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(54) **STORYTELLING DEVICE**

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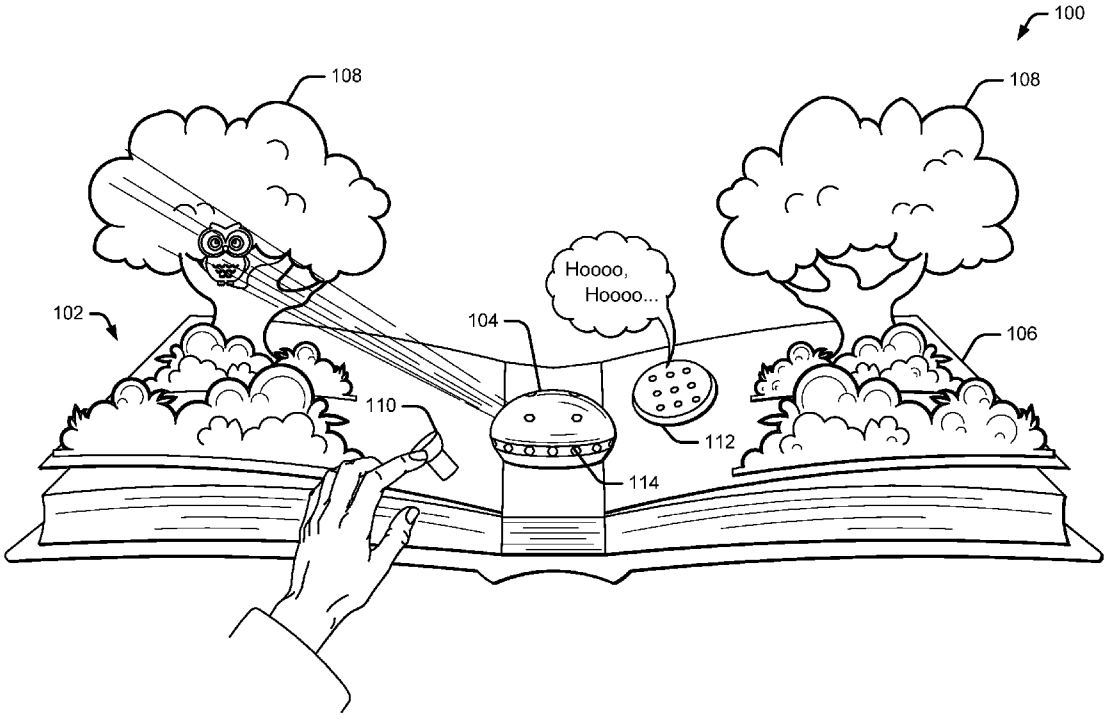
(57) **ABSTRACT**

This document describes a storytelling device. The storytelling device includes electronic output components, such as light sources, speakers, a video projector, or a display. The storytelling device is configured to establish an electronic connection with an interactive book, and to receive book data and sensor data from the interactive book via the electronic connection. Then, based on the sensor data and the book data, the storytelling device controls electronic output components, at the storytelling device and/or the interactive book, to provide story enhancement effects that are correlated to the interactive book.



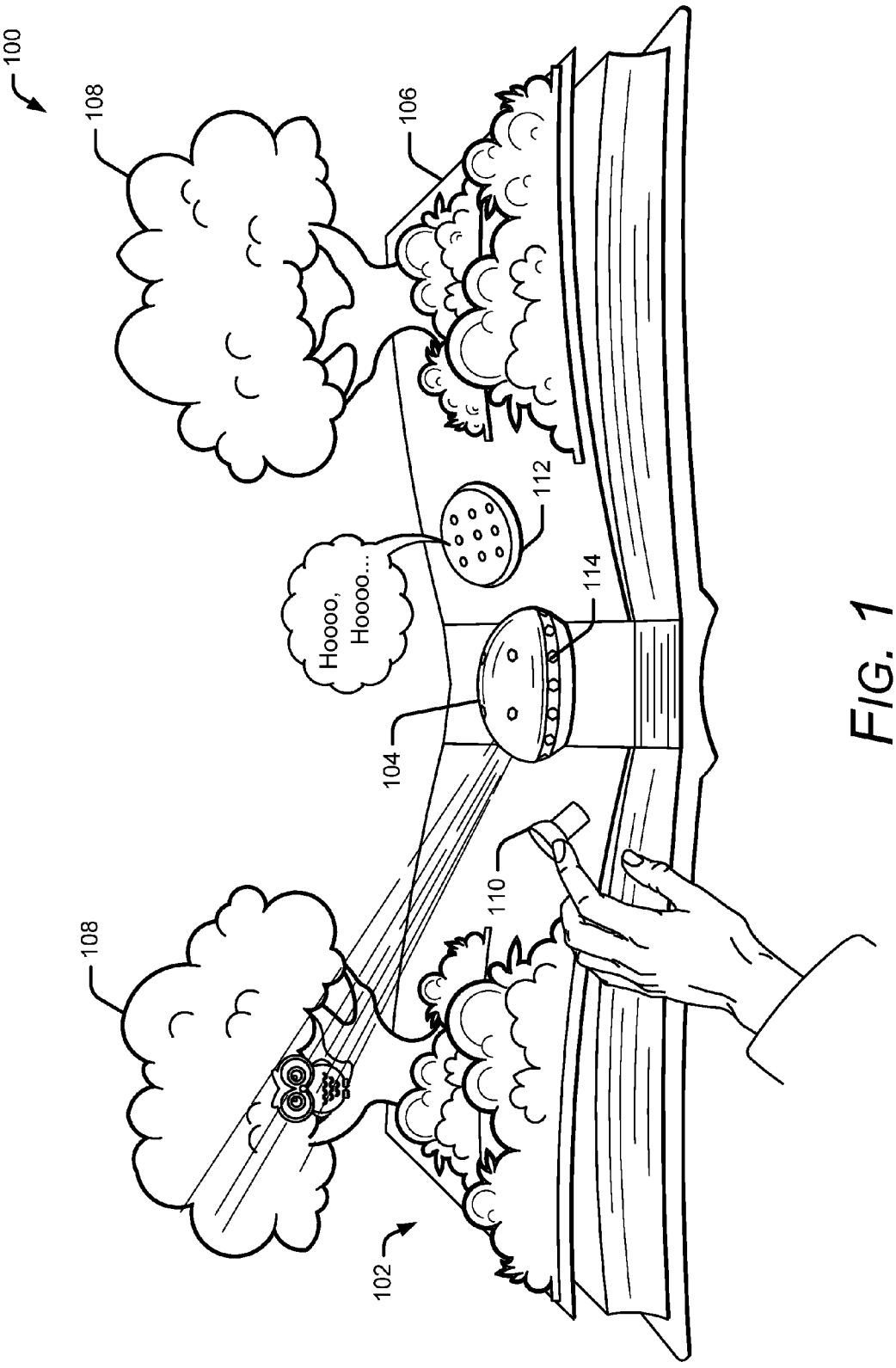


FIG. 1

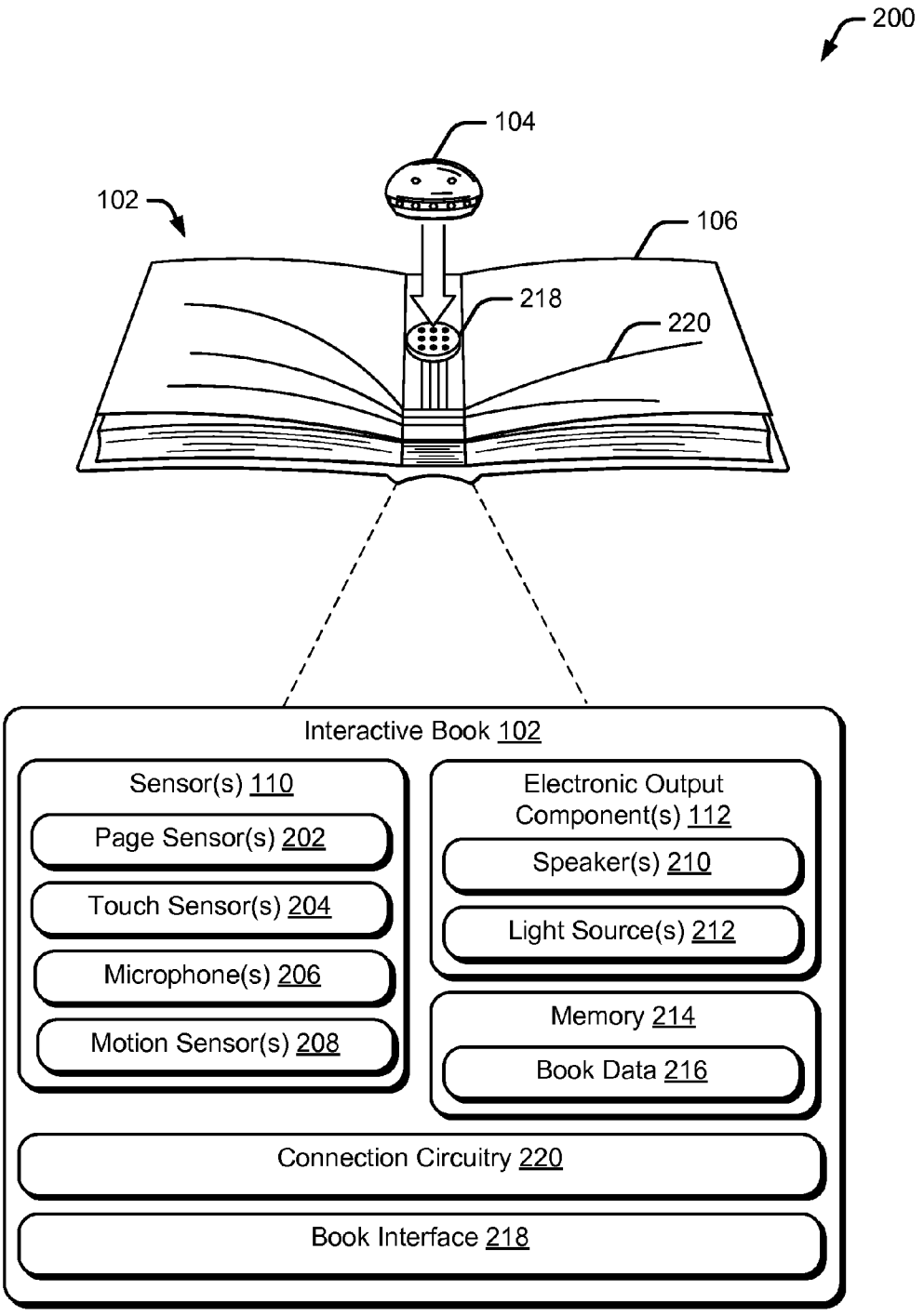

200
104
102
106
218
220
Interactive Book 102
Sensor(s) 110
Page Sensor(s) 202
Touch Sensor(s) 204
Microphone(s) 206
Motion Sensor(s) 208
Electronic Output Component(s) 112
Speaker(s) 210
Light Source(s) 212
Memory 214
Book Data 216
Connection Circuitry 220
Book Interface 218

