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Application No. 10 742 626.4 - 1216	Ref. AF2/P17407EP-W	Date 29.11.2019
Applicant Immersion Corporation		

Communication under Rule 71(3) EPC

1. Intention to grant

You are informed that the examining division intends to grant a European patent on the basis of the above application, with the text and drawings and the related bibliographic data as indicated below.

A copy of the relevant documents is enclosed.

1.1 Auxiliary Request 1

In the text for the Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT
RO SE SI SK SM TR

Description, Pages

1-41 as published

Claims, Numbers

1-15 filed in electronic form on 05-11-2019

Drawings, Sheets

1/13-13/13 as published

With the following amendments to the above-mentioned documents proposed by the division

Description, Pages 1, 2, 13, 14, 41

Claims, Numbers 1, 6, 9

Comments

DESCRIPTION

Pages 1, 2, 13, 41: Description adapted to the claimed invention.

Page 1: Identification of prior art and relevant teachings thereof.

Pages 13, 14: Editorial and/or linguistic correction(s).

CLAIMS

Page 42: Deletion of irrelevant text.

Pages 42, 43, CLAIMS 1, 6: Two-part form introduced over D1 (Rule 43(1) EPC).

Pages 42-44, CLAIMS 1, 6, 9: Reference signs added (Rule 43(7) EPC).

Page 43, Claim 6: Scope of claim clarified (Art. 84 EPC) to exclude human-based implementations (e.g. eyes as sensors, mental determination of the haptic stimulations and muscular generation of the haptic stimulations).

See also the comments in enclosed EPO Form 2906.

1.2 Bibliographic data

The title of the invention in the three official languages of the European Patent Office, the international patent classification, the designated contracting states, the registered name(s) of the applicant(s) and the other bibliographic data are shown on **EPO Form 2056** (enclosed).

2. Invitation

You are invited, **within a non-extendable period of four months** of notification of this communication,

2.1 to EITHER approve the text communicated above and verify the bibliographic data (Rule 71(5) EPC)

(1) by filing a translation of the claim(s) in the other two official languages of the EPO

Fee code	EUR
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(2a) by paying the fee for grant including the fee
for publication:
minus any amount already paid (Rule 71a(5) EPC):

007	925.00
	0.00

Total amount:	925.00
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(3) by paying additional claims fees under Rule 71(4) EPC;
number of claims fees payable: 0
minus any amount already paid (Rule 71a(5) EPC):

016	0.00
	0.00

Total amount:	0.00
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Important: If the translations of the claims and fees have already been filed and paid respectively in reply to a previous communication under Rule 71(3) EPC, e.g. in the case of resumption of examination after approval (see Guidelines C-V, 6), **agreement as to the text to be granted** (Rule 71a(1) EPC) must be expressed within the same time limit (e.g. by approving the text and verifying the bibliographic data, by confirming that grant proceedings can go ahead with the documents on file and/or by stating which translations of the claims already on file are to be used).

Note 1: See "Notes concerning fee payments" below.

Note 2: Any overpaid "minus" amounts will be refunded when the decision to grant (EPO Form 2006A) has been issued.

Note 3: For the calculation of the grant fee under Article 2(2), No. 7, RFees (old fee structure), the number of pages is determined on the basis of a clean copy of the application documents, in which text deleted as a result of any amendments by the examining division is not shown. Such clean copy is made available via on-line file inspection only.

2.2 OR, in the case of disapproval, to request reasoned amendments or corrections to the text communicated above or keep to the latest text submitted by you (Rule 71(6) EPC).

In this case the translations of the claims and fee payments mentioned under point 2.1 above are NOT due.

The terms "amendment(s)" and "correction(s)" refer only to amendments or corrections of the application documents and not of other documents (e.g. bibliographic data, the designation of the inventor, etc.).

If filing amendments, you must identify them and indicate the basis for them in the application as filed. Failure to meet either requirement may lead to a communication from the examining division requesting that you correct this deficiency (Rule 137(4) EPC).

2.3 Bibliographic data

Where you request a change or correction of bibliographic data in response to the Rule 71(3) communication, this will **not** cause the sending of a further communication under Rule 71(3) EPC. You will still have to pay the fees and file translations in reply to the Rule 71(3) communication in the case of 2.1 above, unless you also file a reasoned request for amendments or corrections in response to the Rule 71(3) communication (see case 2.2 above).

3. Loss of rights

If neither of the two possible actions above (see points 2.1 or 2.2) is performed in due time, the European patent application will be deemed to be withdrawn (Rule 71(7) EPC).

4. Further procedure

4.1 In the case of point 2.1 above

- 4.1.1** The decision to grant the European patent will be issued, and the **mention of the grant** of the patent will be published in the European Patent Bulletin, if the requirements concerning the translation of the claims and the payment of all fees are fulfilled and there is agreement as to the text to be granted (Rule 71a(1) EPC).

Note on payment of the renewal fee:

If a renewal fee becomes due before the next possible date for publication of the mention of the grant of the European patent, publication will be effected only after the renewal fee and any additional fee have been paid (Rule 71a(4) EPC).

Under Article 86(2) EPC, the obligation to pay renewal fees to the European Patent Office terminates with the payment of the renewal fee due in respect of the year in which the mention of the grant of the European patent is published.

Note on payment of the designation fee(s):

If the designation fee(s) become(s) due after the communication under Rule 71(3) EPC, the mention of the grant of the European patent will not be published until these fees have been paid (Rule 71a(3) EPC).

- 4.1.2** After publication, the **European patent specification** can be downloaded free of charge from the EPO publication server <https://data.epo.org/publication-server>.

4.1.3 Filing of translations in the contracting states

As regards translation requirements prescribed by the contracting states under Article 65(1) EPC, please consult the website of the European Patent Office

www.epo.org → Law & practice → Legal texts, National law relating to the EPC

www.epo.org → Law & practice → All Legal texts → London Agreement

In the case of a valid extension or validation

As regards translation requirements prescribed by the extension or validation states, please consult the website of the European Patent Office

www.epo.org → Law & practice → Legal texts, National law relating to the EPC

Failure to supply a prescribed translation in a contracting state, or in an extension or validation state may result in the patent being deemed to be void *ab initio* in the state concerned (Art. 65(3) EPC).

4.2 In the case of 2.2 above

If the present communication under Rule 71(3) EPC is based on an auxiliary request and, within the time limit, you maintain the main request or a higher ranking request which is not allowable, the application will be refused (Art. 97(2) EPC).

If the examining division gives its consent to the requested amendments or corrections, it will issue a new communication under Rule 71(3) EPC; otherwise, it shall resume the examination proceedings (Rule 71(6) EPC).

5. Filing of a divisional application

Any divisional application relating to this European patent application must be filed directly with the European Patent Office in Munich, The Hague or Berlin and will be in the language of the proceedings for the present application, or if the latter was not in an official language of the EPO, the divisional application may be filed in the language of the present application as filed (see Article 76(1) and Rule 36(2) EPC). Any such divisional application must be filed while the present application is still pending (Rule 36(1) EPC; Guidelines A-IV, 1.1.1).

6. Notes concerning fee payments

6.1 Making payments

For payments made via deposit account, please note that as from 1 December 2017 debit orders will only be carried out if filed in an electronically processable format (xml), using an accepted means of filing as laid down in the Arrangements for deposit accounts (ADA), published in the Supplementary publication in the Official Journal.

All relevant information related to the modes of payment of fees to the EPO can be retrieved from the EPO website at "**Making Payments**".

6.2 Information concerning fee amounts

Procedural fees are usually adjusted every two years, on even years, with effect from 1 April. Therefore, before making a payment, parties should verify the amounts actually due on the date of payment using the applicable version of the Schedule of fees and expenses, published as a Supplement to the Official Journal of the EPO, available on the EPO website (www.epo.org) at www.epo.org/schedule-of-fees. The "Schedule of fees" table allows the viewing, downloading and searching of individual fee amounts, both current and previous.

6.3 Note to users of the automatic debiting procedure

The fee for grant, including the fee for publication, and any additional claims fees due under Rule 71(4) EPC will be debited automatically on the date of filing of the translations of the claims, or on the last day of the period of this communication. However, if the designation fee(s) become(s) due as set out in Rule 71a(3) EPC and/or a renewal fee becomes due as set out in Rule 71a(4) EPC, these should be paid separately by another permitted way of payment in order not to delay the publication of the mention of the grant. The same applies in these circumstances to the payment of extension and validation fees. The same applies in these circumstances to the payment of extension and validation fees.

Note: If a waiver is expressed in response to a Rule 71(3) communication (see OJ EPO 2015, A52), the fee for grant, including the fee for publication/printing, and any additional claims fees will not be debited automatically. These fees must be paid separately by another means of payment allowed under the Rules relating to Fees.

Examining Division:

Chairman:	Quesson, Christophe
2nd Examiner:	Seifert, J
1st Examiner:	Charcos Lloréns, V



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Enclosures: Text intended for grant

EPO Form 2056
EPO Form 2906

Application No.:

10 742 626.4

IV.2. Patent classification

The classification has been changed. It now is as follows:

INV. G06F3/01 G06F3/0488 A63F13/30 A63F13/40

IV.3. Title of the invention

The title has been changed. It now is as follows:

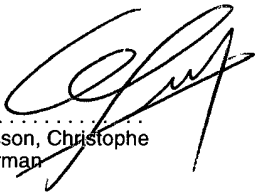
SYSTEM UND VERFAHREN FÜR KOMPLEXE HAPTISCHE STIMULATION
WÄHREND DER EINGABE VON STEUERUNGSGESTEN

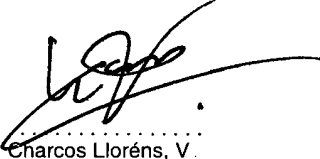
SYSTEM AND METHOD FOR PROVIDING COMPLEX HAPTIC STIMULATION
DURING INPUT OF CONTROL GESTURES

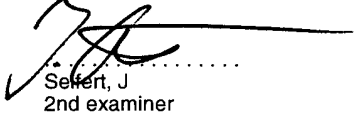
SYSTÈME ET PROCÉDÉ PERMETTANT D'APPLIQUER UNE STIMULATION
HAPTIQUE COMPLEXE PENDANT L'ENTRÉE DE GESTES DE CONTRÔLE

IV.4. Documentation

18.11.2019
Date


Quesson, Christophe
Chairman


Charcos Lloréns, V.
1st examiner


Seifert, J.
2nd examiner

Enclosure(s):

Form 2906

SYSTEM AND METHOD FOR PROVIDING COMPLEX HAPTIC STIMULATION DURING INPUT OF CONTROL GESTURES, AND RELATING TO CONTROL OF VIRTUAL EQUIPMENT

FIELD OF THE INVENTION

(01) The invention relates to a system and method of providing haptic stimulation to a user during performance of a complex control gesture, and optionally during the control of virtual equipment.

