power supplies **158** are adapted to provide power to toy **100** and to components thereof, including audio speakers **128**, illuminators **144**, sensors **146**, processor **150** and/or challenge repository **156**. Power supply **158** may be any suitable power supply, such as a battery or a rechargeable battery, for example chargeable via port **132**, or an external power source to which toy **100** is connected via port **132**. In some embodiments, toy **100** is portable, and is designed to be operable without connection to an external power source, or at a distance greater than 1 meter from an external power source, for extended durations of time, in the range of 1-4 hours of non-stop operation.

In some embodiments, toy **100** may further include a transceiver **160**, shown in FIG. **4**, enabling two way communication with a networked environment, for example via a Local Area Network (LAN), a Wide Area Network (WAN), or via the Internet. The two-way communication may be wired communication or wireless communication, and may use any suitable protocol known in the art. In such embodiments, power supply **158** provides power also to the transceiver.

The transceiver is particularly useful when the challenge repository **156** is remote from toy **100**, such that a challenge may be selected from the challenge repository **156** and provided to processor **150** via the transceiver.

In some embodiments, toy **100** may be functionally associated with an external computing device (not explicitly shown), such as a tablet computer, a laptop computer, or a smartphone, via transceiver **160**. In some such embodiments, a user interface of the external computing device (for example forming part of a dedicated application which interfaces with toy **100**) may receive user input, which may be transmitted from the external computing device to processor **150** for controlling operation of toy **100**, and/or for responding to a specific game or challenge currently being completed using toy **100**. Processor **150** may also provide an output, such as a challenge completion feedback output, to the external computing device, for example via transceiver **160**.

In some embodiments, toy **100** may further include an inactivity sensing functionality adapted to identify when the toy **100** has been inactive for a predetermined duration, and to provide such information to processor **150** for adapting operation of toy **100** so as to preserve power consumption by the toy **100** when it is inactive.

In some embodiments, in response to detection of inactivity by the inactivity sensing functionality, processor **150** may run a low power efficiency power scheme adapted to conserve power in toy **100**, and/or may provide an audio indication to the user that the toy has been inactive and is shutting down.

In some embodiments, the toy **100** may further include a thermal sensor, adapted to provide input to processor **150** when a temperature level in toy **100** exceeds a predetermined threshold. The processor **150** may then operate a temperature control module to adjust the operation of toy **100** to the elevated temperature level, for example by shutting down toy **100**, or by notifying the user of the elevated temperature, thereby to provide for safe and robust device operation.

Reference is now additionally made to FIGS. **5**A and **5**B, which are flowcharts embodiments of exemplary methods of using the interactive electronic toy **100** of FIGS. **1** to **4**.

In the flowchart of FIG. **5**A, all user interaction, once the challenge or game is selected, is with toy **100**. As seen in FIG. **5**A, at step **200** a selection of a challenge or game to be accomplished by the user is received by processor **150**, for example implementing instructions to receive such a selection from storage medium **152**. The challenge is typically selected from challenge repository **156**. In some embodiments, the challenge is selected using selector **110** of upper housing portion **102***a.*

In some embodiments, the challenge repository **156** may include a single challenge, and selection of the challenge may be carried out by associating the challenge repository with processor **150**. For example, the challenge repository may be a computer storage drive, such as an SD card, USB drive, or the like, including a single challenge. As such, the challenge is selected by selecting a suitable challenge repository and inserting it into a suitable slot or port in toy **100**, so as to associate the computer storage drive with processor **150**.

In some embodiments, the challenge repository is local to toy **100**, for example forming part of electronic circuit **148** thereof, or associated with the processor **150** by insertion into a dedicated port as described hereinabove.

In other embodiments, the challenge repository **156** may be remote from toy **100**, for example located on an external server or computing device. In such embodiments, the challenge may be selected by user interaction with a user interface of the external server or computing device, and the selected challenge may be transmitted to processor **150**, for example via transceiver **160**.

The challenge may be any suitable challenge or game which may be provided to the user by toy **100**, as described herein. In some embodiments, the challenge may include any one or more of the following types of challenges:

Color identification challenges;
Shape identification challenges;
Letter identification challenges;
Number identification challenges;
Writing challenges;
Memory challenges;
Maze challenges;
Language challenges;
Math challenges;
Emotional Intelligence challenges;
Music challenges; and
Coding challenges.