FIG. 2

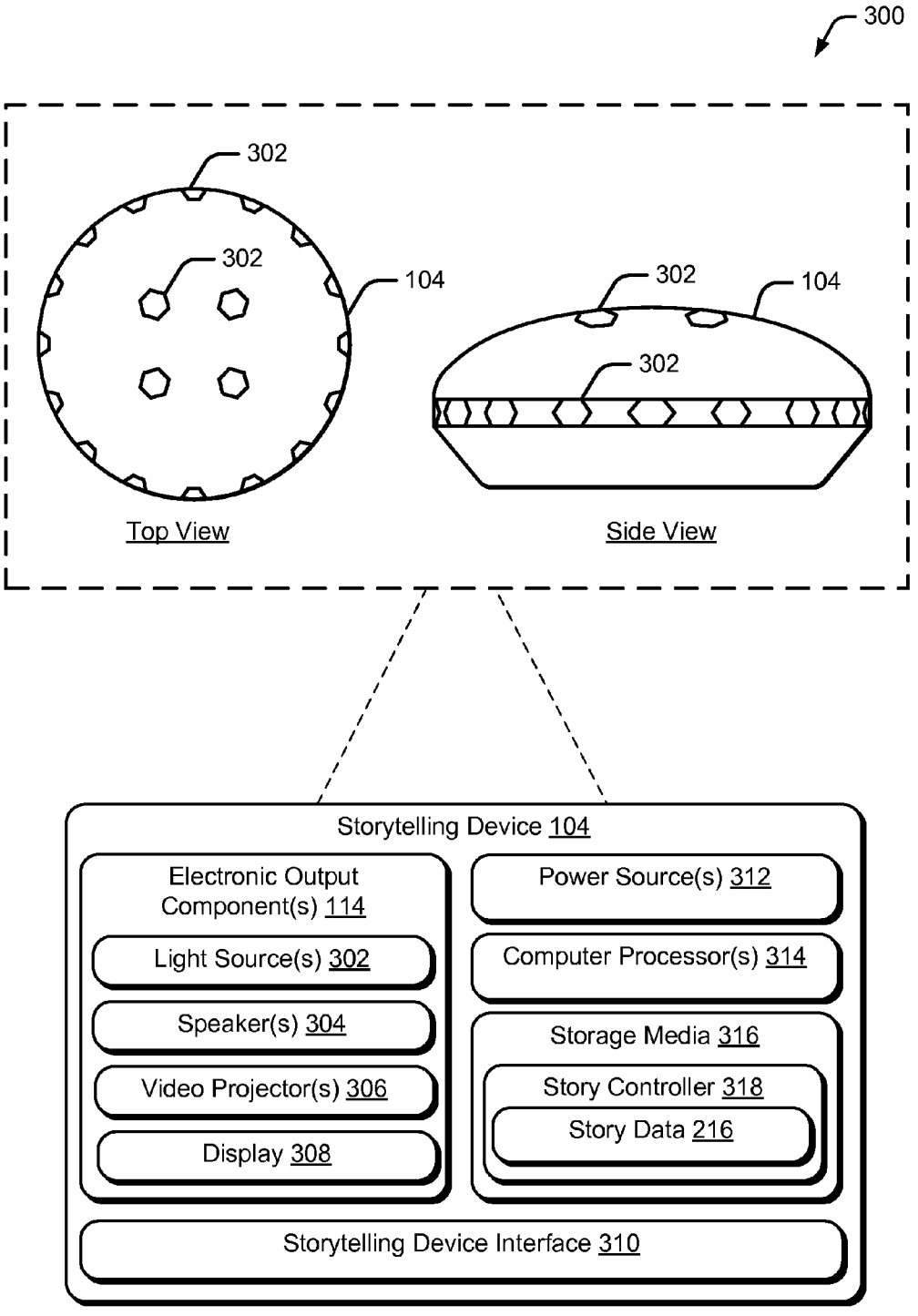

300
302
302
104
Top View
302
104
302
Side View
Storytelling Device 104
Electronic Output Component(s) 114
Light Source(s) 302
Speaker(s) 304
Video Projector(s) 306
Display 308
Power Source(s) 312
Computer Processor(s) 314
Storage Media 316
Story Controller 318
Story Data 216
Storytelling Device Interface 310

FIG. 3

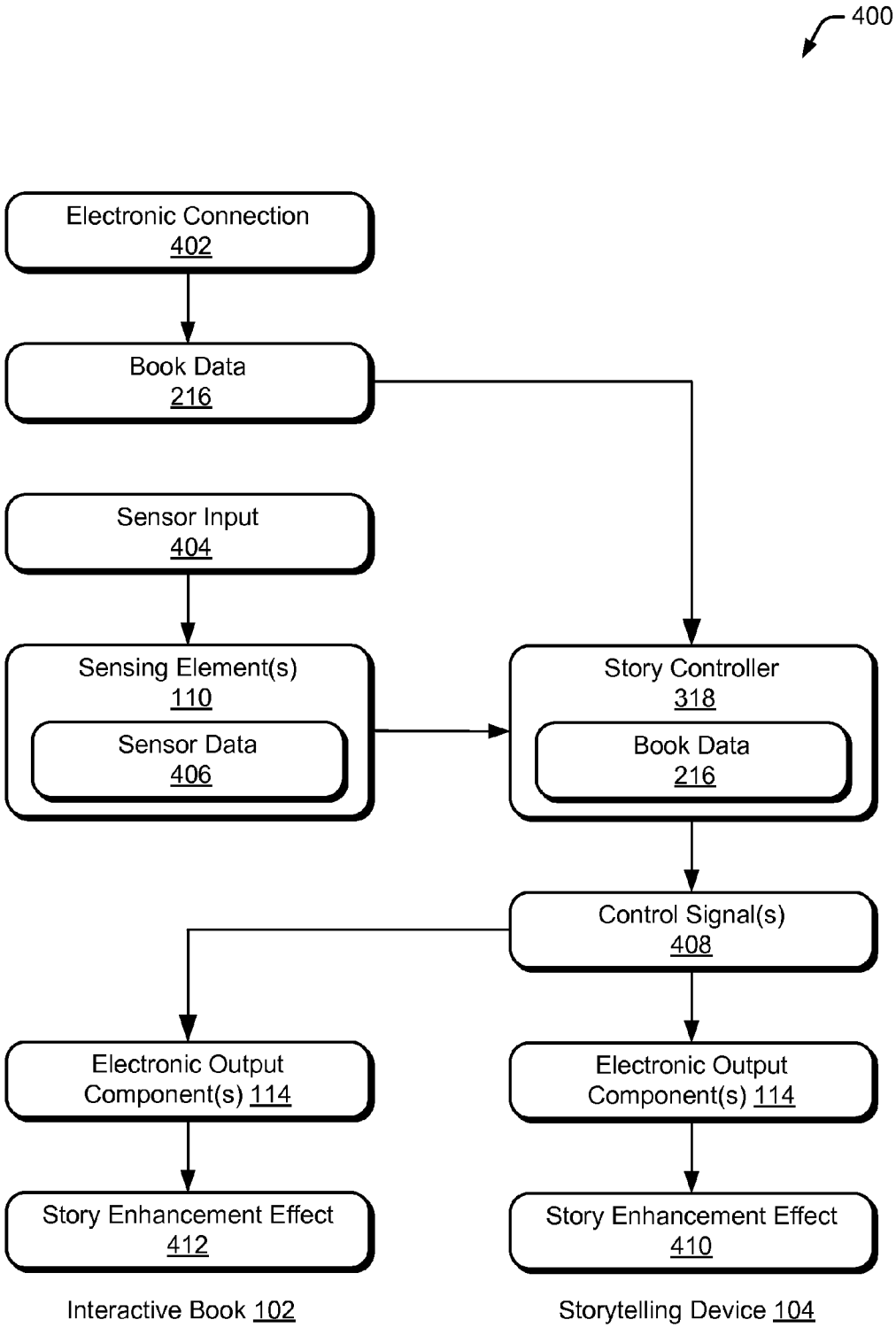

400
Electronic Connection
402
Book Data
216
Sensor Input
404
Sensing Element(s)
110
Sensor Data
406
Story Controller
318
Book Data
216
Control Signal(s)
408
Electronic Output
Component(s) 114
Electronic Output
Component(s) 114
Story Enhancement Effect
412
Story Enhancement Effect
410
Interactive Book 102
Storytelling Device 104