BACKGROUND OF THE INVENTION

(02) Provision of haptic stimulation to users is known. Haptic stimulation provide a physical sensation to users. Haptic stimulation is used in the context of games, and virtual worlds, and in real world control systems. Such haptic stimulation may be generated to provide feedback to users that a control input has been received, that another user has input a command, that virtual or real objects have collided, exploded, or imploded, that an ambient force is present (e.g., simulated or real wind, rain, magnetism, and/or other virtual forces), and/or that other phenomena have occurred. In conventional systems, the parameters of such stimulation is typically static and provides a simple mechanism for instructing a user that a corresponding phenomena has occurred (or will occur).

(03) Conventional game and/or virtual world systems that enable a user to control virtual equipment are known. The control and feedback schemes for interacting with virtual equipment in these conventional systems tend to be limited, and to not correlate strongly with real world control and/or feedback of corresponding real world equipment.

(04) Although basic haptic effects (e.g., vibrate) have been used in mobile and other computing devices, numerous challenges remain for developers to engage users and provide feedback to enhance the user experience.

US 2008/0244459 A1 discloses an example of a method and an apparatus in which several thresholds are used in actuation of a GUI object on a touch screen and providing tactile feedback. As the user touches and pushes the GUI object to pass a selection threshold, a tactile feedback is provided without actuating the GUI object. The user presses further to pass the actuation threshold where a different tactile feedback is provided. In this example, however, the GUI object is not actuated yet. To actuate the GUI object, the user should press further to the confirmation threshold that also provides still another tactile feedback. Depending on a) the current state of the GUI object and b) pressure value applied to the GUI object, the GUI controller determines an appropriate change in the state of the GUI object. In one embodiment, the logical state of GUI object is allowed to change to the actuated state only after the selected state.

US 2007/0150826 A1 relates generally to user interfaces on portable devices, and more particularly, to indicating progress towards satisfaction of a user input condition, e.g., user input that is needed to transition the device from a first interface state to a second interface state. In one embodiment

the user input is a predefined gesture performed on a touch screen to perform an unlock action. The predefined gesture may include a contact of the touch screen on the left edge (to initialize the gesture), a horizontal movement of the point of contact to the opposite edge while maintaining continuous contact with the touch screen, and a breaking of the contact at the opposite edge (to complete the gesture). In some embodiments, in addition to visual feedback, the electronic device supplies non-visual feedback to indicate progress towards completion of the unlock action. The additional feedback may include audible feedback (e.g., sound(s)) or physical feedback (e.g., vibration(s)).

SUMMARY

(05) The invention relates to a system configured to provide haptic stimulation to a user as defined in the independent claim 1, and to a method of providing haptic stimulation to a user of a system as defined in the independent claim 6. Preferred embodiments are defined in the dependent claims. One aspect of the invention relates to a system configured to provide haptic

stimulation to a user of a game. In one embodiment, the system comprises a user interface, an actuator, and one or more processors configured to execute computer program modules. The user interface is configured to generate output signals related to the gestures of a user. The actuator is configured to generate haptic stimulation to the user. The computer program modules comprise a gesture module, a stimulation module and an actuator control module. The gesture module is configured to monitor performance of a control gesture by the user based on the output signals of the user interface. The control gesture is a gesture associated with a command input to the game, and includes an initial portion, a first intermediate portion, and an ending portion. The stimulation module is configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture. The haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture. The actuator control module is configured to control the actuator to generate the stimulation determined by the stimulation module.

(06) Another aspect of the invention relates to a method of providing haptic stimulation to a user of a game. In one embodiment, the method comprises monitoring performance of a control gesture by a user, wherein the control gesture is a gesture associated with a command input to the game, and includes an initial portion, a first intermediate portion, and an ending portion; determining haptic stimulation associated with performance of the control gesture to be generated for the user, wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined

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responsive to performance of the first intermediate portion of the control gesture; and generating the determined stimulation during performance of the control gesture.

(07) Yet another aspect of the invention relates to a system configured to provide stimulation to a user of a game. In one embodiment, the system comprises a touch sensitive electronic display, an actuator, and one or more processors configured to execute computer program modules. The touch sensitive electronic display has an interface surface that is accessible for engagement by the user, and the touch sensitive user interface is configured to generate output signals related to the position at which the interface surface is engaged, and to present views of the game to the user through the interface surface. The views presented through the interface surface include views of virtual equipment having user selectable sections that are selectable by the user to interact with the virtual equipment by engaging the interface surface at the user selectable sections of the views of the virtual equipment. The actuator is configured to generate haptic stimulation to the user. The computer program modules comprise an equipment module, a stimulation module, and an actuator control module. The equipment module is configured to determine the operating parameters of the virtual equipment in the views, and to simulate operation of the virtual equipment. The equipment module determines the operating parameters of the virtual equipment and/or simulates operation of the virtual equipment based on selections by the user of the user selectable sections of the views of the virtual equipment. The stimulation module is configured to determine haptic stimulation to be generated for the user associated with the operating parameters of the virtual equipment and/or simulated operation of the virtual equipment. The actuator control module is configured to control the actuator to generate the stimulation determined by the stimulation module.

(08) Still another aspect of the invention relates to a method of providing stimulation to a user of a game. In one embodiment, the method comprises presenting views of a game through an interface surface of a touch sensitive electronic display that is accessible for engagement by a user, wherein the views presented through the interface surface include

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views of virtual equipment having user selectable sections that are selectable by the user to interact with the virtual equipment by engaging the interface surface at the user selectable sections of the views of the virtual equipment; receiving selection of one of the user selectable sections via an by the user engagement of the selected user selectable section on the interface surface; determining the operating parameters of the virtual equipment in the views and/or simulating operation of the virtual equipment based on the received selection; determining, responsive to the received selection, haptic stimulation to be generated for the user associated with the operating parameters of the virtual equipment and/or simulated operation of the virtual equipment; and generating the determined haptic stimulation.

(09) A still further aspect of the invention relates to a system and method for providing a game on one or more portable computing device in which a virtual object (*e.g.*, a ball) travels through views of the game displayed on the interfaces of the one or more portable computing devices. Haptic effects corresponding to the travel of the virtual object (or virtual objects) through the views are provided on the individual portable computing devices. The haptic effects may be determined based on one or more parameters of the travel of the virtual object (*e.g.*, speed, direction, acceleration, *etc.*), one or more parameters of objects and/or features with which the virtual object interacts (*e.g.*, walls, flippers, blockers, bumpers, *etc.*), and/or other parameters. The haptic effects may include haptic effects to be provided on portable computing devices that are not currently displaying the virtual object corresponding to the haptic effects. This may enhance the interactivity of the game for a group of users playing the game together on separate portable computing devices.

(10) These and other objects, features, and characteristics of the present invention, as well as the methods of operation and functions of the related elements of structure and the combination of parts and economies of manufacture, will become more apparent upon consideration of the following description and the appended claims with reference to the accompanying drawings, all of which form a part of this specification, wherein like reference numerals designate corresponding parts in the various figures. It is to be expressly

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understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of the limits of the invention. As used in the specification and in the claims, the singular form of “a”, “an”, and “the” include plural referents unless the context clearly dictates otherwise.

BRIEF DESCRIPTION OF THE DRAWINGS

(11) FIG. 1 illustrates a system configured to provide haptic stimulation to a user, in accordance with one or more embodiments of the invention.

(12) FIG. 2 illustrates a view of a piece of virtual equipment, in accordance with one or more embodiments of the invention.

(13) FIG. 3 illustrates a view of a piece of virtual equipment, in accordance with one or more embodiments of the invention.

(14) FIG. 4 illustrates a view of a piece of virtual equipment, in accordance with one or more embodiments of the invention.

(15) FIG. 5 illustrates a method of providing haptic feedback to a user, according to one or more embodiments of the invention.

(16) FIG. 6 illustrates a method of providing haptic feedback to a user, according to one or more embodiments of the invention.

(17) FIG. 7 illustrates a portable computing device, in accordance with one or more embodiments of the invention.

(18) FIG. 8A illustrates an example of the use of a game to support multi-user play, according to one or more embodiments of the invention.

(19) FIG. 8B illustrates an example of the use of a game to support multi-user play, according to one or more embodiments of the invention.

(20) FIG. 9 illustrates an example of play areas for two respective users over a plurality of time intervals, in accordance with one or more embodiments of the invention.

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(21) FIG. 10 illustrates an example of play and depicts the virtual object ricocheting off the border of a play area, according to one or more embodiments of the invention.

(22) FIG. 11 illustrate a use of haptic effects to simulate a continuous effect, in accordance with one or more embodiments of the invention.

(23) FIG. 12 illustrates a method for providing a game, according to one or more embodiments of the invention.

(24) FIG. 13 illustrates an example of an interface for an instance of a game, in accordance with one or more embodiments of the invention.