Instructions for completing the challenge, are provided to the user, typically via audio speakers **128**, at step **202**, for example by processor **150** implementing instructions to provide such user instructions from storage medium **152**.

In a first, color identification challenge example, in which the user must press all the buttons illuminated in a specific color (e.g. green), the instructions may be provided by the audio speakers providing the sentence "Press all the green buttons!". The specific color to be identified may be selected by the processor **150** at the time of providing the instructions, for example in a random manner.

In a second, shape identification challenge example, in which the user must press all the illuminated buttons that form a specific shape (e.g. square), the instructions may be provided by the audio speakers providing the sentence "Press all the buttons which together form a square!". The specific shape to be identified may be selected by the processor **150** at the time of providing the instructions, for example in a random manner.

In a third, writing challenge example, in which the user must press buttons to form a specific letter, the instructions may be provided by the audio speakers providing the sentence "Press buttons to form an upper case letter 'L'". The specific letter to be written may be selected by the processor **150** at the time of providing the instructions, for example in a random manner.

In a fourth, memory challenge example, in which the user must remember the locations of all the buttons that were illuminated in a specific color (e.g. red), the instructions may be provided by the audio speakers providing the sentence "Look closely at the buttons and remember which ones are red. After the lights turn off, press all the buttons that were red!". The specific color to be memorized may be selected by the processor **150** at the time of providing the instructions, for example in a random manner.

In a fifth, maze challenge example, in which the user must tilt the device so a light moves along a specific path, the instructions may be provided by the audio speakers providing the sentence "Tilt your toy to move the yellow dot from the green square to the red square, without bumping into blue walls". The specific lengths and locations of the blue walls, as well as the specific colors used for the walls, beginning and end points, and for the element traversing the maze, may be selected by the processor **150** at the time of providing the instructions, for example in a random manner.

In a sixth, coding challenge example, in which the user must move a light along a specific path, the instructions may be provided by the audio speakers providing the sentence "Use the operation buttons to create instructions for moving the yellow dot from the green square to the red square, without bumping into blue walls, and then see whether your plan worked by executing your instructions". The specific lengths and locations of the blue walls, as well as the specific colors used for the walls, beginning and end points, and for the element traversing the maze, may be selected by the processor **150** at the time of providing the instructions, for example in a random manner.

In some embodiments, at step **204**, at least some buttons **142** of toy **100** are illuminated, so as to present the challenge to the user, for example by processor **150** implementing instructions from storage medium **152** to illuminate specific buttons in specific colors. In some embodiments, the number of buttons to be illuminated and/or the locations of the buttons to be illuminated, may be at least partially randomized. Returning to the examples provided hereinabove:

In the first example, all the buttons **142** are illuminated, such that only a subset of the buttons are illuminated in green and the remaining buttons are illuminated in other colors. The specific number of buttons illuminated in green, and the specific locations of the buttons illuminated in green, may be selected by processor **150** at random, in real time when presenting the challenge to the user.

In the second example, selected buttons **142** are illuminated to show multiple shapes, for example a red triangle, a blue square, and a green rectangle. The specific colors of the illuminated shapes, dimensions of the illuminated shapes, and locations of the illuminated shapes may be selected by processor **150** at random, in real time when presenting the challenge to the user.

In the fourth example, all the buttons **142** are illuminated, such that only a subset of the buttons are illuminated in red and the remaining buttons are illuminated in other colors. The specific number of buttons illuminated in red, and the specific locations of the buttons illuminated in red, may be selected by processor **150** at random, in real time when presenting the challenge to the user. Following a predetermined duration allowing the user to memorize the locations of the red buttons, the processor **150** controls illuminators **144** to turn off the illuminating beneath all buttons **142**.

In the fifth example, some buttons **142** are illuminated in blue to form "walls", a single button **142** is illuminated in green and another single button **142** is illuminated in red, to form the maze's beginning and end points, and a third single button **142** is illuminated in yellow to form the dot that has to traverse the maze. The specific number of buttons forming "walls", and the specific locations of the illuminated buttons, may be selected by processor **150** at random, in real time when presenting the challenge to the user.