FIG. 4

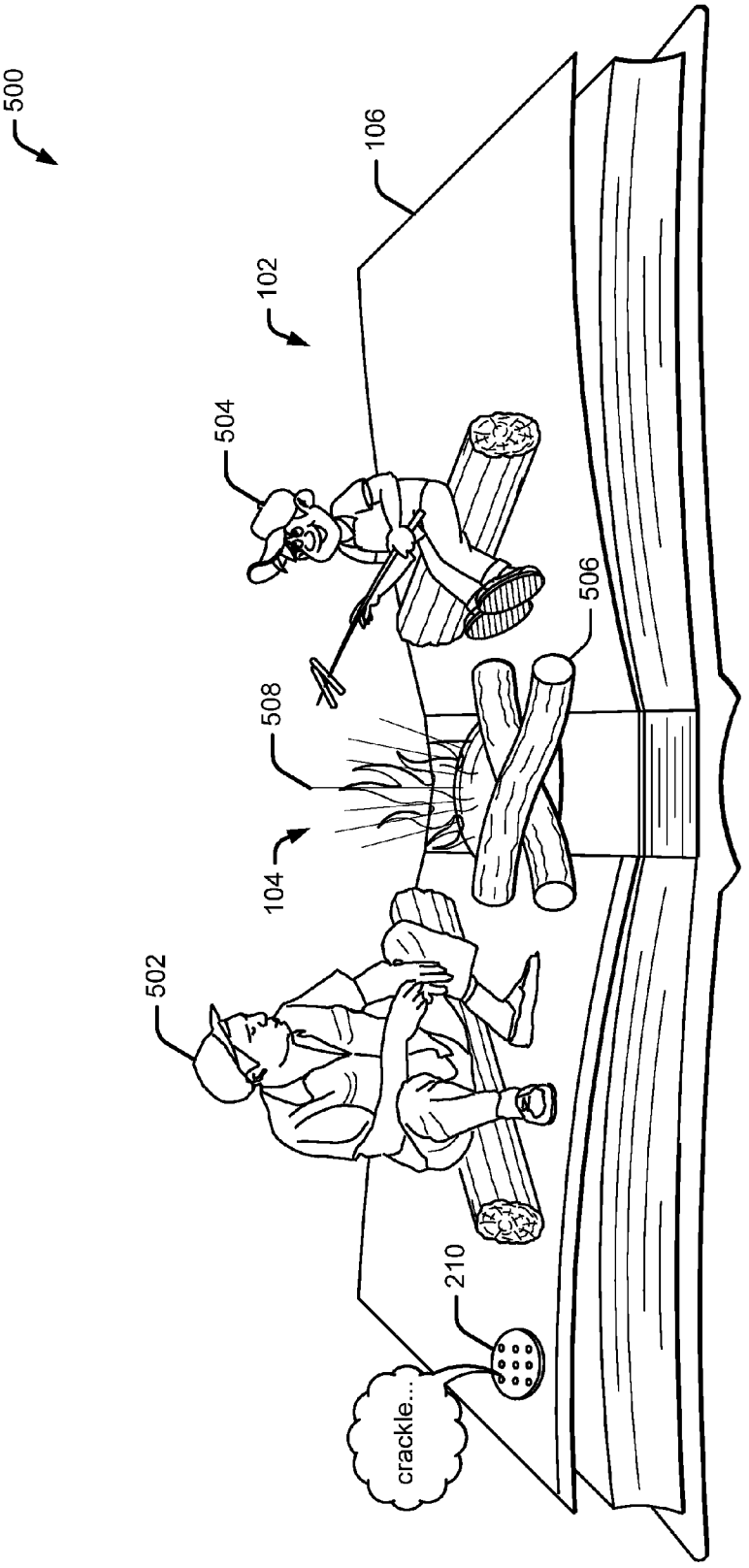


FIG. 5

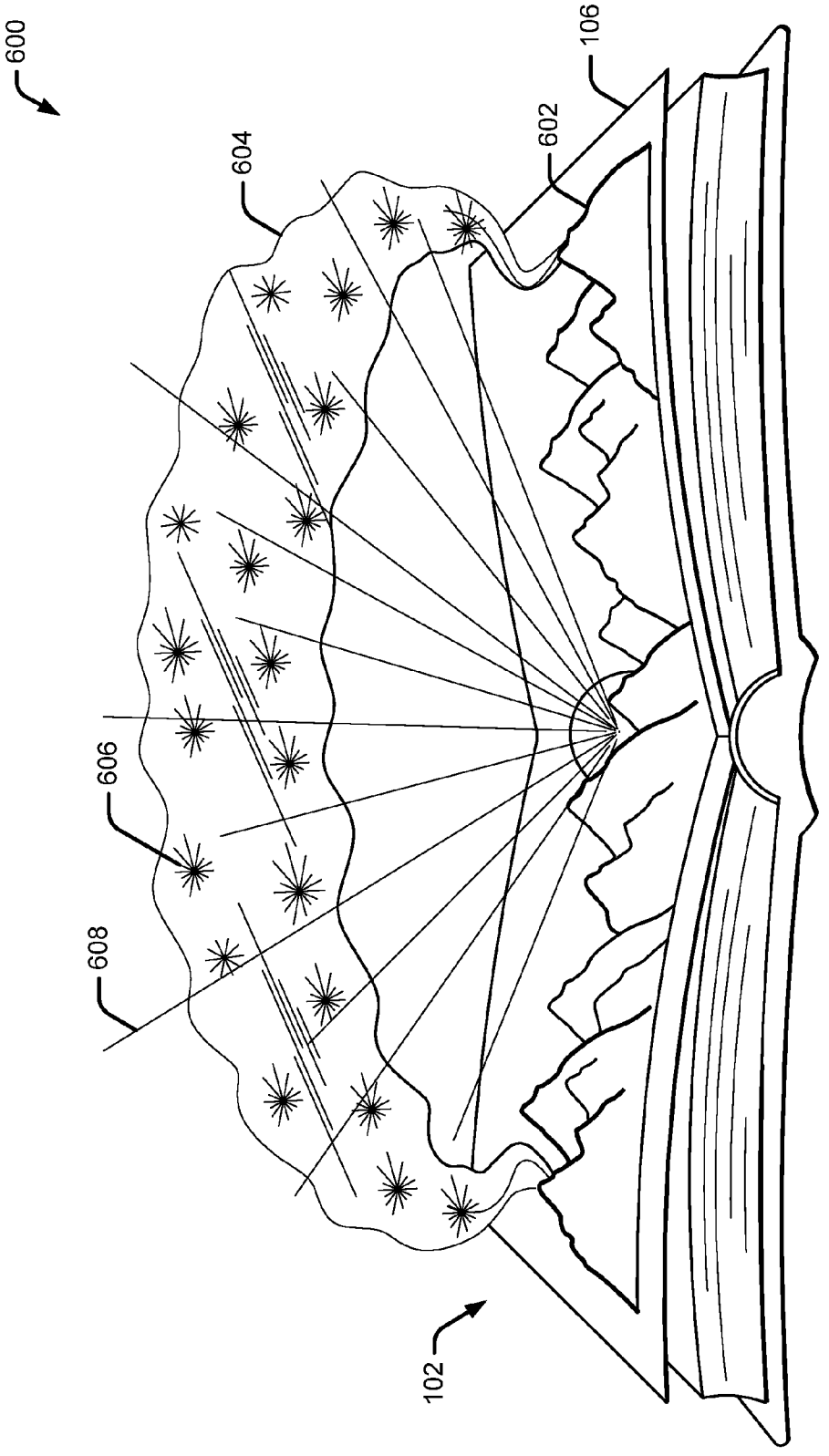


FIG. 6

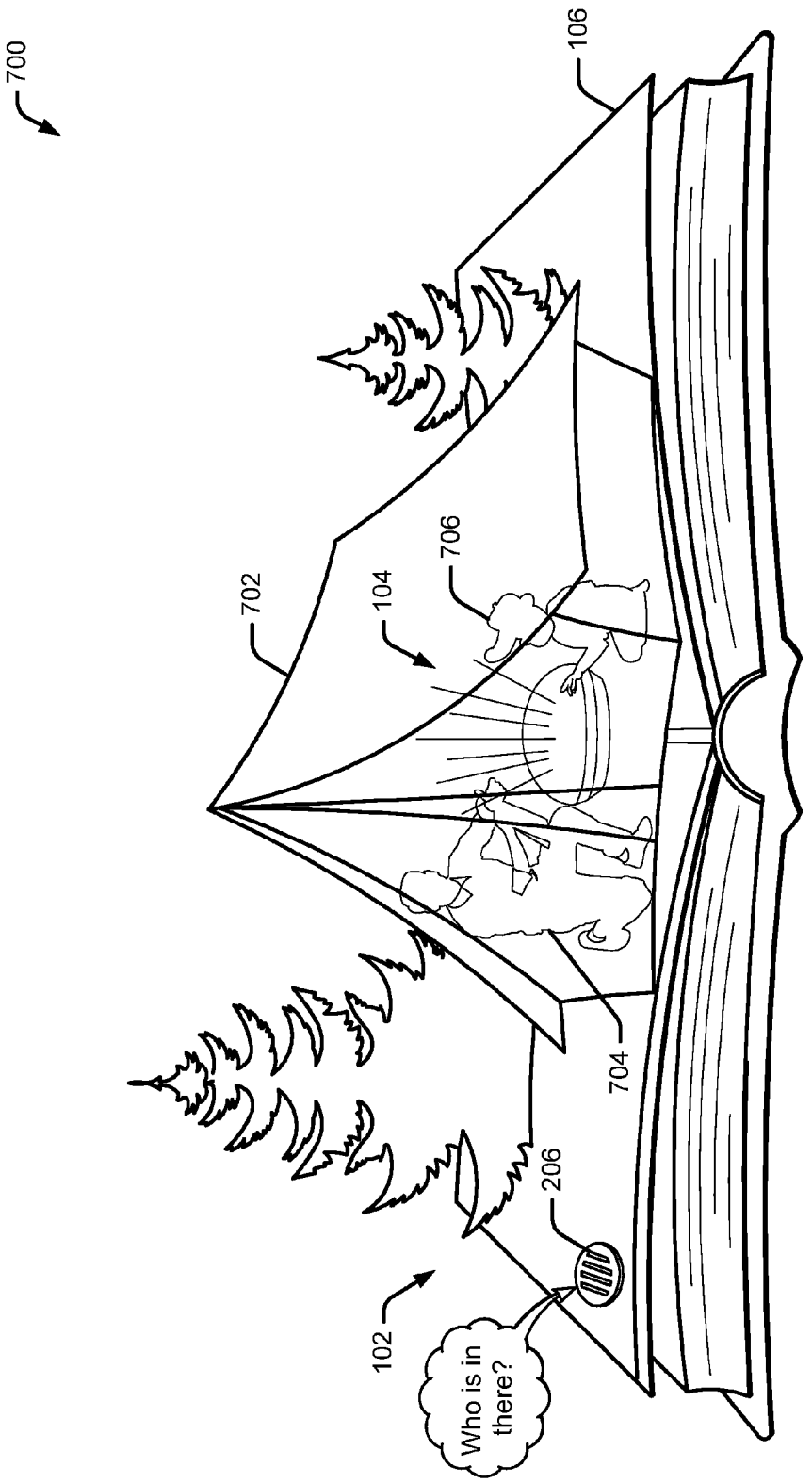


FIG. 7

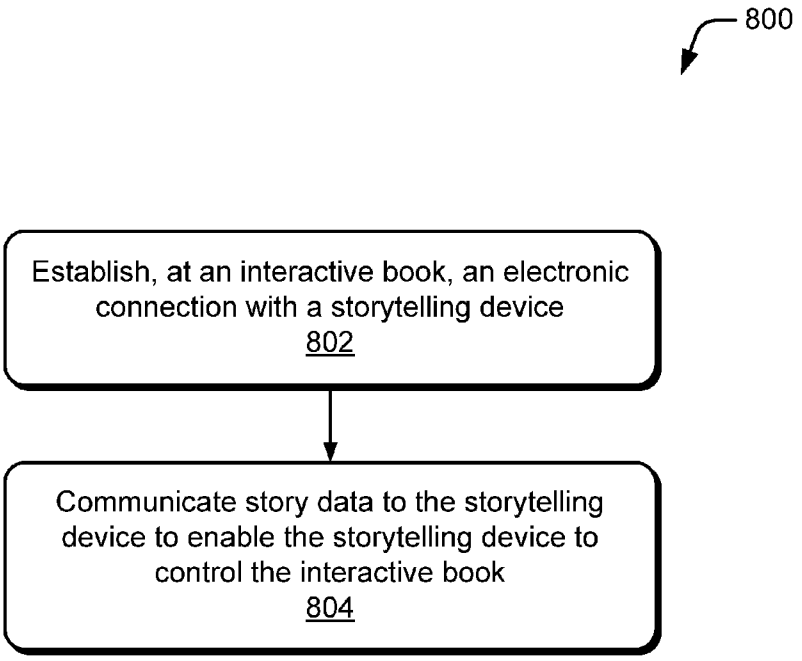

800
Establish, at an interactive book, an electronic connection with a storytelling device
802
Communicate story data to the storytelling device to enable the storytelling device to control the interactive book
804