DETAILED DESCRIPTION

(25) FIG. 1 illustrates a system 10 configured to provide haptic stimulation to a user 12. In one embodiment, the haptic stimulation is provided to user 12 in conjunction with the performance of one or more control gestures through which user 12 controls, for example, a game, a real world component or piece of equipment, and/or other entity. The haptic stimulation is provided to user 12 such that as performance of a given control gesture continues, the haptic stimulation associated with the control gesture changes in accordance with the progression of the control gesture. In one embodiment, the haptic stimulation is provided to user 12 in conjunction with control of virtual equipment by user 12. The haptic stimulation corresponds to control inputs provided to system 10 in controlling the virtual equipment. In one embodiment, system 10 includes one or more user interfaces 14, one or more actuators 16, electronic storage 18, one or more processors 20, and/or other components.

(26) Although this disclosure primarily describes the provision of haptic stimulation in conjunction with control gestures performed to control a game, this is not limiting. The provision of haptic stimulation in accordance with the principles set forth herein may be extended to other contexts in which a user provides input in the form of a control gesture (e.g., controlling a television, a computer, an automobile, a remote control vehicle or vessel,

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etc.). In implementations involving the control of real world components or systems, haptic stimulation may be used to enhance the performance of complex control gestures by users, enhance the user experience, teach users to perform control gestures, and/or provide other enhancement over conventional real world control systems. Implementations involving control of real world components or systems may include instances in which a user is present at the component being controlled (*e.g.*, a control panel in a car, on a microwave, *etc.*), and/or instances in which a user is located remotely from the component being controlled. Control of a remote real world component or system may be accompanied by other sensory stimulation informing the user of the state of the component being controlled. Such other sensory stimulation may include, for example, real-time (or near real-time) video, audio, and/or still images provided to the user.

(27) Several embodiments are described herein as though user 12 were the only user for whom haptic stimulus is being provided. This is not limiting. Expansion of the principles and embodiments described herein is within the ability of one of ordinary skill in the art, and the description of a single user embodiment would enable the person of ordinary skill in the art to make and/or use a multiple user embodiment providing the same features to a plurality of users. A multiple user embodiment may include the provision of haptic stimulation to “passive users” (*e.g.*, users not performing a control gesture) related to the performance of a control gesture by an “active user” (*e.g.*, the user performing the control gesture). The haptic stimulation may further provide feedback to the passive and/or active users of other phenomena present in the multi-user environment.

(28) As used herein, a “control gesture” refers to a gesture made by a user that is a single and discrete control input having separate portions. The separate portions must be performed in specific order and/or with a specific timing to effectively achieve the control input associated with the “control gesture.” Performance of the separate portions, on their own, will not result in the control input associated with the “control gesture” as a whole (*e.g.*, a “control gesture” is not merely a combination of other gestures, each associated with its

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own control input). In some examples, a “control gesture” is an abstract gesture that does not correlate with exactness to the control input to which it corresponds. Some non-limiting examples of a “control gesture” are described below.

(29) The user interface 14 includes one or more input and/or output devices configured to communicate information to and/or receive information from user 12. The user interface 14 may include, for example, one or more content delivery devices that convey content to user 12. This content may include audio content, video content, still images, and/or other content. The content delivery devices may include, for example, electronic displays (e.g., including touch-sensitive displays), audio speakers, and/or other content delivery devices. The user interface 14 may include one or more control input devices configured to generate an output signal indicating input from the user to system 10. For example, user interface 14 may include a game controller, a remote control, a keypad, a button, a switch, a keyboard, a knob, a lever, a microphone, a position detecting device (e.g., an image sensor, a pressure sensor, an optical position detector, an ultrasonic position detector, a touch sensitive surface, and/or other position detecting devices), an accelerometer, a gyroscope, a digital compass, and/or other control input devices. The user interface 14 may be embodied in, or associated with, a computing device, and/or may be embodied in a control peripheral. A computing device may include one or more of a desktop computer, a laptop computer, a handheld computer, a personal digital assistant, a Smartphone, a personal music player, a portable gaming console, a gaming console, and/or other computing devices.

(30) It will be appreciated that although user interface 14 is shown in FIG. 1 as a single entity, this is for illustrative purposes only. In one embodiment, user interface 14 includes a plurality of actuators. The plurality of user interfaces 14 may be included in, carried by, and/or in contact with a single object or device. Or, the plurality of user interfaces 14 may include user interfaces included in and/or carried by a plurality of separate objects or devices.

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(31) The actuators 16 are configured to generate haptic stimulus for user 12. As such, at least some of actuators 16 are in contact with the users, or in contact with objects that contact the users, during conveyance of the sensory content to the users by user interface 14. By way of non-limiting example, one or more of actuators 16 may be positioned in or on a floor surface supporting the users (e.g., installed in the floor, carried by a mat lying on the floor, etc.), one or more of actuators 16 may be carried by a brace or other wearable item worn by the users, one or more of the actuators 16 may be carried by objects that are carried by the users (e.g., carried by a controller), one or more of actuators 16 may be carried by furniture on which the users are seated or lying, one or more of actuators 16 may be carried by user interface 14, and/or one or more of the actuators 16 may be carried by or disposed in or on other objects that contact the users.

(32) As used herein, the term “haptic stimulus” refers to tactile feedback that is applied to the users. For example, such feedback may include one or more of vibrations, forces, and/or motions that are applied physically to the user by the actuators 16 and/or the objects with which both actuators 16 and the user are in contact. The actuators 16 may include any device configured to generate such feedback for application to the users. For example, actuators 16 may include one or more of a piezoelectric actuator, a pneumatic actuator, a central mass actuator, an electroactive polymer actuator, an electrostatic surface actuator, macro-fiber composite actuator, and/or other actuators. For example, a touch sensitive surface (and/or other surfaces) may be actuated to move relative to a user by an electrostatic actuator. The surface actuated by actuators 16 may be rigid, semi-rigid, flexible, and/or deformable.

(33) It will be appreciated that although actuators 16 are shown in FIG. 1 as a single entity, this is for illustrative purposes only. In one embodiment, actuators 16 include a plurality of actuators. The plurality of actuators may be included in, carried by, and/or in contact with a single object or device. Or, the plurality of actuators may include actuators included in, carried by, and/or in contact with a plurality of separate objects or devices.

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(34) In one embodiment, electronic storage 18 comprises electronic storage media that electronically stores information. The electronic storage media of electronic storage 18 may include one or both of system storage that is provided integrally (i.e., substantially non-removable) with system 10 and/or removable storage that is removably connectable to system 10 via, for example, a port (e.g., a USB port, a firewire port, etc.) or a drive (e.g., a disk drive, etc.). Electronic storage 18 may include one or more of optically readable storage media (e.g., optical disks, etc.), magnetically readable storage media (e.g., magnetic tape, magnetic hard drive, floppy drive, etc.), electrical charge-based storage media (e.g., EEPROM, RAM, etc.), solid-state storage media (e.g., flash drive, etc.), and/or other electronically readable storage media. Electronic storage 18 may store software algorithms, information determined by processor 20, information received via user interface 14, and/or other information that enables system 10 to function properly. Electronic storage 18 may be a separate component within system 10, or electronic storage 18 may be provided integrally with one or more other components of system 10 (e.g., processor 20).

(35) Processor 20 is configured to provide information processing capabilities in system 10. As such, processor 20 may include one or more of a digital processor, an analog processor, a digital circuit designed to process information, an analog circuit designed to process information, a state machine, and/or other mechanisms for electronically processing information. Although processor 20 is shown in FIG. 1 as a single entity, this is for illustrative purposes only. In some implementations, processor 20 may include a plurality of processing units. These processing units may be physically located within the same device, or processor 20 may represent processing functionality of a plurality of devices operating in coordination.

(36) As is shown in FIG. 1, processor 20 may be configured to execute one or more computer program modules. The one or more computer program modules may include one or more of a content module 22, a gesture module 24, a stimulation module 26, an equipment module 28, an actuator control module 30, and/or other modules. Processor 20

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may be configured to execute modules 22, 24, 26, 28, and/or 30 by software; hardware; firmware; some combination of software, hardware, and/or firmware; and/or other mechanisms for configuring processing capabilities on processor 20.

(37) It should be appreciated that although modules 22, 24, 26, 28, and 30 are illustrated in FIG. 1 as being co-located within a single processing unit, in implementations in which processor 20 includes multiple processing units, one or more of modules 22, 24, 26, 28, and/or 30 may be located remotely from the other modules. The description of the functionality provided by the different modules 22, 24, 26, 28, and/or 30 described below is for illustrative purposes, and is not intended to be limiting, as any of modules 22, 24, 26, 28, and/or 30 may provide more or less functionality than is described. For example, one or more of modules 22, 24, 26, 28, and/or 30 may be eliminated, and some or all of its functionality may be provided by other ones of modules 22, 24, 26, 28, and/or 30. As another example, processor 38 may be configured to execute one or more additional modules that may perform some or all of the functionality attributed below to one of modules 22, 24, 26, 28, and/or 30.

(38) The content module 22 is configured to control the provision of content to user 12 via user interface 14. If the content includes computer generated images (*e.g.*, in a game, virtual world, simulation, *etc.*), content module 22 is configured to generate the images and/or views for display to user 12 through user interface 14. If the content includes video and/or still images, content module 22 is configured to access the video and/or still images and to generate views of the video and/or still images for display on user interface 14. If the content includes audio content, content module 22 is configured to generate the electronic signals that will drive user interface 14 to output the appropriate sounds. The content, or information from which the content is derived, may be obtained by content module 22 from electronic storage 18.

(39) In one embodiment, the content provided by content module 22 is content associated with a game. In this embodiment content module 22 is configured to render views of the

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game for display to user 12 via user interface 14. The content module 22 further provides audio associated with the views in accordance with the machine readable-program code associated with the game.