In the sixth, coding challenge example, some buttons **142** are illuminated in blue to form "walls", a single button **142** is illuminated in green and another single button **142** is illuminated in red, to form the maze's beginning and end points, and a third single button **142** is illuminated in yellow to form the dot that has to traverse the maze. Additionally, some buttons are illuminated to form operation buttons—for example some of the buttons may be step buttons used to code the sequence of movements or operations the yellow

dot must accomplish to complete the maze, and another implementation button representing "move the dot according to the coded sequence". In one embodiment, the step buttons may include "walk left one step", "walk right one step", "walk up one step", and "walk down one step" buttons. In another embodiment, the step buttons may include "walk forward one step", "turn 90 degrees to the right" and "turn 90 degrees to the left" buttons. The specific number of buttons forming "walls", and the specific locations of the illuminated buttons, may be selected by processor **150** at random, in real time when presenting the challenge to the user.

In other embodiments, in which the challenge instructs the user to press specific buttons to cause them to be illuminated, rather than starting the challenge with illuminated buttons, step **204** may be obviated. Referring back to the third example above, since the user is instructed to press the buttons to write the letter 'L', none of buttons **142** are initially illuminated.

Following providing of the challenge to the user, at step **206** processor **150** receives a challenge response from the user, which response is received by receipt of a signal from one or more sensors. For some challenges, such as the challenges of the first, second, third, fourth, and sixth examples above, the response is received by receiving signals from one or more sensors **146** that buttons **142** corresponding thereto have been depressed by the user.

In some cases, the challenge response received from the user is stored for providing a later feedback. For instance, in the sixth coding example, the challenge response includes receiving a sequence signals from sensors associated with the step buttons, in which the user is indicating how the yellow dot should move. For example, the sequence may include 3 steps upwards, 4 steps left, 2 steps down, 3 steps left. Typically, the challenge response further includes receiving a signal from a sensor associated with implementation button, following the sequence of signals associated with the step buttons.

For some challenges, such as the challenge of the fifth example above, the response is received by receiving signals from the orientation sensor that the orientation of toy **100** has been changed in a specific way.

At step **208**, processor **150** provides feedback to the user, based on the received response. The feedback may include de-illumination of one or more buttons **142**, illuminating one or more buttons **142**, and/or providing audio feedback via audio speakers **128**. In some embodiments, the feedback is provided each time the user depresses a button. In other embodiments, the feedback is provided only following completion of the entire challenge.

Returning to the examples provided hereinabove:

In the first example, the processor may provide feedback to the user by de-illuminating all green buttons pressed by the user, by providing a confirming audible sound, e.g. a sound of clapping hands, when a green button is pressed, and/or by providing a negative or rejecting audible sound when a button of another color is pressed.

In the second example, the processor may provide feedback to the user by de-illuminating buttons belonging to the square, when those are depressed by the user, by providing a confirming audible sound when one of the buttons belonging to the square is depressed or when all the buttons belonging to the square are depressed, and/or by providing a negative or rejecting audible sound when a button of another shape is pressed.

In the third example above, the processor may provide feedback to the user by illuminating buttons depressed by the user in the process of forming the letter 'L', and/or by providing a confirming audible sound when the set of depressed buttons forms the letter 'L'.

In the fourth example, the processor may provide feedback to the user by re-illuminating buttons pressed by the user that were initially illuminated in red, by providing a confirming audible sound when the user depresses a button that was initially illuminated in red (i.e. remembering where the red button was), and/or by providing a negative or rejecting audible sound when the user depresses a button that was initially illuminated in a color other than red (i.e. misremembering where the red buttons were).

In the fifth example, the processor receives signals from the accelerometer indicating that the user is tilting toy **100**. As feedback, the processor may cause the button currently illuminated in yellow to be de-illuminated, and an adjacent button (in the direction of tilting of toy **100**) to be illuminated in yellow, thereby "moving" the yellow "dot" along the maze in accordance with directions in which the user tilts toy **100**. Additionally, the processor may provide feedback by providing a confirming audible sound when the user tilts the toy to "move" the yellow dot in the correct direction or when the user has managed to get the yellow dot to traverse the entire maze, and/or by providing a negative or rejecting audible sound when the user "moves" the yellow dot in the wrong direction or causes the yellow dot to "bump into a wall".

In the sixth, coding challenge example, the feedback may be provided in response to receipt of the signal from the sensor associated with the implementation button. As feedback, the processor may cause the button currently illuminated in yellow to be de-illuminated, and an adjacent button to be illuminated in yellow in a direction determined according to the instructions provided by the user in the sequence of signals received from the step buttons, thereby "moving" the yellow "dot" along the maze in accordance with the steps coded by the user. Additionally, the processor may provide feedback by providing a confirming audible sound when the instructions coded by the user successfully "move" the yellow dot through the entire maze, and/or by providing a negative or rejecting audible sound when the instructions coded by the user cause the yellow dot to "bump into a wall".