FIG. 8

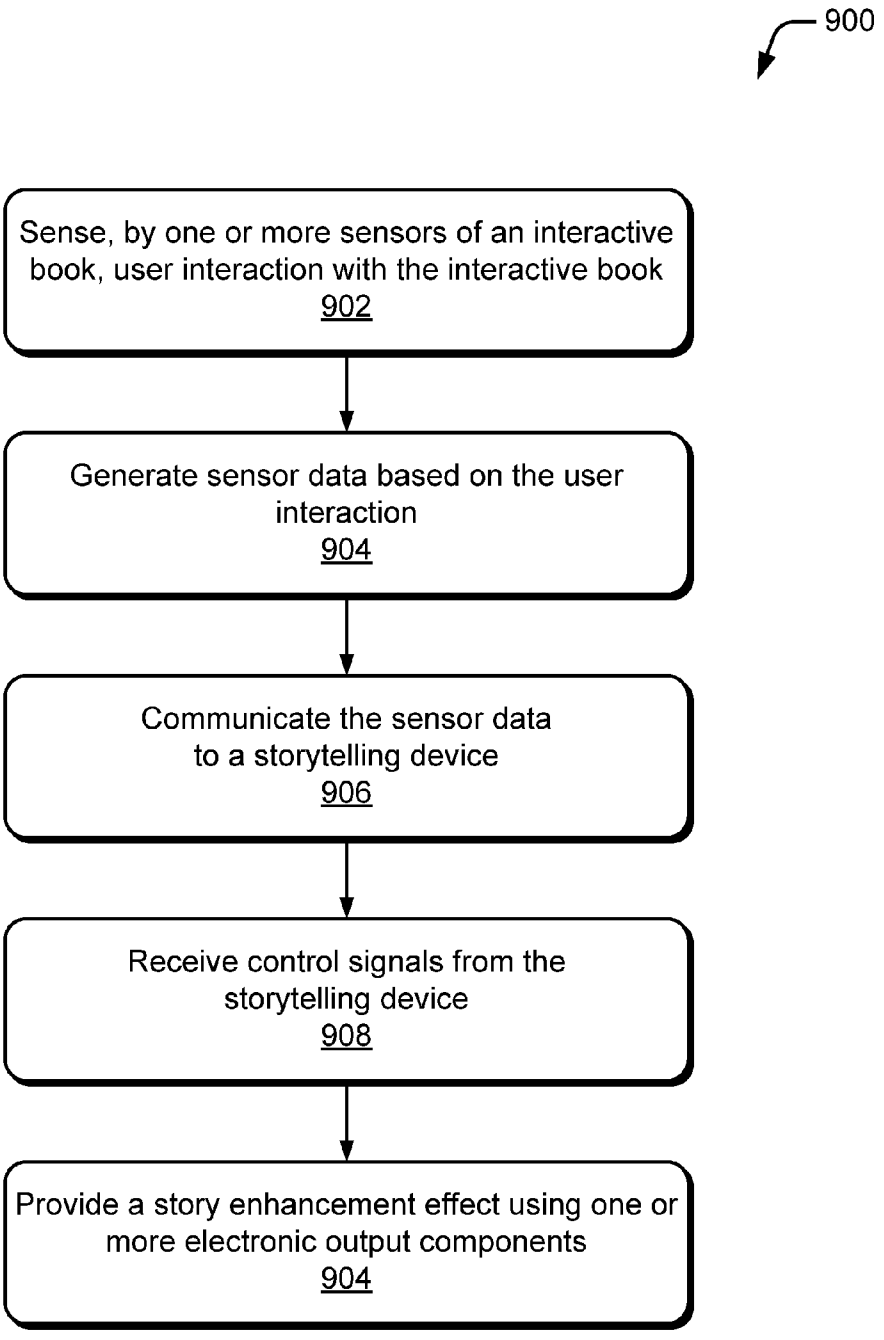

900
Sense, by one or more sensors of an interactive book, user interaction with the interactive book
902
Generate sensor data based on the user interaction
904
Communicate the sensor data to a storytelling device
906
Receive control signals from the storytelling device
908
Provide a story enhancement effect using one or more electronic output components
904

FIG. 9

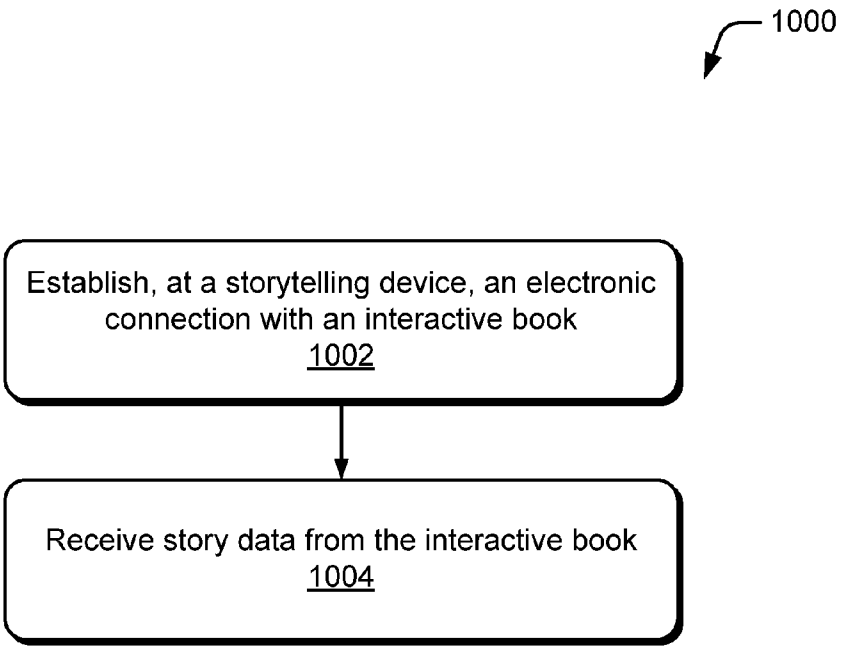

1000
Establish, at a storytelling device, an electronic connection with an interactive book
1002
Receive story data from the interactive book
1004

FIG. 10

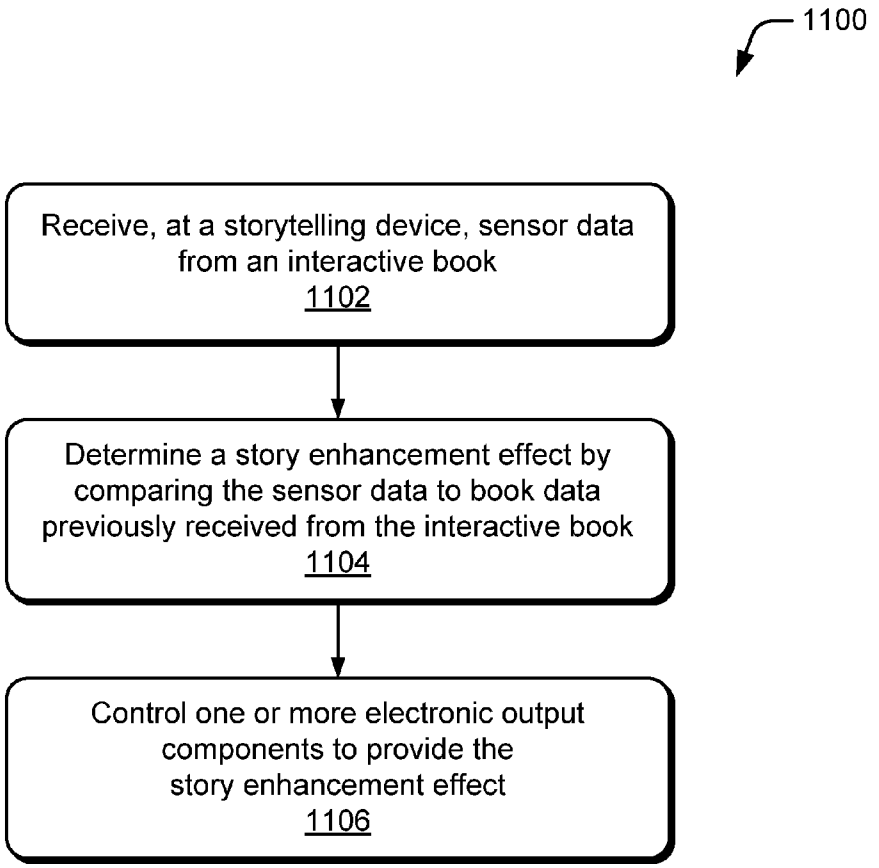

1100
Receive, at a storytelling device, sensor data from an interactive book
1102
Determine a story enhancement effect by comparing the sensor data to book data previously received from the interactive book
1104
Control one or more electronic output components to provide the story enhancement effect
1106

FIG. 11

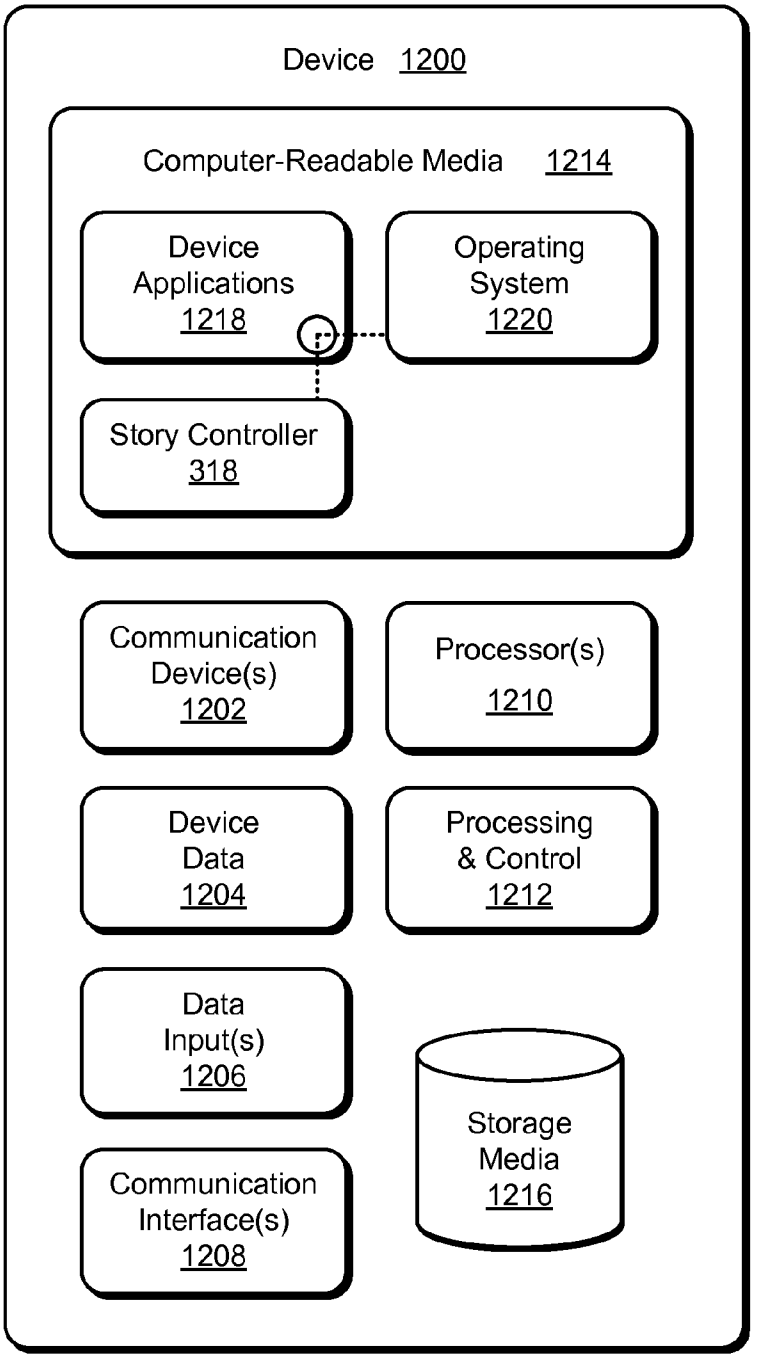

Device 1200
Computer-Readable Media 1214
Device Applications 1218
Operating System 1220
Story Controller 318
Communication Device(s) 1202
Processor(s) 1210
Device Data 1204
Processing & Control 1212
Data Input(s) 1206
Storage Media 1216
Communication Interface(s) 1208

FIG. 12

STORYTELLING DEVICE

PRIORITY APPLICATION

[0001] This application is a non-provisional of and claims priority under 35 U.S.C. §119(e) to U.S. Patent Application Ser. No. 62/044,101, titled "Storytelling Device," and filed on Aug. 29, 2014, the disclosure of which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] Recently some books, such as children's books, include an audio component that enriches the experience of reading the book. For example, the audio component may include physical control buttons and a speaker attached to the side of the book. The book itself may include words, pictures, and written instructions that tell the user to push specific buttons on the audio component to cause audio to be played via the speaker. The audio component and the book are not truly integrated, however, because there is no information exchanged between the book and the audio component.

SUMMARY

[0003] This document describes an interactive book and a storytelling device. The interactive book includes sensors, electronic output components, such as light sources and speakers, and a memory that maintains book data. The sensors and the electronic output components are integrated into the book itself, such as within physical pages of the interactive book. The interactive book is configured to establish an electronic connection with the storytelling device. When the electronic connection is established, the book data is communicated from the interactive book to the storytelling device.