(40) The gesture module 24 is configured to receive one or more output signals generated by user interface 14 indicating control inputs received from user 12. Based on the received one or more output signals, gesture module 24 monitors performance of one or more control gestures by user 12. In one embodiment, a control gesture being monitored by gesture module 24 includes an initial portion, one or more intermediate portions, and an ending portion.

(41) In an embodiment in which user interface 14 includes a touch-sensitive surface through which input is received from user 12, an initial portion of a control gesture may include initiating contact with the touch-sensitive surface at one or more locations. The control gesture may dictate a location (or locations for a multi-touch control gesture) at which contact is initiated, a pressure with which contact is initiated, and/or other parameters of the initial contact between user 12 and the touch sensitive surface. If user 12 is already in contact with the touch-sensitive surface, the initial portion of the control gesture may include moving to one or more locations corresponding to the control gesture, maintaining contact (at specific location(s), or generally) with the touch-sensitive surface, motioning in one or more specific directions, making one or more specific shapes, ending contact at one or more locations on the touch-sensitive surface, and/or other actions. The one or more intermediate portions of the control gesture may include one or more of maintaining contact at one or more points without moving, motioning in a specific direction, making a specific shape, halting motion, contacting the touch-sensitive surface at one or more additional locations, ending contact at one or more locations on the touch-sensitive surface, pressing harder or softer on the touch-sensitive surface, and/or other actions. The ending portion may include one or more of ending contact at one or more locations on the touch-sensitive surface, halting motion at one or more locations, motioning in a specific direction, making a specific

shape, contacting the touch-sensitive surface at one or more additional locations, pressing harder or softer on the touch-sensitive surface, and/or other actions.

(42) One or more of the actions dictated by the initial portion, the one or more intermediate portions, and/or the ending portion of the control gesture that are location-based may be associated with static locations (e.g., at the same location every time), dynamic locations that do not change during the corresponding portion (e.g., the location may move between performances of the control gesture, but remains fixed while the portion corresponding to the location is performed), dynamic locations that change during the corresponding portion, and/or other types of locations.

(43) In the embodiment in which user interface 14 includes a touch-sensitive surface, one of the most simple examples of a control gesture would include an initial portion of in which user 12 contacts the touch-sensitive surface. The intermediate portion may include holding the contact made during the initial portion of the control gesture. The ending portion may include removing the contact made during the initial portion of the control gesture, and maintained during the intermediate portion of the control gesture.

(44) In the invention the user interface 14 includes one or more sensors configured to monitor motion of user 12 in space (e.g., an imaging sensor, a pressure sensor, an accelerometer, and/or other sensors). An initial portion of a control gesture may include one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner (e.g., holding hands in a predetermined configuration, and/or other configurations of body parts), motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at (or above, or below) a specific rate and/or acceleration,

changing a direction of motion or movement in a specific manner, and/or other actions. The one or more intermediate portions may include one or more of changing orientation of the head, and/or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body

parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at (or above, or below) a specific rate and/or acceleration, changing a direction of motion or movement in a specific manner, halting motion or movement by one or more body parts, and/or other actions. The ending portion of the control gesture may include one or more of changing orientation of the head, and/or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at (or above, or below) a specific rate and/or acceleration, changing a direction of motion or movement in a specific manner, halting motion or movement by one or more body parts, and/or other actions.

(45) The gesture module 24 is configured to monitor performance of the control gestures by obtaining the output signal of user interface 14 indicating movement and/or motion of user 12, and comparing the movement and/or motion of user 12 with the control gestures. One or more of the control gestures may be a function of the content being conveyed to user 12 via user interface 14 by content module 22. For example, one or more of the control gestures may be a function of a game being conveyed to user 12 via user interface 14. One or more of the control gestures may be independent from the content being provided to user 12 via user interface 14. For example, one or more of the control gestures may control function of user interface 14, processor 20, and/or other components.

(46) The stimulation module 26 is configured to receive information related to performance of control gestures from gesture module 24, and to determine haptic stimulation to be generated for user 12 associated with the control gestures. The haptic stimulation determined by stimulation module 26 includes haptic stimulation that is responsive to performance of the control gestures separate from the context in which they are performed. For example, in the context of a game haptic stimulation responsive to performance of a

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control gesture includes haptic stimulation that is not dependent on other variables within the game other than performance of the control gesture.

(47) The haptic stimulation determined by stimulation module 26 is complex and rich beyond the haptic stimulation typically associated with control gestures. For example, in conventional systems, haptic stimulation associated with control gestures tends to include a single stimulation that is provided during and/or after a control gesture. This haptic stimulation provides confirmation of the control gesture. The haptic stimulation determined by stimulation module 26, by contrast, tracks more closely with performance of the control gesture to increase the immersive experience provided by the haptic stimulation.

(48) In one embodiment, the haptic stimulation determined by stimulation module 26 corresponding to a control gesture includes a first stimulation, a second stimulation, and/or other stimulations. The first stimulation is different from the second stimulation. This means that one or more parameters of the first stimulation is different from the second stimulation. The one or more parameters may include one or more of, for example, periodicity, force, directionality, location, and/or other parameters of haptic stimulation. Variation of the one or more parameters between the first stimulation and the second stimulation (and/or other stimulations) may be smooth, and/or may be discrete so as to create a distinct step in the parameter(s) of haptic stimulation between the first stimulation and the second stimulation.

(49) The stimulation module 26 is configured to correlate provision of the first stimulation and the second stimulation with performance of the control gesture to which the first stimulation and the second stimulation correspond. In one embodiment, the first stimulation is determined by stimulation module 26 responsive to performance of the initial portion of the control gesture and the second stimulation is determined by stimulation module 26 responsive to performance of one or more intermediate portions of the control gesture. Responsive to the ending portion of the control gesture, stimulation module 26 may determine another stimulation (e.g., a third stimulation), or may cease the provision of haptic stimulation associated with the control gesture.

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(50) In one embodiment, stimulation module 26 determines haptic stimulation associated with a control gesture such that the stimulation is different between intermediate portions of the control gesture. This may result in a smooth changes in the haptic stimulation as performance of the control gesture proceeds, and/or in discrete changes in the haptic stimulation as performance of the control gesture transitions between intermediate portions.

(51) The haptic stimulation determined by stimulation module 26 may be provided to give user 12 some feedback about performance of a control gesture. This may include stimulation that informs user 12 that a portion of the control gesture has begun and/or is currently ongoing, stimulation that prompts user 12 to begin a next portion of the control gesture, and/or stimulation that provides other information about performance of the control gesture to user 12.

(52) In one embodiment stimulation module 26 provides haptic stimulation to user 12 that indicates to user 12 that performance of a control gesture has failed. In this embodiment, responsive to failure by user 12 to perform a portion of a control gesture, or failing to properly transition from one portion of the control gesture to another portion of the control gesture, stimulation module 26 determines a stimulation for provision to user 12 that is indicative of the failure. For example, the failure stimulation may include a fizzle, and/or other stimulation.

(53) Some illustrative examples of control gestures and corresponding haptic stimulation are presented hereafter. The examples given correspond to some classes of game characters commonly found in games that include combat between players and/or between players and non-player characters. Specifically, the examples given below correspond to “casters”, “close combat warriors”, and “ranged combat warriors.” It will be appreciated that these classes of characters are not limiting. Other classes of characters, and/or hybrids included characteristics of a plurality of the classes, may be implemented in accordance with the principles set forth herein.

(54) A “caster” is a character that casts spells (or other similar attacks and/or defenses) during combat. Examples of caster characters include wizards, priests, warlocks, engineers,

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and/or other characters. To control a caster to cast a given spell, user 12 may be required to perform a control gesture that corresponds to the given spell. As user 12 progresses through the portions of the control gesture, the haptic stimulation determined by stimulation module 26 corresponding to the control gesture may inform user 12 as to the progress of the control gesture. The haptic stimulation associated with the control gesture may further provide information about the power of the spell being cast (*e.g.*, greater the force and/or more rapid periodicity may indicate a more powerful spell).

(55) In one embodiment, as the control gesture proceeds between the portions of the control gesture, the force and/or rapidity of the haptic stimulation determined by stimulation module 26 may increase. This increase may be gradual as the control gesture proceeds and/or in discrete steps (*e.g.*, at transitions between the portions of the control gesture). This is not intended to be limiting, as other parameters of the haptic stimulation may be changed to indicate the progress of the control gesture. The haptic stimulation may provide feedback about the (thus far) successful progress of the control gesture, and/or prompt user 12 with respect to future performance of the control gesture (*e.g.*, to proceed to the next portion, to maintain the current portion, *etc.*). Upon performing the final portion of the control gesture, stimulation module 26 may determine haptic stimulation that indicates the spell being successfully cast. In one embodiment, user 12 may perform portions of the control gesture that effectively “store” the spell for discharge. This may store the spell for an indefinite period, or for some predetermined maximum storage time. During storage, stimulation module 26 may determine haptic stimulation that confirms the ongoing storage of the spell. If the storage period has a maximum storage time, the haptic stimulation may indicate the status of the storage period with respect to the maximum storage time.

(56) A “close combat warrior” is a character configured to fight enemies at close quarters (*e.g.*, hand-to-hand combat). Such a character may be armed with swinging weapons (*e.g.*, clubs, maces, *etc.*), stabbing and/or slashing weapons (*e.g.*, knife, axe, sword, *etc.*), and/or other close quarter weapons. As user 12 controls the character to, for example, wield a

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blow, stimulation module 26 may determine haptic stimulation that mimics some real-world properties of such attacks. For example, as user 12 strikes into an opponent or object, a first feedback may mimic the striking and/or cutting sensation. As user 12 withdraws a weapon after such a blow, a second feedback may mimic the withdrawal of the weapon from the object or opponent. As another example, as user 12 swings a weapon in a ready position (e.g., swinging a ball on a chain) a first feedback determined by stimulation module 26 may mimic the real world sensation that would be the result of such an activity in real life.