In some embodiments, feedback regarding completion of the challenge may also be provided to a remote device or location, such as a device operated by a parent, teacher, therapist, or other guide, at optional step **210**. Such feedback may be provided from processor **150** via the transceiver.

It is a particular feature of the present invention that, upon completion of a challenge, if the user selects to repeat the same challenge or type of challenge, processor **150** presents the same type of challenge but changed in some way.

In some embodiments, the changes may be a result of randomization of the creation of challenges. In other embodiments, the changes may be a result of a specific challenge or game being repeated multiple times in sequence, in which case the processor may increase the difficulty of the challenges. In such embodiments, memory component **152** may include a learning module, instructing processor **150** to periodically or continuously learn the level at which the user completes challenges, so as to provide challenges at a higher difficulty level when a challenge is successfully completed, or to make the challenge easier if the user is having trouble completing the challenge.

Using the first example hereinabove, upon the user requesting to repeat the challenge a second time processor **150** may change the color of the buttons to be identified and

depressed by the user, the locations of the buttons to be identified and depressed by the user, and/or the number of buttons to be identified and depressed by the user. As another alternative for the first example, in the first time the user completes the challenge, all the buttons are illuminated only in two strongly contrasting colors, making it easier to find the green buttons, and in a subsequent completion of the challenge the buttons are illuminated in less strongly contrasting colors and/or in many colors, making it more difficult to find the green buttons and increasing the level of the challenge.

Turning to FIG. **5**B, the figure relates to an embodiment in which part of the user interaction is via an external computing device, such as a tablet computer or smartphone, typically running a suitable software application dedicated for interaction with toy **100**. As explained in further detail hereinbelow, in such embodiments, the user may provide user input also via the user interface of the external computing device.

As seen in FIG. **5**B, at step **220** a selection of a challenge or game to be accomplished by the user is received by processor **150**. As described hereinabove with respect to step **200** of FIG. **5**A, the challenge may be received from a local or from a remote challenge repository, and may include any suitable challenge or game.

The method illustrated in FIG. **5**B will be described hereinbelow with respect to the exemplary coding challenge provided hereinabove.

Instructions for completing the challenge are provided to the user at step **222**. In some embodiments, the instructions may be provided via audio speakers **128** of toy **100**, as described hereinabove with respect to step **202** of FIG. **5**A. In some embodiments, the instructions may also, or alternatively, be provided via a user interface element of the external computing device, such as being provided via audio speakers of the external computing device or being displayed on a display-screen of the external computing device.

Returning to the coding challenge example provided hereinabove with respect to FIG. **5**A, in some embodiments the instructions may be provided by the audio speakers **128** and/or the audio speakers of the remote computing device providing the sentence "Use the operation buttons to create instructions for moving the yellow dot from the green square to the red square, without bumping into blue walls, and then see whether your plan worked by executing your instructions". In some embodiments, the instructions may be displayed visually (in writing, drawings, icons, or an animated example) on the display-screen of the external computing device.

As discussed hereinabove, the specific lengths and locations of the blue walls, as well as the specific colors used for the walls, beginning and end points, and for the element traversing the maze, may be selected by the processor **150** and/or by a processor of the remote computing device at the time of providing the instructions, for example in a random manner.

In some embodiments, at step **224**, at least some buttons **142** of toy **100** are illuminated, so as to present the challenge to the user, substantially as described hereinabove.

In the coding challenge example, some buttons **142** are illuminated in blue to form "walls", a single button **142** is illuminated in green and another single button **142** is illuminated in red, to form the maze's beginning and end points, and a third single button **142** is illuminated in yellow to form the dot that has to traverse the maze. The specific number of buttons forming "walls", and the specific locations of the illuminated buttons, may be selected by processor **150** at random, in real time when presenting the challenge to the user. In some embodiments, the illuminated buttons may additionally include a specific "complete coding" button **142** (e.g. illuminated in another color, such as black), to be used once coding is complete to determine whether the coding was correct.