[0004] The storytelling device also includes electronic output components, such as light sources, speakers, a video projector, or a display. The storytelling device receives sensor data from the sensors of the interactive book. Then, based on the sensor data and the book data, the storytelling device controls the electronic output components, at the interactive book and/or at the storytelling device, to provide story enhancement effects that are correlated to the interactive book.

[0005] This summary is provided to introduce simplified concepts concerning an interactive book and a storytelling device, which is further described below in the Detailed Description. This summary is not intended to identify essential features of the claimed subject matter, nor is it intended for use in determining the scope of the claimed subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Embodiments of techniques and devices for an interactive book and a storytelling device are described with reference to the following drawings. The same numbers are used throughout the drawings to reference like features and components:

[0007] FIG. **1** is an illustration of an example environment in which an interactive book and a storytelling device may be embodied.

[0008] FIG. **2** illustrates a more-detailed example of the interactive book in accordance with various implementations.

[0009] FIG. **3** illustrates a more-detailed example of the storytelling device in accordance with various implementations.

[0010] FIG. **4** illustrates a system in which a story controller initiates story enhancement effects in accordance with various implementations.

[0011] FIG. **5** illustrates an implementation example in which story enhancement effects are triggered by a page turn.

[0012] FIG. **6** illustrates an additional implementation example in which story enhancement effects are triggered by a page turn.

[0013] FIG. **7** illustrates an additional implementation example in which story enhancement effects are triggered by voice input.

[0014] FIG. **8** illustrates an example method of communicating book data to a storytelling device.

[0015] FIG. **9** illustrates an example method of sensing user interaction with an interactive book to initiate story enhancement effects.

[0016] FIG. **10** illustrates an example method of receiving book data from an interactive book.

[0017] FIG. **11** illustrates an example method of controlling an electronic output component to provide a story enhancement effect for an interactive book.

[0018] FIG. **12** illustrates various components of an example computing system that can be implemented as any type of computing device as described with reference to the previous FIGS. **1-11** to implement the interactive book or the storytelling device.

DETAILED DESCRIPTION

[0019] Overview

[0020] This document describes an interactive book and a storytelling device. The interactive book includes sensors (e.g., a page sensor, a touch sensor, and a microphone) and electronic output components (e.g., light sources and a speaker). Unlike conventional solutions, the sensors and the electronic output components are integrated into the book itself, such as by being embedded in physical pages of the interactive book.

[0021] The interactive book also includes a memory which maintains book data usable to provide various story enhancement effects correlated to the story of the interactive book. For example, the book data maps control signals for the story enhancement effects to sensor data generated by the sensors of the interactive book. In one or more implementations, the interactive book does not include logic or controllers for processing the book data to provide the story enhancement effects.

[0022] The storytelling device is a separate device that forms an electronic connection with an interactive book. The storytelling device includes logic and controllers configured to process book data received from the interactive book to provide story enhancement effects that are correlated to the interactive book. The storytelling device is "story agnostic" because the storytelling device is not associated with any one particular interactive book. Instead, the storytelling device is designed to control multiple different interactive books using book data received when connected to each respective interactive book.

[0023] The storytelling device also includes a power source for the interactive book, and electronic output components, such as light sources, speakers, a projector, or a display. Integrating the logic, power, and electronic output components with the storytelling device reduces the cost of manufacturing each interactive book. Notably, this also reduces the

cost of each interactive book to consumers, and diminishes the consumer's loss if a single interactive book is destroyed by a rambunctious toddler.

[0024] Both the storytelling device and the interactive book are inoperable until the electronic connection is established. When the electronic connection is established, however, the storytelling device provides power to the interactive book, and the interactive book communicates the book data to the storytelling device. The storytelling device then uses the book data to provide story enhancement effects as the user interacts with the interactive book.

[0025] In operation, the storytelling device receives sensor data from the sensors of the interactive book as the reader interacts with the interactive book, such as by turning pages of the interactive book or touching touch sensors within the pages. Based on the sensor data and the book data, the storytelling device controls the electronic output components, at the interactive book and/or at the storytelling device, to provide story enhancement effects that are correlated to the interactive book. To do so, the storytelling device communicates control signals to the electronic output components, at the interactive book and/or the storytelling device, to cause the electronic output components to provide the story enhancement effects, such as by outputting light or playing audio or video content.

[0026] Thus, the interactive book and the storytelling device are truly integrated because, unlike conventional solutions, there is a "two-way" information exchange between the interactive book and the storytelling device. The interactive book communicates book data and sensor data to the storytelling device, and the storytelling device communicates control signals back to electronic output components of the interactive book.

[0027] Example Environment

[0028] FIG. **1** is an illustration of an example environment **100** in which an interactive book and a storytelling device may be embodied. Interactive book **102** is configured to enable user interaction with a story of the interactive book, and storytelling device **104** is configured to assist interactive book **102** in telling the story by controlling various story enhancement effects which are correlated to the story.

[0029] Interactive book **102** is a physical book and includes physical pages ("pages") **106**, which may be implemented with a physical material such as paper, cardboard, or plastic, to name just a few. Each page **106** of interactive book **102** may include text or images like many standard physical books.

[0030] In one or more implementations, interactive book **102** includes three-dimensional pop-up elements ("pop-up elements) **108**, which pop-up and out of pages **106** of interactive book **102** when the reader turns to a particular page. Such pop-up elements may commonly be found in children's books, and may be made from any type of sturdy material, such as cardboard, plastic, and so forth. In environment **100**, pop-up elements **108** include two trees that pop-up from interactive book **102** when the reader turns to page **106**. While many examples described herein will reference pop-up elements, in some cases interactive book **102** may be implemented without pop-up elements.

[0031] Interactive book **102** also includes sensors **110** that are configured to sense various types of input. For example, sensors **110** may include a page sensor configured to sense a current page of interactive book **102**, a touch sensor configured to sense touch input and gestures, a microphone configured to sense voice input, or a motion sensor configured to sense motion input. Sensors **110** are integrated within interactive book **102**, such as by being embedded within pages **106** of interactive book **102** or in the spine of interactive book **102**.

[0032] In environment **100**, sensor **110** is illustrated as a touch sensor that is embedded in page **106** and associated with an image of a flashlight. The touch sensor is configured to receive touch input when the reader's finger touches the image of the flashlight. In one or more implementations, interactive book **102** does not include a dedicated power source, thus, without storytelling device **104**, sensors **110** of interactive book **102** are inoperable.

[0033] Interactive book **102** is configured to establish an electronic connection with storytelling device **104**. The electronic connection enables data and control signals to be transferred between interactive book **102** and storytelling device **104**. In addition, storytelling device **104** provides a power source for interactive book **102** through the electronic connection. In this example, storytelling device **104** is connected to the spine of interactive book **102**, such that storytelling device **104** is positioned in the center of interactive book **102** when opened. For example, each page of interactive book **102** includes a hole in the center that enables storytelling device to connect to the spine of interactive book **102**.

[0034] Storytelling device **104** is configured to enhance the reading of interactive book **102** by controlling various "story enhancement effects," which are specifically correlated to interactive book **102**. As described herein, a "story enhancement effect" corresponds to output by one or more electronic output components, such as playing audio through a speaker, outputting light using a light source, or displaying video using a video projector or a display.

[0035] Both the interactive book **102** and storytelling device **104** may include electronic output components, which are depicted as electronic output components **112** and **114**, respectively. In this example, electronic output component **112** is depicted as a speaker that is integrated within page **106** of interactive book **102**, and electronic output component **114** is depicted as light sources positioned around an outer surface of storytelling device **104**. Note that the positioning of storytelling device **104** enables storytelling device **104** to shine light from the light sources to illuminate a currently opened page **106** (e.g., the page currently being read by the reader) of interactive book **102**.

[0036] Storytelling device **104** includes logic and controllers to control electronic output components **112** and **114** to provide the story enhancement effects. However, storytelling device **104** is "story agnostic", which means that the storytelling device need not include data or instructions for any one particular story.

[0037] In contrast, interactive book **102** includes book data usable to control the story enhancement effects for interactive book **102**, but may not include logic or controllers configured to use the book data. The book data maps sensor data generated by sensors **110** to various story enhancement effects, and provides control signals usable to control electronic output components **112** and/or **114** to provide the story enhancement effects. Additionally, the book data may include media data, such as audio files or video files, associated with interactive book **102**. In FIG. **1**, for example, the book data may include an audio file that can be played to output the sound an owl might make, such as "hoooo, hoooo".

[0038] Interactive book **102** communicates the book data to storytelling device **104** when the electronic connection between interactive book **102** and storytelling device **104** is

established. This enables storytelling device **104** to use the book data received from interactive book **102** to control various story enhancement effects which are correlated to interactive book **102**.

[0039] In this example, when the user's finger touches the touch sensor integrated into page **106**, it causes storytelling device **104** to initiate story enhancement effects by controlling the light sources of storytelling device **104** to illuminate the tree pop-up element **108**, which enables the reader to see an owl in the tree. Additionally, storytelling device **104** causes the speaker in interactive book **102** to play the audio file to make the "hoooo, hoooo" sound. Note, therefore, that the story enhancement effects are specifically correlated interactive book **102**. The light sources are controlled to illuminate an exact area of the tree at which the owl is located, and the speakers are controlled to make the "hooo, hooo" sound at the exact time the owl is illuminated.

[0040] Having discussed an environment in which an interactive book and a storytelling device may be embodied, now consider a more-detailed discussion of interactive book **102**.

[0041] Interactive Book

[0042] FIG. **2** illustrates a more-detailed example **200** of interactive book **102** in accordance with various implementations.

[0043] In this example, interactive book **102** includes sensors **110**, which include, by way of example and not limitation, a page sensor **202**, a touch sensor **204**, a microphone **206**, and a motion sensor **208**. As discussed above, each of the sensors **110** may be integrated into interactive book **102**, such as by being embedded in a page **106** of interactive book **102**, or at any other position within interactive book **102**, such as in the spine of interactive book **102**. Interactive book **102** may not include a power source or controllers for the sensors, which decreases the cost of manufacturing each interactive book **102**.

[0044] Each sensor **110** is configured to sense user interaction with interactive book **102**, and to generate sensor data corresponding to the user interaction. The sensor data may include an identifier of the sensor, as well as the user interaction detected. For example, if touch input is sensed by a touch sensor on page **5** of interactive book **102**, the touch data includes an identifier of the touch sensor on page **5**, and the user interaction detected (e.g., single touch, double tap, or swipe up). Interactive book **102** communicates the sensor data to storytelling device **104** effective to cause the storytelling device **104** to initiate a story enhancement effect based on the sensor data.

[0045] Page sensor **202** is configured to sense the current page **106** of interactive book **102**, which is currently open, and to output page data indicating the current page **106**. In FIG. **1**, for example, page sensor **202** may detect the current page **106** of interactive book **102** when the reader turns to the page with the tree pop-up elements.

[0046] In one or more implementations, page sensor **202** is implemented as a flex sensor. Flex sensors are configured to change in resistance or voltage when they flex or bend. For example, the flex sensor may output a high resistance value with a high amount of bend, and a low resistance value with a low amount of bend. Thus, the flex sensor may be attached around the hinge of interactive book **102** to sense the current page of interactive book **102** that is opened. For example, the resistance values of the flex sensor may be mapped to each page of interactive book **102** to enable storytelling device **104** to determine the current page based on the resistance value of the flex sensor.

[0047] Touch sensor **204** is configured to sense touch input when a user touches touch sensor **204**, and to generate touch data corresponding to the touch input. Touch sensor **204** may be configured to detect a single touch or tap, multi-finger touches and taps (e.g., two-finger touches), and/or gestures (e.g., swiping up, down, left, or right). In FIG. **1**, for example, touch sensor **204** detects touch input when the user's finger touches the touch sensor associated with the flashlight. Touch sensor **204** may be implemented as any type of sensor configured to receive touch input, such as a capacitive touch sensor, a resistance touch sensor, or a piezo touch sensor, to name just a few.