Releasing the weapon from the ready position (e.g., striking an opponent or object with the swinging ball) may result in the determination by stimulation module 26 of a second stimulation that mimics the feel of such an attack. The intensity of an attack may be determined based on an amount of time a control gesture (or some portion thereof) is performed, the range of motion of a control gesture, a speed of motion during a control gesture, pressure of the contact between the user and a touch screen included in user interface 14, and/or other parameters of a control gesture (or some portion thereof).

(57) In some implementations, the user interface 14 includes a touch screen in which displays of the content associated with a game is presented by content module 22. In such implementations, the location at which the control gesture is made impacts the manner in which the game is controlled and/or the haptic stimulation determined by stimulation module 26 (for the user inputting the gesture and/or other users). For example, in controlling a close combat warrior, a user may input an attacking control gesture in a manner that indicates a specific portion of an enemy at which the attack should be directed (e.g., a leg, an arm, the head, the torso, *etc.*). Similarly, in controlling a close combat warrior, a user may input a defense or blocking control gesture in a manner that indicates a specific portion of a character being controlled that should be defended or blocked (e.g., a leg, an arm, the head, the torso, *etc.*). This location-based aspect of the control gesture may be taken into account in determining the success and/or impact of the corresponding control, and/or in determining

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the haptic stimulation that corresponds to the control gesture. Multiple attacks may be triggered by touching multiple locations on the touch screen of user interface 14.

(58) A “ranged combat warrior” is a character that is configured and armed for attacking enemies from a range. This may include characters armed, for example, to release projectiles such as arrows, stones, bullets, rockets, and/or other projectiles. By way of non-limiting example, user 12 may control a ranged combat warrior to fire a bow and arrow. In this example, different haptic stimulation may be determined by stimulation module 26 for notching the arrow, drawing the bow (and varying the haptic stimulation to indicate increasing string tension), releasing the string, the bowstring striking the forearm of the character upon release, and/or other portions of the control gesture associated with firing an arrow. The intensity and/or speed of an attack or projectile may be determined based on an amount of time a control gesture (or some portion thereof) is performed, the range of motion of a control gesture, a speed of motion during a control gesture, pressure of the contact between the user and a touch screen included in user interface 14, and/or other parameters of a control gesture (or some portion thereof).

(59) The target at which a ranged attack is directed and/or the path of a projectile emitted as part of a ranged attack may be determined based on a control gesture. For example, if user interface includes a touch screen, the user performing a control gesture may contact a portion of the touch screen on which the target of the ranged attack is displayed (e.g., as part of the control gesture). Similarly, the user may trace on the touch screen a path of a projectile emitted during a ranged attack. The tracing of the path of the projectile may form at least part of the control gesture initiating the attack. The target and/or the path indicated by the control gesture may impact the determination of the corresponding haptic stimulation determined by stimulation module 26.

(60) Game content may include boxes, rooms, gates, vehicles, and/or other objects or items that are “locked”, and must be opened through performance of some control gesture. In some implementations, in response to a user selecting such an object or item, stimulation

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module 26 may determine haptic stimulation indicating to the user that the selected object or item is locked. Performance by the user of a control gesture to unlock the object or item may result in the determination of haptic stimulation by stimulation module 26 corresponding to the control gesture.

(61) In one embodiment, the haptic stimulation determined stimulation module 26 for a given control gesture may vary based on characteristics of a character in a game being controlled by user 12. For example, the haptic stimulation may vary as a function of character skill, character fatigue, character injury, weapon type, weapon disrepair, and/or other characteristics.

(62) Changing the haptic stimulation based on character fatigue and/or injury may be a way of handicapping user 12 as a character that was fatigued or injured would be. This may include altering the force, periodicity, and/or other parameters of the haptic stimulation to inhibit precise control by user 12 (e.g., by increasing the force), to inhibit perception of cues and prompts in the haptic stimulation (e.g., by reducing force, increasing the force of portions of the haptic stimulation that do not provide cues and prompts, reducing response time to cues and/or prompts, *etc.*), and/or otherwise handicapping user 12.

(63) Varying the haptic stimulation based on character skill may provide a gradual and/or graduated “unlocking” of skills and abilities. For a character with more training and/or skill in a given ability, stimulation module 26 may determine haptic stimulation that provides more clear and/or more easily followed guide to performing a control gesture corresponding to the given ability. For example, as the skill of the character increases, the haptic stimulation determined by stimulation module 26 for the character may provide more definite cues and/or prompts (e.g., see the examples above with respect to character fatigue) that guide user 12 through the control gesture. This enables user 12 to utilize the control gesture without being fully trained in the corresponding ability, but may impact the reproducibility of the control gesture for the user unless further training and/or other skill-building is sought.

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(64) Altering the haptic stimulation determined for a control gesture based on the equipment of a character may incentivize maintaining repair of equipment and/or obtaining upgraded equipment without making such activities mandatory. Instead of a digital determination of whether a control gesture is available to user 12, the stimulation module 26 provides haptic stimulation that makes the control gesture easier and/or more enjoyable with “better” virtual equipment.

(65) The equipment module 28 is configured to provide control over virtual equipment for user 12. Within the context of a game being provided to user 12 by system 10, user 12 may control virtual equipment (*e.g.*, directly or through a character that is using the virtual equipment). In such cases, content module 22 provides to user 12, via user interface 14 views of the virtual equipment. The equipment module 28 is configured to determine the operating parameters of the virtual equipment, and to simulate its operation.

(66) In one embodiment in which user interface 14 includes a touch sensitive electronic display, equipment module 28 determines the operating parameters of the virtual equipment and/or simulates operation of the virtual equipment based on selections by user 12 of user selectable sections of the views of the virtual equipment. The user selectable sections of the virtual equipment may be located in the views of the virtual equipment that correspond to sections of the virtual equipment analogous to sections of equipment that would be engaged in real life to configure operating parameters of equipment and/or to operate equipment. The operating parameters of the virtual equipment that are configurable by engaging user selectable sections of the views of the virtual equipment include one or more of an amount of loaded rounds of ammunition, a level of disrepair, a stopping power, a projectile velocity, an ammunition type, a noise level, and/or other operating parameters.

(67) By way of illustration, FIG. 2 shows a view of a piece of virtual equipment 32 (*e.g.*, a gun). In the view shown in FIG. 2, piece of virtual equipment 32 includes a plurality of selectable sections 34 (illustrated in FIG. 2 as section 34a, section 34b, section 34c, and section 34d). By selecting section 34a, user 12 may configure the handle/stock of piece of

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virtual equipment 32. By selecting section 34b, user 12 may configure the ammunition of piece of virtual equipment 32. By selecting section 34c, user 12 may configure the sights of piece of virtual equipment 32. By selecting section 34d, user 12 may configure the barrel/muzzle of piece of virtual equipment 32.

(68) Selection of one of selectable sections 34 to configure piece of virtual equipment 32 may include simply selecting the desired selectable section 34, and then selecting a new configuration for the selected section 34. In one embodiment, reconfiguration is made through a touch and drag type of interaction. For example, user 12 may engage an area on user interface 14 that corresponds to ammunition and “drag” the ammunition to section 34b to reload piece of virtual equipment 32. Similarly, user 12 may select and drag a silencer (and/or other muzzle or barrel feature) to section 34d of piece of virtual equipment 32 to change the sound characteristics of piece of virtual equipment 32 (and/or other characteristics).

(69) As another illustrative example, FIG. 3 shows a view of a virtual firearm 36 having a plurality of selectable sections 38 (shown in FIG. 3 as section 38a, section 38b, section 38c, and section 38d). The selectable sections 38 of stimulation module 26 may be selected in a fashion similar to the one discussed above with respect to FIG. 2.

(70) As yet another illustrative example, FIG. 4 shows a view of a piece of virtual equipment 40 configured to show the proximity of various items to a user (or to a character being controlled by a user) in a game. The piece of virtual equipment 40 includes a plurality of selectable sections 42 (shown in FIG. 4 as section 42a, section 42b, section 42c, section 42d, and section 42e). Individual ones of selectable sections 42 correspond to individual modes of piece of virtual equipment 40 such that selection of one of selectable sections 42 results in piece of virtual equipment 40 operating in accordance with the selected mode. For example, in a first mode piece of virtual equipment 40 may provide an indication of the proximity of other characters, in a second mode piece of virtual equipment 40 may provide an indication of the proximity of enemies, in a third mode piece of virtual equipment 40 may

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provide an indication of the proximity of one or more resources (e.g., gold, food, ammunition, power-ups, etc.).

(71) Returning now to FIG. 1, in one embodiment, stimulation module 26 is configured to determine haptic stimulation to be generated for the user that is associated with the operating parameters of the virtual equipment and/or the simulated operation of the virtual equipment. This may include, for example, varying the haptic stimulation based on the current operating parameters of a piece of virtual equipment, determining haptic stimulation during the reconfiguration of a piece of virtual equipment to reflect changes being made in the piece of virtual equipment, and/or other aspects of configuration and/or operation of virtual equipment.

(72) By way of non-limiting example, if a virtual firearm is reloaded by user 12, stimulation module 26 determines haptic feedback indicating the reload. The new ammunition is different from previously used ammunition, stimulation module 26 determines haptic feedback upon firing of the firearm that is different from the haptic stimulation determined during firing of the previously used ammunition.

(73) In one embodiment, actuators 16 are configured to actuate the touch sensitive electronic display that presents the views of the virtual equipment to user 12. In this embodiment, delivery of the haptic stimulation determined by stimulation module 26 to user 12 as user 12 engages the touch sensitive electronic display results in a more immersive virtual equipment control experience. For example, as user 12 engages the touch sensitive display to reload a gun, or to switch out a piece of equipment, haptic stimulation is provided to user 12 through the touch sensitive surface that corresponds to the control being exerted over the gun.