At step **225**, a user interface for providing challenge completion input is displayed to the user on the display-screen of the remote computing device. In the coding example being used herein, the user interface may include operation interface elements (e.g. icons or buttons). For example some of the interface elements may be step icons used to code the sequence of steps the yellow dot must accomplish to complete the maze. Another interface element may be a "complete coding" icon. In one embodiment, the step icons may include "walk left one step", "walk right one step", "walk up one step", and "walk down one step" icons. In another embodiment, the step icons may include "walk forward one step", "turn 90 degrees to the right" and "turn 90 degrees to the left" icons.

Following providing of the challenge and the user interface to the user, at step **226** processor **150** receives a challenge response from the user, at least part of which response is received via transceiver **160** from the external computing device. In some embodiments, some of the response is received by receipt of a signal from one or more of sensors of toy **100**, as described hereinabove with respect to FIG. **5**A.

In the current coding example, the user may provide the challenge response input by engaging the step icons in a specific sequence, indicating how the yellow dot should traverse the maze. For example, the sequence may include engaging the step upwards icon 3 times, engaging the step left icon 4 times, engaging the step down icon 2 times, and engaging the step left icon 3 times. Once the user has coded the method for the yellow dot to traverse the maze, the user provides a "complete coding" input, either by engaging the corresponding icon on the user interface of the external computing device, or by pressing the corresponding button **142** on toy **100**. Subsequently, the coded sequence of instructions generated by the user using the step icons is transmitted from the external computing device to processor **150**, for example via transceiver **160**.

At step **228**, processor **150** provides feedback to the user, based on the received response. The feedback may include de-illumination of one or more buttons **142**, illuminating one or more buttons **142**, providing audio feedback via audio speakers **128** and/or providing feedback via the user interface of the external computing device

In the coding challenge example, the feedback may be provided in response to receipt of the "complete coding" signal. As feedback, the processor may cause the button **142** currently illuminated in yellow to be de-illuminated, and an adjacent button to be illuminated in yellow in a direction determined according to the coded sequence of steps, thereby "moving" the yellow "dot" along the maze in accordance with the steps coded by the user. Additionally, the processor may provide feedback by providing a confirming audible sound when the instructions coded by the user successfully "move" the yellow dot through the entire maze, and/or by providing a negative or rejecting audible sound when the instructions coded by the user cause the yellow dot to "bump into a wall".

In some embodiments, feedback regarding completion of the challenge may also be provided to, or via, the external computing device.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable subcombination or as suitable in any other described embodiment of the invention. Certain features described in the context of various embodiments are not to be considered essential features of those embodiments, unless the embodiment is inoperative without those elements.

It will be appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable sub-combination.

Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims. All publications, patents and patent applications mentioned in this specification, are herein incorporated in their entirety by reference into the specification, to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated herein by reference. In addition, citation or identification of any reference in this application shall not be construed as an admission that such reference is available as prior art to the present invention.

The invention claimed is:

1. An interactive electronic toy system, comprising:

a challenge repository storing a plurality of challenges or games to be completed by a user using the interactive electronic toy system;

a housing, including first and second housing portions attached to one another, such that a hollow is defined therebetween;

a plurality of buttons, each of said buttons being selectively depressible and being accessible from an exterior of said housing, each of said buttons being at least partially transparent, wherein the plurality of buttons are devoid of images displayed thereon;

a plurality of illuminators disposed within said hollow, such that each specific button of said plurality of buttons has at least one corresponding illuminator of said plurality of illuminators disposed thereunder, such that illumination of said at least one corresponding illuminator is visible through said specific button;

a plurality of pressure sensors disposed within said hollow, each pressure sensor of said plurality of pressure sensors being disposed under, and being associated with, a corresponding one of said buttons, and is adapted to provide an electrical signal when said corresponding one of said buttons is depressed or released;

a processor, functionally associated with said challenge repository, said plurality of illuminators, and said plurality of sensors;

a non-transitory computer readable storage medium storing software modules including instructions to be executed by said processor, said non-transitory computer readable storage medium having stored:

instructions to receive a selection of a specific challenge;

instructions to present said specific challenge to the user, by illuminating a subset of said plurality of buttons;

instructions to receive a challenge response from the user, in which the user responds to said specific challenge by at least one of moving said housing and depressing at least one of said plurality of buttons; and

instructions to provide feedback to the user, based on said received challenge response; and

at least one power supply adapted to provide power to said plurality of illuminators, said plurality of pressure sensors, and said processor,

wherein said instructions to present said specific challenge to the user comprise instructions to change the effect of at least one of said plurality of buttons between a first instance of presenting said specific challenge and a second subsequent instance of presenting said specific challenge.