[0048] Microphone **206** is configured to sense audio input when a reader speaks, and to generate audio data corresponding to the audio input. Thus, microphone **206** may be able to sense specific utterances from a user, which can be used to initiate various story enhancement effects.

[0049] Motion sensor **208** is configured to sense motion input, and generate motion data corresponding to the motion input. For example, motion sensor **208** may be able to sense when the user shakes interactive book **102**, picks up interactive book **102**, drops interactive book **102**, and so forth. Motion sensor **208** may be implemented as any type of sensor configured to sense motion, rotation, and so forth, and thus may be implemented as an accelerometer or a gyroscope, to name just a few.

[0050] While sensors **110** are described as including page sensor **202**, touch sensor **204**, microphone **206**, and motion sensor **208**, note that sensors **110** may include any type of sensor that can be integrated into a physical book.

[0051] In this example, interactive book **102** includes electronic output components **112** which include, by way of example and not limitation, speakers **210** and light sources **212**.

[0052] Speakers **210** are configured to receive control signals and audio files from storytelling device **104**, and to output audio. Speakers **210** can output any type of audio, such as animal sound effects, a voice reading the story of interactive book **102**, or a song corresponding to interactive book **102**. Speakers **210** may be implemented as small, lightweight speakers, such as those commonly found on greeting cards. Thus, speakers **210** may be placed on individual pages **106** of interactive book **102**. Alternately, speakers **210** may be implemented elsewhere, such as in the spine of interactive book **102**.

[0053] Light sources **212** are configured to receive control signals from storytelling device **104**, and to output light based on the control signals. Light sources **212** may be implemented as any type of light source. In one or more implementations, light sources **212** are implemented as light-emitting-diodes (LEDs). Light sources **212** may be controlled to perform various types of lighting effects, such as flickering, twinkling, blinking, and so forth.

[0054] Interactive book **102** further includes a memory **214** that maintains book data **216**. Book data **216** provides a blueprint for controlling electronic output components **112** and/or **114** to provide story enhancement effects that are specifically correlated to interactive book **102**. Book data **216** is specific to the story of interactive book **102**. For example, book data **216** for a first interactive book **102** with a story

about trucks is not the same as book data **216** for a second interactive book **102** with a story about animals.

[0055] In one or more implementations, book data **216** includes a mapping between sensor data generated by sensors **110** and story enhancement effects. Thus, the sensor data can be used to "trigger" the story enhancement effects. For example, turning to a specific page may generate page data that triggers a story enhancement effect that is specifically correlated to the specific page. As another example, touching a specific touch sensor may generate touch data that triggers a story enhancement effect that is specifically correlated to the page on which the touch sensor is located. As described above, the sensor data may include an identifier of the sensor, as well as the sensed user interaction. Thus, book data **216** enables storytelling device **104** to compare sensor data to the mapping between sensor data and story enhancement effects of book data **216**, and to determine the story enhancement effect to provide based on the comparison.

[0056] Additionally, for each story enhancement effect in the mapping, book data **216** provides control signals usable to control electronic output components **112** at interactive book **102** and/or electronic output components **114** at storytelling device **104** to provide the story enhancement effect. Thus, as discussed in more detail below, storytelling device **104** can use the control signals to control the electronic output components to provide output corresponding to the story enhancement effect that is specifically correlated to the layout of the current page that is open. For example, the control signals are usable to control light sources to illuminate a specific region of a pop-up element **108** on a page **106** that is currently open.

[0057] Book data **216** may also include media files that can be used to output media content (e.g., audio and/or video content). For example, book data **216** may include a digital audio file corresponding to a particular sound effect, voice utterance, or song that is specific to interactive book **102**. The digital audio file may be implemented as any type of digital audio file, such MP3, WAV, and so forth. As another example, book data **216** may include a digital video file corresponding to video clips or video effects that are specific to interactive book **102**. The digital video file may be implemented as any type of digital video file, such as AVI, MOV, WMV, and so forth.

[0058] Interactive book **102** is configured to communicate book data **216** to storytelling device **104** when an electronic connection is established with storytelling device **104**. Doing so enables storytelling device **104** to control electronic output components **112** and/or **114** to provide story enhancement effects that are correlated to interactive book **102**.

[0059] To establish the electronic connection, interactive book **102** includes a book interface **218** and connection circuitry **220** which connects book interface **218** to sensors **110** and electronic output components **112**. In one or more implementations, book interface **218** is implemented as spring-loaded pogo pins which are configured to connect to corresponding pogo pins on storytelling device **104**. However, book interface **218** may also be implemented as other types of connective interfaces that enable the transfer of data, control signals, and power between interactive book **102** and storytelling device **104**.

[0060] In this example, book interface **218** is positioned in the center of interactive book **102**. The bottom of storytelling device **104** is configured to connect to book interface **218**, such that storytelling device **104** is positioned in the center of interactive book **102** when the book is open. Each page **106** may include a circular cut-out to enable storytelling device **104** to be visible when any page **106** is open. In some cases, interactive book **102** may include pop-up elements **108** that pop-up and cover storytelling device **104**. Examples of such pop-up elements are discussed with regards to FIGS. **5**, **6**, and **7**, below.

[0061] Connection circuitry **220** connects to interface **218**, and can be embedded into pages **106** to connect interface **218** to sensors **110** and electronic output components **112** in pages **106**. In this example, connection circuitry **220** connects to interface **218** in the spine of interactive book **102**, and the runs down the spine of interactive book **102**, and into pages **106**.

[0062] In one or more implementations, to reduce the amount of wiring of connection circuitry **220**, small sensor boards may be placed on each page **106** that can control sensors **110** and electronic output components **112** on the particular page **106**. This configuration reduces the amount of wiring of connection circuitry **220** that is needed to connect each sensor **110** and electronic output component **112** to book interface **218**.

[0063] When the electronic connection is established with storytelling device **104**, book data **216** is communicated from memory **214** on interactive book **102** to storytelling device **104**. In some cases, interactive book **102** may automatically communicate book data **216** to storytelling device **104** responsive to detecting that the electronic connection with storytelling device **104** is established. Alternately, when the electronic connection is established, storytelling device **104** may communicate a request to interactive book **102**. Responsive to receiving the request, interactive book **102** communicates book data **216** to storytelling device **104**.

[0064] Having discussed interactive book **102**, consider now a more-detailed discussion of storytelling device **104**.

[0065] Storytelling Device

[0066] FIG. **3** illustrates a more-detailed example **300** of storytelling device **104** in accordance with various implementations.

[0067] As described throughout, storytelling device **104** is a separate device that can be attached or detached from interactive books **102**, and includes centralized logic and controllers configured to process book data **216** and sensor data received from interactive book **102** to provide story enhancement effects that are correlated to interactive book **102**.

[0068] In this example, the shape of storytelling device **104** is semi-spherical, and resembles a "puck" or a "stone". It is to be appreciated, however, that storytelling device **104** is not limited to this spherical design.

[0069] Storytelling device **104** includes electronic output components **114**, which include, by way of example and not limitation, light sources **302**, speakers **304**, video projectors **306**, and a display **308**. Storytelling device **104** may include additional electronic output components **114**, or just a subset of the electronic output components **114** illustrated in FIG. **3**. For example, in some cases, storytelling device **104** may be implemented in different versions, such that a more-expensive, premium version may include video projector **306** or display **308**, whereas a less-expensive, basic version may not include video projector **306** and display **308**.

[0070] Light sources **302** may be implemented as any type of light source, such as LEDs. Light sources **302** are configured to receive control signals from storytelling device **104**, and to output light based on the control signals. In this example, light sources **302** are positioned on the outer surface

of storytelling device **104**. As shown in a "top view" and a "side view", light sources **302** may be positioned around the perimeter of storytelling device **104** and configured to project light towards pages **106**. Positioning light sources **302** around storytelling device **104** enables light to reach any area of interactive book **102**. Alternately or additionally, storytelling device **104** may include light sources **302** positioned on a top surface of storytelling device **104**, as illustrated in the top view.

[0071] In one or more implementations, light sources **302** may include high-intensity LEDs and low-intensity LEDs. The high-intensity LEDs can be controlled to shine out and illuminate parts of interactive book **102**, such as pop-up elements **108**, while the low-intensity LED's may be controlled to glow softly.

[0072] Speakers **304** are configured to receive audio files and control signals from storytelling device **104**, and to output audio. Speakers **304** can output any type of audio, such as animal sound effects, a voice reading the story of interactive book **102**, or a song corresponding to interactive book **102**. In some cases, storytelling device **104** may not include speakers, and instead use speakers **210** embedded in interactive book **102**. Alternately, interactive book **102** may not include speakers **210** in which case speakers **304** of storytelling device **104** can be used for all audio output.

[0073] Video projector **306** is configured to receive video files and control signals from storytelling device **104**, and to project video. In one or more implementations, video projector **306** is implemented as a small "pico" projector. Video projector **306** may be controlled to project the video onto specific areas of interactive book **102** to interact with areas of the book, such as pop-up elements **108**. In FIG. **1**, for example, video projector **306** could be controlled to project video of the owl into the tree pop-up element, instead of relying on the light sources to illuminate the owl. Video projector **306** may also be controlled to project video to areas outside of interactive book **102**. For example, video projector **306** may be configured to project images or video, such as images or video of the moon and stars, onto the ceiling in a room in which the reader is reading interactive book **102**.

[0074] Display **308** is configured to receive video or image files and control signals from storytelling device **104**, and to display images or video. Display **308** may be implemented as any type of display, such as a liquid crystal display (LCD) or other types of high-resolution displays. In some cases, display **308** may be a circular display, similar to what might be found on a conventional smartwatch. Display **308** may positioned so that it covers the top portion of storytelling device.

[0075] Consider that display **308** may be used to display images corresponding to interactive book **102**, or even text of the story of interactive book **102**. For example, rather than including the text of the story on individual pages **106**, display **308** can display text of the story that changes as each page is turned. Consider also that text of the story could be displayed in any language by display **308**, which would allow a single version of interactive book **102** to be compatible with multiple languages.

[0076] Storytelling device **104** includes a storytelling device interface **310** that is configured to establish an electronic connection to interactive book **102**. For example, the bottom of storytelling device **104** may include pogo pins designed to connect to the pogo pins of book interface **218**. Of course, any type of connective interface may be used to connect storytelling device **104** to interactive book **102**.

[0077] Storytelling device **104** includes a power source **312**, which may be implemented as any type of chargeable or removable battery. Power source **312** is configured to provide power to storytelling device **104**. In one or more implementations, power source **312** also provides power to sensors **110** and electronic output components **112** of interactive book **102** via the electronic connection between storytelling device interface **310** and book interface **218**. Placing the power source for interactive book **102** on storytelling device **104**, instead of interactive book **102**, decreases the cost of manufacturing each interactive book **102** thereby also decreasing the cost to the consumer.

[0078] Storytelling device **104** includes one or more computer processors **314** and computer-readable storage media (storage media) **316**. Applications and/or an operating system (not shown) embodied as computer-readable instructions on storage media **316** can be executed by computer processors **314** to provide some or all of the functionalities of storytelling device **104** described herein. Storage media **316** also includes a story controller **318**.