(74) The actuator control module 30 is configured to control actuators 16 to generate the haptic stimulus determined by stimulation module 26. This includes communicating the haptic stimulus to be generated from processor 22 to actuators 16. The haptic stimulus to be

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generated may be communicated over wired communication links, wireless communication links, and/or other communication links between processor 22 and actuators 16.

(75) FIG. 5 illustrates a method 44 of determining and/or providing haptic stimulation to a user. The haptic stimulation may be determined and/or provided to the user in conjunction with a game, and/or in other contexts. The operations of method 44 presented below are intended to be illustrative. In some embodiments, method 44 may be accomplished with one or more additional operations not described, and/or without one or more of the operations discussed. Additionally, the order in which the operations of method 44 are illustrated in FIG. 5 and described below is not intended to be limiting.

(76) In some embodiments, method 44 may be implemented in one or more processing devices (e.g., a digital processor, an analog processor, a digital circuit designed to process information, an analog circuit designed to process information, a state machine, and/or other mechanisms for electronically processing information). The one or more processing devices may include one or more devices executing some or all of the operations of method 44 in response to instructions stored electronically on an electronic storage medium. The one or more processing devices may include one or more devices configured through hardware, firmware, and/or software to be specifically designed for execution of one or more of the operations of method 44.

(77) At an operation 46, performance of an initial portion of a control gesture by a user is monitored. Performance of the initial portion of the control gesture may be monitored based on the output signal of a user interface similar to or the same as user interface 14 (shown in FIG. 1 and described above). In one embodiment, operation 46 is performed by a gesture module similar to or the same as gesture module 24 (shown in FIG. 1 and described above).

(78) At an operation 48, responsive to performance of the initial portion of the control gesture, a first haptic stimulation is determined. The first haptic stimulation corresponds to the initial portion of the control gesture. In one embodiment, operation 48 is performed by a

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stimulation module 26 similar to or the same as stimulation module 26 (shown in FIG. 1 and described above).

(79) At an operation 50, the first haptic stimulation is generated for the user. In one embodiment, operation 50 is performed by one or more actuators similar to or the same as actuators 16 (shown in FIG. 1 and described above).

(80) At an operation 52, a determination is made as to whether a first intermediate portion of the control gesture has been performed by the user. Responsive to the first intermediate portion of the control gesture having been performed, method 44 proceeds to an operation 54. In one embodiment operation 52 is performed by a gesture module similar to or the same as gesture module 24 (shown in FIG. 1 and described above).

(81) At operation 54, a second haptic stimulation is determined. The second haptic stimulation corresponds to the first intermediate portion of the control gesture. In one embodiment, operation 54 is performed by a stimulation module similar to or the same as stimulation module 26 (shown in FIG. 1 and described above).

(82) At an operation 56, the second haptic stimulation is generated for the user. In one embodiment, operation 56 is performed by one or more actuators similar to or the same as actuators 16 (shown in FIG. 1 and described above).

(83) Referring back to operation 52, responsive to the first intermediate portion of the control gesture not having been performed, method 44 proceeds to an operation 58 at which a determination is made as to whether the control gesture has failed. This may be determined based on the output signal of a user interface similar to or the same as user interface 14 (shown in FIG. 1 and described above). The determination of whether the control gesture has failed may be made, for example, based on an amount of time since performance of the initial portion of the control gesture, if actions not included in the control gesture have been performed since performance of the initial portion of the control gesture,

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and/or other factors. In one embodiment, operation 58 is performed by a gesture module similar to or the same as gesture module 24 (shown in FIG. 1 and described above).

(84) Responsive to a determination at operation 58 that the control gesture has not failed, method 44 returns to operation 52. Responsive to a determination at operation 58 that the control gesture has failed, method 44 proceeds to an operation 60. At operation 60, haptic stimulation is determined that indicates failure of the control gesture. In one embodiment, operation 60 is performed by a stimulation module similar to or the same as stimulation module 26 (shown in FIG. 1 and described above).

(85) Upon determination of the haptic stimulation at operation 60, the determined haptic stimulation is generated for the user at operation 62. In one embodiment, operation 62 is performed by one or more actuators similar to or the same as actuators 16 (shown in FIG. 1 and described above).

(86) Referring back to operation 52, further responsive to determination that the first intermediate portion of the control gesture has been performed, method 44 proceeds to an operation 64. At operation 64, a determination is made as to whether an ending portion of the control gesture has been performed. Responsive to a determination that the control gesture has ended, method 44 ends the provision of haptic stimulation associated with the control gesture. In one embodiment, a final haptic stimulation associated with the completion of the control gesture is further determined and generated. In one embodiment, operation 64 is performed by a gesture module similar to or the same as gesture module 24 (shown in FIG. 1 and described above).

(87) Responsive to a determination at operation 64 that the ending portion of the control gesture has not yet been performed, method 44 proceeds to an operation 66. At operation 66, a determination is made as to whether the control gesture has failed. This may be determined based on the output signal of a user interface similar to or the same as user interface 14 (shown in FIG. 1 and described above). The determination of whether the control gesture has failed may be made, for example, based on an amount of time since

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performance of the first intermediate portion of the control gesture, if actions not included in the control gesture have been performed since performance of the first intermediate portion of the control gesture, and/or other factors. In one embodiment, operation 66 is performed by a gesture module similar to or the same as gesture module 24 (shown in FIG. 1 and described above).

(88) Responsive to a determination at operation 66 that the control gesture has not failed, method 44 returns to operation 64. Responsive to a determination at operation 66 that the control gesture has failed, method 44 proceeds to operations 60 and 62.

(89) In one embodiment, the control gesture includes more than one intermediate portion. In this embodiment, method 44 is expanded between operations 52 and 64 to monitor the additional intermediate portion(s) and generate corresponding haptic stimulation in a manner similar to that shown and described for the first intermediate portion.

(90) FIG. 6 illustrates a method 68 of determining and/or providing haptic stimulation to a user. The haptic stimulation may be determined and/or provided to the user in conjunction with a game, and/or in other contexts. The operations of method 68 presented below are intended to be illustrative. In some embodiments, method 68 may be accomplished with one or more additional operations not described, and/or without one or more of the operations discussed. Additionally, the order in which the operations of method 68 are illustrated in FIG. 6 and described below is not intended to be limiting.

(91) In some embodiments, method 68 may be implemented in one or more processing devices (e.g., a digital processor, an analog processor, a digital circuit designed to process information, an analog circuit designed to process information, a state machine, and/or other mechanisms for electronically processing information). The one or more processing devices may include one or more devices executing some or all of the operations of method 68 in response to instructions stored electronically on an electronic storage medium. The one or more processing devices may include one or more devices configured through hardware,

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firmware, and/or software to be specifically designed for execution of one or more of the operations of method 68.

(92) At an operation 70, a view of virtual equipment is presented to the user via a touch sensitive electronic display. The view includes selectable sections that are selectable by the user to interact with the virtual equipment shown in the view. In one embodiment, the view of the virtual equipment is determined by a content module similar to or the same content module 22 (shown in FIG. 1 and described above).

(93) At an operation 72, selection of one of the selectable sections of the view of the virtual equipment is received. The selection may be received through the touch sensitive electronic display through which the view is presented.

(94) At an operation 74, operation of the virtual equipment is simulated and/or one or more parameters of the virtual equipment is adjusted based on the selection received at operation 72. In one embodiment, operation 74 is performed by an equipment module similar to or the same as equipment module 28 (shown in FIG. 1 and described above).

(95) At an operation 76, haptic stimulation associated with the operation of the virtual equipment and/or the adjustment of the operating parameters of the virtual equipment effected at operation 74 is determined. In one embodiment, operation 76 is performed by a stimulation module similar to or the same as stimulation module 26 (shown in FIG. 1 and described above).

(96) At an operation 78, the haptic stimulation determined at operation 76 is generated for the user. In one embodiment, operation 78 is performed by one or more actuators similar to or the same as actuators 16 (shown in FIG. 1 and described above).

(97) As was mentioned above, the description of complex haptic stimulation in response to gesture-based control for a single user is not intended to be limiting. Haptic stimulation generated in response to gesture-based control in a multi-user environment is also

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contemplated. The haptic stimulation provided to a given user may include haptic feedback that is responsive to gesture-based controls of another user and/or other phenomena.

(98) FIG. 7 is a diagram illustrating an example 100 of a portable computing device configured in accordance with one or more aspects of the present invention. Particularly, a tablet computer 102 is shown. Tablet computer 102 includes a screen 104 mounted to a body 106, with the top surface 108 representing a surface with which a user interacts. In this example, top surface 108 is bordered by body 106, but the screen area could extend all the way to the edges of the tablet. Tablet computer 102 can use any number or type of touch-sensing technologies to determine when a user has touched on or near surface 106. For example, surface 108 may include a resistance or capacitance-based touch sensing system and/or an optical touch sensing system.

(99) Although a tablet computer is shown in this example, it can be understood that any touch-enabled computing device can be used. For instance, a smaller device such as a cellular telephone or media player may feature a touch-enabled display and can provide haptic outputs in accordance with the present subject matter. As another example, a haptically-enabled display surface associated with and interfaced to another computing device (e.g., a desktop or server computer) can be used. For example, surface 108 may represent a larger touch-enabled surface such as a table upon which a screen image is projected from above or below. A flat surface is depicted here, although the present subject matter could be applied for use in devices with curved surface and/or non-smooth surfaces. Gestures input to the computer (or other computing device) via touch may be control gestures. It will be appreciated that the description of gestures involving touch are not intended to limit the scope of control gestures discussed herein. Control gestures may include (with or without touch gestures) manipulation of a component or body (e.g., "tilt" controls), manipulation of one or more stick controls, manipulation of one or more buttons, manipulation of one or more switches, and/or manipulation of or interaction with other interface features.