2. The interactive electronic toy system of claim **1**, wherein said first housing portion includes a plurality of openings, each of said openings adapted to receive one of said plurality of buttons and to enable access thereto.

3. The interactive electronic toy system of claim **1**, wherein said first housing portion includes at least one opening, adapted to receive at least two of said plurality of buttons and to enable access thereto.

4. The interactive electronic toy system of claim **1**, wherein each of said plurality of illuminators is adapted to provide illumination in a plurality of colors.

5. The interactive electronic toy system of claim **1**, wherein each of said plurality of buttons has a group of illuminators of said plurality of illuminators disposed thereunder, each illuminator in said group of illuminators adapted to illuminate in a different color.

6. The interactive electronic toy system of claim **1**, further comprising an orientation sensor, adapted to provide information regarding a three-dimensional orientation of said housing,

wherein said instructions to receive said challenge response include instructions to receive at least one signal from said orientation sensor, indicative of the orientation of said housing as the user's response to said selected challenge.

7. The interactive electronic toy system of claim **1**, further including a progress button adapted to enable progress between steps of said selected challenge or between levels of a challenge or game.

8. The interactive electronic toy system of claim **1**, wherein said instructions to provide feedback to the user comprise instructions to provide visual feedback to the user, via at least one of said illuminators, said visual feedback comprising at least one of illumination of at least one of said illuminators or deactivation of at least one of said illuminators.

9. The interactive electronic toy system of claim **1**, further comprising a transceiver, wherein said instructions to receive said selection of said specific challenge comprise instructions to receive said selection from a second device, remote from said housing, via said transceiver.

10. The interactive electronic toy system of claim **1**, further comprising a transceiver, wherein said instructions to provide feedback comprise instructions to provide said feedback to a second device, remote from said housing, via said transceiver.

11. The interactive electronic toy system of claim **1**, wherein said instructions to provide said specific challenge include instructions to randomize at least one aspect of said specific challenge.

12. A method of providing a challenge to a user using an interactive electronic toy including a housing and a plurality of buttons, each button associated with at least one illuminator and with at least one pressure sensor, the method comprising:

receiving a selection of a specific challenge, said specific challenge being selected from a challenge repository associated with the interactive electronic toy;

presenting said specific challenge to the user by illuminating at least some of said plurality of buttons;

receiving a challenge response from the user, in which the user responds to said specific challenge by at least one of moving the housing of the interactive electronic toy and depressing at least one of the plurality of buttons; and

providing feedback to the user, based on said received challenge response,

wherein the only visual indication provided to the user for completion of said specific challenge is by illumination and de-illumination of said plurality of buttons,

wherein said plurality of buttons are devoid of any images displayed thereon, and

wherein said presenting said specific challenge to the user comprises assigning a first effect to a specific one of said plurality of buttons during a first presentation of said specific challenge, and assigning a different effect to said specific one of said plurality of buttons during a second presentation of said specific challenge.

13. The method of claim **12**, wherein said receiving said selection comprises receiving said selection from a challenge repository formed as a removable memory component inserted into a corresponding slot in the housing of the interactive electronic toy.

14. The method of claim **12**, wherein said challenge repository is remote from the interactive electronic housing and said receiving said selection comprises receiving said selection from said remote challenge repository via a transceiver forming part of the interactive electronic toy.

15. The method of claim **12**, wherein said receiving said challenge response comprises receiving a signal from at least one pressure sensor corresponding to said at least one of the plurality of buttons depressed by the user.

16. The method of claim **12**, wherein said receiving said challenge response comprises receiving an orientation signal from an orientation sensor forming part of said housing, said orientation signal indicative of an orientation of said housing as the user's response to said selected challenge.

17. The method of claim **12**, wherein said providing said feedback to the user comprises providing visual feedback to the user, via at least one of the illuminators, said visual feedback including illuminating at least one of the illuminators or deactivating at least one of the illuminators.

18. The method of claim **12**, wherein the interactive electronic toy is functionally associated with a second device, remote therefrom, and wherein said providing said feedback comprises providing said feedback to said second device via a transceiver.

19. The method of claim **12**, wherein said providing said specific challenge includes randomizing at least one aspect of said specific challenge.

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