[0079] Story controller **318** receives book data **216** from interactive book **102**, and uses book data **216** to initiate story enhancement effects by communicating control signals to electronic output components **112** and **114**. Storytelling device **104** may include various electronic output component microcontrollers, such as an LED microcontroller configured to control LEDs, an MP3 audio codec microcontroller configured to play audio through speakers, and so forth. Thus, in some cases, story controller **318** may utilize the various microcontrollers associated with the electronic output components to initiate the story enhancement effects.

[0080] In order to better understanding the functionality of story controller **318**, consider FIG. **4**, which illustrates a system **400** in which story controller **318** initiates story enhancement effects in accordance with various implementations.

[0081] In example **400**, interactive book **102** communicates book data **216** to storytelling device **104** responsive to an electronic connection **402** being established between interactive book **102** and storytelling device **104**. For example, as discussed previously, the electronic connection is established when book interface **218** is connected to storytelling device interface **310**.

[0082] Book data **216** includes a mapping between sensor data generated by sensors **110** and story enhancement effects. Additionally, for each story enhancement effect, book data **216** includes control signals usable to control an electronic output component to provide the story enhancement effect. Book data **216** may also include media files, such as audio files or video files that can be used to play media content.

[0083] For example, in environment **100** of FIG. **1**, book data **216** may include an audio file corresponding to the "hoooo, hoooo" sound and a mapping between touch data generated by the touch sensor on page **106** and story enhancement effects corresponding to illuminating the tree pop-up element and causing the speaker to make the "hoooo, hoooo" sound. In addition, book data **216** may include control signals usable to control the light sources on storytelling device **104** to illuminate the tree pop-up element **108** on page **106** and to play the audio file using the speaker embedded in page **106** of interactive book **102**.

[0084] As a reader begins reading and interacting with interactive book **102**, sensors **110** receive sensor input **404**. For example, sensor input **404** may include page input corre-

sponding a current page turned to by the reader sensed by page sensor **202**. Alternately or additionally, sensor input **404** may correspond to touch input sensed by touch sensor **204**, voice input sensed by microphone **206**, motion input sensed by motion sensor **208**, and so forth.

[0085] Next, sensor **110** generate sensor data **406** based on the sensor input. For example, page sensor **202** can generate page data based on page input, touch sensor **204** can generate touch data based on touch input, microphone **206** can generate voice data based on voice input, and motion sensor **208** can generate motion data based on motion input. Returning to FIG. **1**, consider that page data is generated by page sensor **202** when the user turns to page **106**. Further, touch data is generated by touch sensor **204** when the user touches the touch sensor associated with the flashlight. Sensor data **406** may include an identifier of the sensor, as well as the user interaction detected.

[0086] Interactive book **102** communicates sensor data **406** to storytelling device **104**. To do, sensor data **406** is routed to book interface **218** via connection circuitry **220**. Book interface **218** then provides sensor data **406** to storytelling device **104** via storytelling device interface **310**.

[0087] Story controller **318** uses sensor data **406** to initiate story enhancement effects that are correlated to interactive book **102**. To do so, story controller **318** compares sensor data **406** to book data **216**. For example, story controller **318** compares the identifier of the sensor and the user interaction detected by the sensor in sensor data **406** to the mapping of book data **216**. Then, story controller **318** selects a story enhancement effect from the mapping between sensor data and story enhancement effects in book data **216** based on sensor data **406**. Next, story controller **318** initiates the story enhancement effect by transmitting control signals **408**, associated with the selected story enhancement effect in book data **216**, to electronic output components **112** and **114**.

[0088] For example, control signals **408** are communicated to electronic output component **114**, at storytelling device **104**, to cause electronic output component **114** to provide story enhancement effect **410**. In FIG. **1**, for example, a control signal is communicated to the light sources of storytelling device **104** to cause the light sources to provide the story enhancement effect by illuminating the tree pop-up element **108**, which enables the reader to see an owl in the tree.

[0089] Similarly, control signals **408** are communicated to electronic output component **112**, at interactive book **102**, to cause electronic output component **112** to provide story enhancement effect **412**. For example, in FIG. **1**, control signals **408** cause the speaker in interactive book **102** to provide the story enhancement effect by outputting audio corresponding to the "hoooo, hoooo" sound of an owl.

[0090] Having discussed examples of interactive device **102** and storytelling device **104**, consider now various implementation examples in which interactive book **102** and storytelling device **104** may be implemented.

Implementation Examples

[0091] FIG. **5** illustrates an implementation example **500** in which story enhancement effects are triggered by a page turn.

[0092] In this example, the reader has turned to a page **106** of interactive book **102**, which includes pop-up elements **108** in the form of a father **502** and a son **504** sitting around a campfire **506**. Unlike FIG. **1** where storytelling device **104** is exposed in the center of interactive book **102**, in this example storytelling device **104** is at least partially covered by the pop-up element of campfire **506**. For example, campfire **506** includes logs placed over storytelling device **104**. In addition, campfire **506** may include red, yellow, or orange color vellums and/or transparencies that cover storytelling device **104**.

[0093] When the user turns to page **106**, page sensor **202** senses the current page as input and communicates page data to storytelling device **104**. Storytelling device **104** accesses book data **216**, to determine a story enhancement effect that is associated with the current page indicated by the page data. In this case, book data **216** instructs storytelling device **104** to twinkle the light sources (not pictured) positioned on the top of the storytelling device **104**. Thus, storytelling device **104** communicates control signals to light sources **302** on the top of storytelling device **104** to cause the light sources to output twinkling light rays **508**. The red, orange, and yellow color vellums or transparencies of campfire **506**, which overlap storytelling device **104**, interact with light rays **508** output by light sources **302** to provide a story enhancement effect that resembles a real campfire.

[0094] In this example, book data **216** also includes an audio file corresponding to the sound of a crackling fire, and control signals usable to play the audio file through speaker **210** based on the current page **106**. Thus, storytelling device **104** causes speaker **210** to play the cracking fire sound to provide a story enhancement effect corresponding to a real campfire.

[0095] FIG. **6** illustrates an additional implementation example **600** in which story enhancement effects are triggered by a page turn. In this example, the reader has turned to a page **106** of interactive book **102**, which includes pop-up elements **108** in the form of a mountain range **602** and an aurora **604**. Mountain range **602** blocks storytelling device **104** from the front, while aurora **604** goes over the top of interactive book **102** thereby blocking the view of storytelling device **104** from the top. Aurora **604** is constructed from a semi-transparent paper, and includes multiple light sources **606** embedded into the actual paper or material of aurora **604**.

[0096] When the user turns to the current page **106**, page sensor **202** senses the current page as input and communicates page data to storytelling device **104**. Storytelling device **104** accesses book data **216**, to determine story enhancement effects to apply based on the page data. In this case, book data **216** instructs storytelling device **104** to output light rays **608** using light sources **302** of storytelling device to cause aurora **604** to "glow", and to cause light sources **606** embedded in aurora **604** to twinkle to resemble stars in the aurora. Thus, storytelling device initiates these story enhancement effects by communicating control signals to light sources **302** and **306**.

[0097] Thus, similar to FIG. **5**, the story enhancement effects are triggered by a page turn. Unlike FIG. **5**, however, storytelling device **104** controls electronic output components **112** that are embedded into a pop-up element **108** of page **106**.

[0098] In one or more implementations, storytelling device **104** could also control video projector **306** to project a video or static images onto page **106**. For example, video projector **306** could be controlled to project a video of a person climbing mountain range **602**.

[0099] FIG. **7** illustrates an additional implementation example **700** in which story enhancement effects are triggered by voice input. In this example, the reader has turned to

a page **106** of interactive book **102** which includes pop-up elements **108** in the form of a tent **702** that covers storytelling device **104**.

[0100] Page **106** includes a microphone **206** that is configured to receive voice input. When the reader says, "who is in there?" microphone **206** senses voice input and communicates voice data to storytelling device **104**. Storytelling device **104** accesses book data **216**, to determine a story enhancement effect to initiate based on the voice data. In this case, book data **216** instructs storytelling device **104** to use light sources **302** on storytelling device **104** to illuminate tent **702**. Thus, storytelling device **104** communicates control signals to light sources **302** to cause light sources **302** to illuminate tent **702**. When tent **702** is illuminated, the reader is able to see pop-up elements **108** of a father **704** and a son **706** within tent **702**.

[0101] While the examples above describe some of the functionality of storytelling device **104** and interactive book **102**, it is to be appreciated that a variety of other story enhancement effects may be initiated by storytelling device **104** using electronic output components located at storytelling device **104** and/or interactive book **102**. Further, the story enhancement effects may be triggered by various different types of sensor data, including different combinations of sensor data. For example, in some cases the story enhancement effects are triggered by page data, while in other cases the story enhancement effects are triggered by sensor data other than page data, such as touch data, voice data, or motion data. Further, in some cases the story enhancement effects may be triggered by different combinations of sensor data, such as page data and touch data, voice data and motion data, and so forth.

[0102] Notably, the specifications and capabilities of storytelling device **104** can be provided to developers to enable development of a wide variety of different types of interactive books that are designed to be controlled by storytelling device **104**. For example, the specifications can tell developers the types of functions storytelling device **104** can perform, as well as the control signals and instructions needed to trigger these functions. In this way, developers of interactive book **102** are able to create fun, imaginative, and engaging interactive books that encourage user interaction and enable the storytelling device to provide story enhancement effects that bring interactive books to life.

[0103] Example Methods

[0104] FIGS. **8** and **9** illustrate an example method **800** of communicating book data to a storytelling device, and an example method **900** of sensing user interaction with an interactive book to initiate story enhancement effects. FIGS. **10** and **11** illustrate an example method **1000** of receiving book data from an interactive book, and an example method **1100** of controlling an electronic output component to provide a story enhancement effect for an interactive book. These methods and other methods herein are shown as sets of blocks that specify operations performed but are not necessarily limited to the order or combinations shown for performing the operations by the respective blocks. In portions of the following discussion reference may be made to environment **100** of FIG. **1**, example **200** of interactive book **102** of FIG. **2**, example **300** of storytelling device **104** of FIG. **3**, and system **400** of FIG. **4**, reference to which is made for example only. The techniques are not limited to performance by one entity or multiple entities operating on one device.

[0105] FIG. **8** illustrates an example method **800** of communicating book data to a storytelling device. At **802**, an electronic connection is established with a storytelling device. For example, interactive book **102** (FIG. **1**) establishes an electronic connection **402** (FIG. **4**) with storytelling device **104** when a user connects book interface **218** (FIG. **2**) to storytelling device interface **310** (FIG. **3**).

[0106] At **804**, book data is communicated to storytelling device **104** to enable storytelling device **104** to control interactive book **102**. For example, interactive book **102** communicates book data **216** from memory **214** to storytelling device **104**. In some cases, interactive book **102** communicates book data **216** responsive to the electronic connection with storytelling device **104** being established. Alternately, interactive book **102** communicates book data **216** responsive to receiving a request from storytelling device **104** after the electronic connection is established.

[0107] FIG. **9** illustrates an example method **900** of sensing user interaction with an interactive book to initiate story enhancement effects. At **902**, user interaction with interactive book **102** is sensed by one or more sensors. For example, sensors **110** (FIG. **1**) sense user interaction with interactive book **102** as sensor input **404** (FIG. **4**). In some cases, the user interaction corresponds to the user turning to a particular page **106** of interactive book **102**. In this case, page sensor **202** (FIG. **2**) senses the current page of interactive book **102**. Alternately or additionally, the user interaction may be sensed by other sensors **110**, such as touch input sensed by touch sensor **204**, voice input sensed by microphone **206**, or motion input sensed by motion sensor **208**.