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(100) FIG. 7 illustrates an example of the architecture of a computing device 102 at 110.

Computing device 102 comprises one or more processors 112 configured to execute computer program modules, a memory 114 such as RAM, ROM, or other memory technology, a display interface 116, a haptic interface 118, I/O interface 120, and network interface 122. Any suitable display technology can be used. In some embodiments, an LCD display is used.

(101) Haptic interface 118 can comprise suitable components for driving one or more actuators used to play back haptic effects so as to provide a physical sensation to a user of device 102. For example, some or all of display 104 may include embedded actuators so that targeted physical output can be provided to a portion of the display to provide a physical effect where the user touches surface 108. Additional actuators may be used to provide haptic output via other surfaces of tablet 102, such as its sides and the surface opposite surface 108 (i.e., the back of the device). It will be appreciated that the location of the actuator relative to the desired physical effect can vary. For example, in order to produce an effect at a first part of the screen, an actuator at a second part of the screen (or elsewhere in the device) may be driven so that the properties of intervening components of the screen and/or device influence what is felt at the first part of the screen.

(102) In one embodiment, the tablet comprises an actuator having an eccentric rotating mass motor. The actuator is coupled either directly or indirectly to a surface of the tablet housing. Powering the motor causes vibration on the surface that a user can feel. By varying the magnitude and freq of the signal sent to the actuator, various effects are possible. As another example, an actuator may be used to raiser or lower sections of the screen to create ridges, troughs, or other features. As a further example, an actuator can comprise a piezoelectric. For example, a piezoelectric actuator can be embedded, at least partially, in an inorganic polymer matrix, such as silicone. As yet a further example, an actuator may comprise a macro-fiber composite actuator or piezocomposite actuator. Such actuators may be formed as a thin layer of piezoelectric fibers suspended in a matrix (e.g.,

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epoxy). The fibers may communicate electrically with polyimide electrodes. Many other types of actuators may be used, and so this exemplary description of actuators is not meant to be limiting.

(103) I/O interface 120 can be used by processor(s) 112 to receive input and provide output using any suitable components. For example, I/O interface 120 may link to speakers and/or a microphone for receiving voice input and providing audio output. As another example, I/O interface 120 may provide a connection to peripheral devices such as a mouse or stylus used to provide input to the device, or to an imaging sensor used to capture still images and/or video.

(104) Network interface 122 can be used to link device 102 to a network using one or more networking technologies. For instance interface 122 may provide a connection to suitable components for connecting to an IEEE 802.11 (Wi-Fi) or 802.16 (Wimax) network, or a connection using Bluetooth technology. As another example, interface 122 may allow communication via a telephone, Ethernet, or other wired connection or may support other wireless technology such as communication via an IR port.

(105) Computing device 102 can comprise additional components—for example, one or more storage components (e.g., magnetic or solid-state hard disk drives) can be included. If computing device 102 comprises a cellular telephone, appropriate RF components may be included as well.

(106) Memory 114 tangibly embodies one or more program components that configure computing device 102 to operate in an intended manner. For example, memory 114 can include one or more applications, an operating system, and can also include stored data. As illustrated, memory 114 also includes a program component 124 for providing an interactive game in accordance with one or more aspects noted below.

(107) Generally, the game can configure computing device 102 to present a play area 126 via display 104, track the movement of a virtual object 128 (e.g., a ball) in the play area, and

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respond to user interactions to launch and deflect the virtual object during play using paddle 130. Additionally, the game can be configured to play back haptic effects as the virtual object moves through and encounters features of the play area. The haptic effects can be selected to provide a sensation that differs based on the particular features that are encountered. In this example, play area includes a top T, bottom B, left side L, and right side R. The game can be configured so that the virtual object is deflected by paddle 130 prior to reaching left side L. If multiple players are involved, the virtual object may exit at one or more sides T, B, or R and pass to another user's screen as noted below.

(108) FIG. 8A illustrates an example 200A of the use of a game to support multi-user play. The game program can support sending and receiving data to facilitate tracking the position of the virtual object in a play area that comprises multiple screens. In this example a first device 202 is interfaced to a second device 204 via a network 206. Network 206 may comprise a local area network, a wide area network, or may represent a direct connection between devices 202 and 204. By interfacing multiple devices running an instance of the game, a user can experience haptic effects when the virtual object encounters features in another user's screen. Such haptic effects may include haptic effects determined in accordance with a control gesture input on another user's screen.

(109) For example, if the play area 126 of FIG. 7 is used, then when virtual object 128 exits at right side R of a first device it may enter the screen at right side R of the second device. As another example, the devices may have mirror-image layouts; that is, device 202 may feature paddle 130 along left side L while device 204 includes paddle 130 along right side R. In that case, when the virtual object reaches right side R of the play area of the first device, it may enter the play area at left side L of the other device, headed towards right side R and paddle 130 in the play area of the other device.

(110) Server 208 is depicted to illustrate that in some embodiments, multi-user play may be facilitated by a server. However, as noted above, in some embodiments game program is configured to directly interface with other instances without need of a server.

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(111) FIG. 8B illustrates another example 200B of a multi-user play. In this example, three devices 202, 204, and 210 are interfaced via a first network 206. A second network 214 facilitates interaction with a fourth device 212. For example, network 206 may comprise a local area network connection while network 214 may comprise a wide-area network connection. Compass 216 is illustrated to show that in some embodiments the relative position of multiple players can be considered. For example, as the “westmost” player, device 202 may include paddle 130 at left side L. Device 204 may have its paddle positioned along top side T, since device 204 is “northmost.” Device 210 may have its paddle positioned along bottom side B, while device 212 may have its paddle positioned along right side R. Alternatively, the paddle may remain on the same side of the screen for each user but with appropriate mapping between edges to maintain the relative position of the users around the shared play area.

(112) It will be understood that in various embodiments the game can be configured to dynamically adjust the behavior and connections between the play areas based on factors such as each device’s orientation, the relative position of the players, and other considerations such as the relative size of screen areas. As will be noted below, the virtual object can move from one screen to another in other manners in addition to or instead of encountering the boundaries of the play area.

(113) FIG. 9 illustrates an example of play areas 302A and 302B for two respective users A and B over a plurality of time intervals (I), (II), and (III). Each play area 302 includes a respective paddle 304. At time interval (I), virtual object 306 has been launched or deflected from paddle 304B towards the boundary of play area 302B. As shown at time interval (II), exit point 308 from play area 302B is mapped to an entry point 310 in play area 302A. The mapping may allow the virtual object to pass instantly between the play areas or there may be a delay based on the distance between the players (e.g., as determined by GPS and/or other triangulation or proximity detection techniques). In any event, time interval (II) depicts virtual object 306 encountering paddle 304A. For example, user A may have moved paddle

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304A by sliding his or her fingers along the display surface of his device to intercept virtual object 306.

(114) When virtual object 306 encounters paddle 304A, a haptic effect H1 is selected and played back. As illustrated, haptic effect H1 is localized to the point at which user A touches paddle 304A (and/or another part of play area 302). As was noted above, the sensation can be generated by commanding one or more actuators to provide motion or another effect; the actuators may be located at the point at which the effect is intended to be felt and/or elsewhere. FIG. 9 shows effect H1 as “(((H1)))” in play area 302A and as “(H1)” in play area 302B since the effect is also played back for player B and localized to player B’s touch point. However, as indicated the intensity of effect H1 differs as between players A and B.

(115) The haptic effect can be selected based on the simulated physics of the game. For example, the paddles 304 may represent a hard surface, and so effect H1 may comprise a strong, sharp effect. Since a deflection is meant to represent a “hit,” effect H1 may be the strongest effect in the game. The “hit” is played back to user B to alert user B that the virtual object will be returned and user B can prepare to deflect the incoming virtual object. The hit may be played back to player B with a suitable indicator of direction—for instance, the effect may be designed to feel like it originated from the left, rather than the top or bottom; this may be helpful when three or more users are playing together.

(116) By playing back the haptic effect even for a collision (or other event) occurring in a different player’s screen, the game can enhance the perception that the players are sharing a space even though the players cannot view one another’s play areas. Thus, the players may become more immersed in the game and may have a more compelling game experience.

(117) FIG. 10 illustrates another example of play and depicts the virtual object ricocheting off the border of a play area. Particularly, three time intervals (I), (II), and (III) are again shown. Play areas 402A and 402B correspond to players A and B, while paddles 404 and virtual object 406 are also illustrated. As shown at time interval (I), virtual object 406 is launched with a trajectory towards a point 408 at the top boundary of play area 402. Interval

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(II) illustrates when virtual object 406 encounters point 408. A “bounce” haptic effect H2 is played back to players A and B, localized to their touch points at respective paddles 404A and 404B.

(118) Since the “bounce” occurs in play area 402B and is at a closer distance to paddle 404B than paddle 404A, it is depicted as “((H2))” in play area 402B and “(H2)” in play area 402A since the bounce is “louder” for player B. As shown at time interval (III), after the bounce the virtual object passes to play area 402A. Alerted to the bounce, player A may attempt to intercept the virtual object and prevent it from reaching the goal area behind paddle 404A.

(119) FIG. 11 is a diagram illustrating another aspect of the present subject matter. In addition to or instead of haptic effects played in response to events changing the virtual object trajectory or other “discrete” events, haptic effects can be played back to simulate a continuous effect. In this example, play areas 502 for two players A and B are shown in a time interval (I) and a time interval (II). For purposes of illustration, play areas 502 are shown in a “landscape,” rather than “portrait” orientation. Each play area features a respective paddle 504 as well, and virtual object 506 is depicted.