[0108] At **904**, sensor data is generated based on the user interaction, and at **906** the sensor data is communicated to a storytelling device. For example, sensor **110** generates sensor data **406** based on the user interaction with interactive book **102**. Then, sensor data **406** is communicated by sensors **110** to book interface **218** via connection circuitry **220**. Book interface **218** communicates sensor data **406** to storytelling device **104** via storytelling device interface **310** (FIG. **3**). Communicating sensor data **406** to storytelling device **104** causes storytelling device **104** to initiate one or more story enhancement effects.

[0109] At **908**, control signals are received from the storytelling device, and at **910** a story enhancement effect is provided based on the control signals. For example, control signals **408** are received from storytelling device **104** by interactive book **102** via book interface **218**. Control signals **408** are then routed from book interface **218**, via connection circuitry **220**, to electronic output components **112** causing electronic output components **112** to provide story enhancement effect **412** that is correlated to interactive book **102**, such as by outputting light through light sources **212**, or playing audio through speakers **210**.

[0110] Alternately or additionally, communicating sensor data **406** to storytelling device **104** may cause story controller **318** at storytelling device **104** to transmit control signals **408** to electronic output component **114** at storytelling device **104**. Electronic output component **114** at storytelling device **104** then provides story enhancement effect **410**, such as by outputting light from light sources **302** to illuminate a pop-up element **108** in page **106** of interactive book **102**.

[0111] FIG. **10** illustrates an example method **1000** of receiving book data from an interactive book. At **1002**, an electronic connection is established with an interactive book. For example, storytelling device **104** (FIG. **1**) establishes an

electronic connection **402** (FIG. **4**) with interactive book **102** when a user connects storytelling device interface **310** (FIG. **3**) to book interface **218** (FIG. **2**).

[0112] At **1004**, book data is received from interactive book **102**. For example, storytelling device **104** receives book data **216** from interactive book **102**. In some cases, storytelling device **104** automatically receives book data **216** responsive to establishing the connection with interactive book **102**. Alternately, storytelling device **104** communicates a request to interactive book **102** to cause interactive book **102** to communicate book data **216** to storytelling device **104** after the electronic connection is established. As discussed above, story controller **318** can use book data **216** to provide story enhancement effects when sensor data is received from interactive book **102**.

[0113] FIG. **11** illustrates an example method **1100** of controlling an electronic output component to provide a story enhancement effect for an interactive book. At **1102**, sensor data is received from interactive book **102**. For example, sensor data **406** (FIG. **4**) generated by sensors **110** is received from interactive book **102** via storytelling device interface **310** (FIG. **3**). In some cases, sensor data **406** corresponds to a current page of interactive book **102** sensed by page sensor **202** (FIG. **2**). Alternately or additionally, sensor data **406** may correspond to touch data generated by touch sensor **204**, voice data generated by microphone **206**, or motion data generated by motion sensor **208**.

[0114] At **1104**, a story enhancement effect is determined by comparing the sensor data to book data previously received from the interactive book. For example, story controller **318** of storytelling book **104** compares sensor data **406** to book data **216** previously received from interactive book **102** (e.g., step **1004** of FIG. **10**).

[0115] At **1106**, one or more electronic output components are controlled to provide the story enhancement effect. For example, story controller **316** communicates control signals **408** to electronic output component **114** at storytelling device **104** to cause electronic output component **114** to provide story enhancement effect **410**. Alternately or additionally, story controller **316** communicates control signals **408** to electronic output component **112** at interactive book **102** to cause electronic output component **112** to provide story enhancement effect **412**.

[0116] Example Computing System

[0117] FIG. **12** illustrates various components of an example computing system **1200** that can be implemented as any type of client, server, and/or computing device as described with reference to the previous FIGS. **1-11** to implement interactive book **102** and/or storytelling device **104**. In embodiments, computing system **1200** can be implemented as one or a combination of a wired and/or wireless wearable device, System-on-Chip (SoC), and/or as another type of device or portion thereof. Computing system **1200** may also be associated with a user (e.g., a person) and/or an entity that operates the device such that a device describes logical devices that include users, software, firmware, and/or a combination of devices.

[0118] Computing system **1200** includes communication devices **1202** that enable wired and/or wireless communication of device data **1204** (e.g., received data, data that is being received, data scheduled for broadcast, data packets of the data, etc.). Device data **1204** or other device content can include configuration settings of the device, media content stored on the device, and/or information associated with a user of the device. Media content stored on computing system **1200** can include any type of audio, video, and/or image data. Computing system **1200** includes one or more data inputs **1206** via which any type of data, media content, and/or inputs can be received, such as human utterances, user-selectable inputs (explicit or implicit), messages, music, television media content, recorded video content, and any other type of audio, video, and/or image data received from any content and/or data source.

[0119] Computing system **1200** also includes communication interfaces **1208**, which can be implemented as any one or more of a serial and/or parallel interface, a wireless interface, any type of network interface, a modem, and as any other type of communication interface. Communication interfaces **1208** provide a connection and/or communication links between computing system **1200** and a communication network by which other electronic, computing, and communication devices communicate data with computing system **1200**.

[0120] Computing system **1200** includes one or more processors **1210** (e.g., any of microprocessors, controllers, and the like), which process various computer-executable instructions to control the operation of computing system **1200** and to enable techniques for, or in which can be embodied, interactive book **102** and storytelling device **104**. Alternatively or in addition, computing system **1200** can be implemented with any one or combination of hardware, firmware, or fixed logic circuitry that is implemented in connection with processing and control circuits which are generally identified at **1212**. Although not shown, computing system **1200** can include a system bus or data transfer system that couples the various components within the device. A system bus can include any one or combination of different bus structures, such as a memory bus or memory controller, a peripheral bus, a universal serial bus, and/or a processor or local bus that utilizes any of a variety of bus architectures.

[0121] Computing system **1200** also includes computer-readable media **1214**, such as one or more memory devices that enable persistent and/or non-transitory data storage (i.e., in contrast to mere signal transmission), examples of which include random access memory (RAM), non-volatile memory (e.g., any one or more of a read-only memory (ROM), flash memory, EPROM, EEPROM, etc.), and a disk storage device. A disk storage device may be implemented as any type of magnetic or optical storage device, such as a hard disk drive, a recordable and/or rewriteable compact disc (CD), any type of a digital versatile disc (DVD), and the like. Computing system **1200** can also include a mass storage media device **1216**.

[0122] Computer-readable media **1214** provides data storage mechanisms to store device data **1204**, as well as various device applications **1218** and any other types of information and/or data related to operational aspects of computing system **1200**. For example, an operating system **1220** can be maintained as a computer application with computer-readable media **1214** and executed on processors **1210**. Device applications **1218** may include a device manager, such as any form of a control application, software application, signal-processing and control module, code that is native to a particular device, a hardware abstraction layer for a particular device, and so on.

[0123] Device applications **1218** also include any system components, engines, or managers to implement interactive book **102** and/or storytelling device **104**. In this example, device applications **1218** include story controller **318**.

CONCLUSION

[0124] Although embodiments of techniques using, and objects including, an interactive book and a storytelling device have been described in language specific to features and/or methods, it is to be understood that the subject of the appended claims is not necessarily limited to the specific features or methods described. Rather, the specific features and methods are disclosed as example implementations of the interactive book and the storytelling device.

What is claimed is:

1. A storytelling device, comprising:

one or more electronic output components;

a storytelling device interface configured to establish an electronic connection with an interactive book that includes one or more sensors; and

a story controller configured to:

receive book data from the interactive book via the storytelling device interface responsive to establishing the electronic connection with the interactive book;

receive sensor data from the one or more sensors of the interactive book via the storytelling device interface; and

responsive to receiving the sensor data, cause the one or more electronic output components to provide a story enhancement effect using the book data.

2. The storytelling device as recited in claim **1**, wherein the one or more electronic output components comprise multiple light sources positioned on an outer surface of the storytelling device.

3. The storytelling device as recited in claim **2**, wherein the story controller is configured to control the multiple light sources to illuminate one or more areas on a physical page of the interactive book that is open to provide the story enhancement effect.

4. The storytelling device as recited in claim **3**, wherein the one or more areas comprise at least one region on a pop-up element of the physical page that is open.

5. The storytelling device as recited in claim **1**, wherein at least one of the one or more electronic output components comprise a video projector, and wherein the story controller is configured to cause the video projector to project video to one or more areas on physical pages of the interactive book that is open to provide the story enhancement effect.

6. The storytelling device as recited in claim **1**, wherein at least one of the one or more electronic output components comprise a display positioned on a top surface of the storytelling device, and wherein the story controller is configured to cause the display to render images or video to provide the story enhancement effect.

7. The storytelling device as recited in claim **1**, further comprising a power source configured to provide power to the one or more sensors of the interactive book via the electronic connection.

8. The storytelling device as recited in claim **1**, wherein the sensor data indicates a current physical page of the interactive book that is open.

9. The storytelling device as recited in claim **8**, wherein the story controller is further configured to control one or more other electronic output components to provide the story enhancement effect, the one or more other electronic output components embedded in the current physical page of the interactive book that is open.

10. The storytelling device as recited in claim **9**, wherein the one or more other electronic output components embedded in the current physical page of the interactive book that is open includes a speaker, and wherein the story controller is configured to control the speaker to play audio content, the audio content included in the book data.

11. A method comprising:

receiving, at a storytelling device, sensor data from an interactive book, the sensor data generated by one or more sensors integrated into the interactive book;

determining a story enhancement effect by comparing the sensor data to book data previously received from the interactive book; and

controlling one or more electronic output components to provide the story enhancement effect.

12. The method as recited in claim **11**, wherein the book data comprises:

a mapping between sensor data and story enhancement effects; and

for each story enhancement effect, control signals usable to control the one or more electronic output components to provide the story enhancement effect.

13. The method as recited in claim **12**, wherein controlling the one or more electronic output components to provide the story enhancement effect comprises:

selecting the story enhancement effect from the mapping between sensor data and story enhancement effects in the book data based on the received sensor data; and

communicating control signals associated with the selected story enhancement effect to the corresponding electronic output component to cause the electronic output component to provide the story enhancement effect.

14. The method as recited in claim **11**, further comprising, prior to receiving the sensor data:

establishing an electronic connection with the interactive book; and

receiving the book data from the interactive book responsive to establishing the electronic connection.

15. The method as recited in claim **11**, wherein the sensor data comprises page data indicating a current physical page of the interactive book that is open.

16. The method as recited in claim **15**, wherein controlling the one or more electronic output components to provide the story enhancement effect comprises communicating one or more control signals to light sources at the storytelling device to cause the light sources to provide the story enhancement effect by illuminating a specific area of the current physical page of the interactive book that is open.

17. The method as recited in claim **15**, wherein controlling the one or more electronic output components to provide the story enhancement effect comprises communicating one or more control signals to a video projector at the storytelling device to cause the video projector to provide the story enhancement effect by projecting video to a specific area of the current physical page of the interactive book.

18. The method as recited in claim **15**, wherein controlling the one or more electronic output components to provide the story enhancement effect comprises communicating one or more control signals to an electronic output component embedded in the current physical page of the interactive book that is open to cause the electronic output component to provide the story enhancement effect.

19. The method as recited in claim **11**, wherein the sensor data comprises one of:

voice data generated from voice input sensed by a microphone embedded in a physical page of the interactive book; or

touch data generated from touch input sensed by a touch sensor embedded in a physical page of the interactive book.

20. A computing device comprising:

an interface to establish an electronic connection with an interactive book;

multiple light sources positioned around an outer surface of the computing device; and

a controller configured to control the multiple light sources to illuminate specific areas of the interactive book responsive to receiving sensor data from sensors of the interactive book via the interface.

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