(120) Each play area of this example also includes seams 508 represented by dotted lines. For example, seams 508 may represent boundaries between planks in a wooden surface depicted in the play area. To simulate a wood panel back ground, a continuous low rumble effect to correlate with the virtual object rolling across the surface can be combined with click effects to correlate with the virtual object encountering seams 508. This effect is shown as “H3” in FIG. 11. At time interval (I), the effect is shown as “((H3))” for players B and “(H3)” for player A since the virtual object is closer to paddle 504B than paddle 504A. At time interval (II), effect H3 is louder for paddle 504A since virtual object 506 is moving towards player A. Although the background effect is shown in conjunction with seams 508, a background effect could be included to simulate a surface alone (i.e. a continuous surface) or could vary as the

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simulated background surface changes (e.g., from a wood area to a metal area to a concrete area, etc.).

(121) FIG. 12 is a flowchart illustrating illustrative steps in a method 600 for providing a game in accordance with the present subject matter. Block 602 represents setting up one or more play areas. For example, if two users desire to play, respective play areas can be initialized and mappings between the shared boundaries (and/or other entry-exit points) can be determined.

(122) Block 604 occurs while play continues. At least one instance of the game can track the position and motion of the virtual object based on interaction with paddles, obstacles, and characteristics of the play area based on a model simulating physics of the game. For example, the model can provide for changes in the virtual object's speed and direction based on simulating momentum, mass, and material characteristics of the virtual object and the other items in the play area.

(123) At block 606, based on the position and motion of the virtual object at, before, and/or after an event, one or more haptic effects to play back can be determined. For example, if the virtual object encounters a boundary or other object in the play area, a haptic effect associated with the physical interaction between the virtual object and boundary/object can be selected for playback. Different boundaries/objects may result in different effects. For example, a border or paddle may result in a "hard" effect, while obstacles included in the play area may have "soft" effects. Simulated properties of the virtual object can be taken into account as well—the game may support a mode with a hard (e.g., steel) virtual object or a soft (e.g., rubber) virtual object with appropriate changes in the haptic output scheme.

(124) Additionally or alternatively the haptic effect can relate to a background effect. For instance, as was noted above, a continuous haptic effect simulating passage of the virtual object over a simulated surface can be provided based on characteristics of that surface. As another example, the surface may include material or an obstacle for the virtual object to

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pass through and a suitable haptic effect can be provided to simulate passage through the material/obstacle.

(125) At block 608, the game determines the position of the virtual object relative to the haptic delivery point(s) to adjust how the haptic effect is to be output. For instance, a haptic delivery point can include the point at which a user touches the screen of a device. The “loudness” (i.e., intensity) of the haptic effect can be inversely proportional to the distance between the delivery point and the virtual object. Directionality may also be applied. For example, if a ricochet occurs on another screen, the haptic effect that is presented may include a directional component or may be otherwise be presented to give an indication of where the ricochet occurred.

(126) At block 610, suitable signals are sent to the actuators to generate the haptic effect(s) having the desired volume. For example, the game can consult a library of signal patterns for use in generating different haptic effects and use the signal patterns to command one or more actuators embedded in the screen and/or other portions of the device. The haptic effects may include sounds and/or visual elements as well.

(127) For multi-user play, each respective instance of the game can determine the virtual object's position and motion while in that instance's play area and pass that information to the other instances. When the virtual object exits the play area, information regarding the virtual object's motion (e.g., a vector with direction and speed) can be used to continue tracking by the instance of the game whose play area is to receive the virtual object.

(128) In some embodiments, when an event occurs and/or when background effects are provided, the haptic effect is selected by the instance of the game whose play area contains the virtual object when the haptic effect is to be triggered and that information is provided to the other instances of the game. For example, in a game involving player A and player B, if the virtual object collides with an obstacle, border, or paddle in player A's play area, the instance of the game on player A's device can provide player B's device the desired haptic

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effect along with information about the collision and position thereof for use by the instance of the game on player B's device in determining a volume or directionality for the effect.

(129) FIG. 13 is a diagram illustrating an example of an interface 700 for an instance of a game configured in accordance with aspects of the present subject matter. In this example, a pinball-like game is presented in which the play area 702 includes a border 704, 706 that extends inward from the screen boundaries. The objective of the game is to prevent a virtual object (not shown), such as a ball or other object, from reaching 708 by deflecting the virtual object using paddle 710. To begin play, the virtual object may be launched from paddle 710 or may appear elsewhere in play area 702.

(130) Interface 700 includes a plurality of control buttons 712, 714, 716, and 718 which may be used to provide inputs and access menus. For example, buttons 712 and 714 may comprise play and pause buttons, while button 716 provides a "launch" command and button 718 exits the game or launches a menu for configuring, saving, or exiting the game. In some embodiments, control buttons 712-718 may be provided with suitable haptic effects to simulate pushing a physical button.

(131) Turning to play area 702, a plurality of simulated lights 720 can be provided to enhance the visual experience; the lights may or may not act as obstacles. A bumper 722 may cause the virtual object to "bounce" in response to a collision in a manner different from a ricochet from border 704, 706. For example, border 704, 706 may be presented as a simulated metal border which causes a sharp ricochet effect. Bumper 722 may feature an initial amount of "give" before imparting force on the virtual object in a manner similar to that of a pinball machine bumper. Accordingly, when the virtual object encounters border 704, 706 or bumper 722, different respective haptic effects may be played back at the point(s) at which the user contacts the screen to provide different sensations in accordance with the simulated physical response of the borders/bumper. Additionally, as was noted above, the intensity of the effect can depend on distance from the point(s) at which the user contacts the screen.

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(132) This example features metal bars 724, 726, and 728, which may provide a still further response to collisions with a virtual object and may be assigned their own respective haptic effect. Arrows 730 may comprise a visual effect and/or may result in an acceleration of the virtual object into xylophone structure 732. In this example, xylophone structure 732 comprises a plurality of keys (732A, 732B, 732C identified), with each ascending key having its own associated haptic effect. For example, as the virtual object moves from key 732A to 732B to 732C, the haptic effect may increase in pitch along with corresponding xylophone sound effects. At the same time, the haptic effect may decrease in intensity as the virtual object moves away.

(133) In some embodiments, point 734 represents an exit from the play area and into a second user's play area, which is identical to play area 702. When the virtual object enters play area 702, it may be returned via chute 736 along with an accompanying "rattle" representing passage through the chute. As was noted above, each haptic effect in one user's play area can also be played back in the other user's (or users') play area(s) but with a corresponding decrease in intensity based on the separation from the site of the event causing the haptic effect and the user's point of contact with the screen.

(134) Some embodiments feature one or more instances of a vortex as shown at 738. Vortex 738 can comprise a portion of play area 702 that attracts the virtual object toward opening 740. If the virtual object reaches opening 740, the virtual object may pass into another play area. When the virtual object initially contacts vortex 738, a first haptic effect representing the "pull" of the vortex may be played back, with the effect becoming stronger until (and if) the virtual object reaches opening 740. At that point, an "exit" effect may be played back to represent the virtual object's exit from the vortex in another play area. This can, for instance, alert the user of the play area receiving the virtual object to move his or her paddle 710 into position.

(135) In some embodiments, if the virtual object is not deflected from goal area 708, a haptic effect representing entry of area 708 is presented, such as absorption of the virtual

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object or an explosion. At that point, depending upon the rules of the game, the virtual object may be provided for launch again via paddle 710 for another round. In some embodiments, the game proceeds until one player reaches a predetermined score level (e.g., 7 goals) and/or score differential (ahead by 3 goals). As another example, point values may be associated with hitting certain obstacles (e.g., bumper 722, bars 724, 726, 728, lights 720) or passing through all keys of xylophone structure 732. Embodiments may support moving or destroying obstacles (e.g., breaking through bricks) during the course of play, with suitable haptic effects provided based on motion or destruction of the obstacles.

(136) In some embodiments, a computing device may be sensitive to distance of a user's fingers or stylus from the touch screen and/or touch pressure. These features may be used during play of the game and/or in configuring the game application. For instance, if the device indicates that the user is not touching the screen or another haptically-enabled area, haptic effects can be turned off to reduce power consumption. As another example, the user may be able to hover to provide input. For instance, the area at which buttons 712-716 are presented may ordinarily appear as brushed metal, but the buttons may appear in response to a user hovering or touching the area.

(137) In several examples above, game play proceeded based on movement of a paddle using touch. Additionally or alternatively, gameplay may depend on tilt sensors and/or accelerometers. For example, users may be able to tilt or swing their devices to affect the movement of the virtual object and/or paddle position. Haptic effects can be delivered at the point(s) at which the users grip their respective devices. In some embodiments, the game may use multiple paddles per user or may use no paddles at all, with all input based on tilt/acceleration.

(138) Several examples of multi-user play were provided. In some embodiments, single-user play is also supported. For example, a play area may be completely closed, with the virtual object returning towards the paddle and goal area. As another example, single user play may proceed with one or more other players simulated, with the other players having a

respective simulated play area and with corresponding haptic feedback when the virtual object enters the simulated play area.

(139) Although the invention has been described in detail for the purpose of illustration based on what is currently considered to be the most practical and preferred embodiments, it is to be understood that such detail is solely for that purpose and that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover modifications and equivalent arrangements that are within the scope of the appended claims. X

For example, it is to be understood that the present invention contemplates that, to the extent possible, one or more features of any embodiment can be combined with one or more features of any other embodiment.

1. A system (10) configured to provide haptic stimulation to a user, the system comprising:
- a user interface (14) including one or more sensors configured to generate output signals related to the gestures of a user;
 - an actuator (16) configured to generate haptic stimulation to the user; and
 - one or more processors (20) configured to execute computer program modules, the computer program modules comprising:
 - a gesture module (24) configured to monitor performance of a control gesture by the user based on the output signals of the user interface,
 - wherein the control gesture is a gesture associated with a single and discrete command input to the system, and includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input;
 - a stimulation module (26) configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture,
 - wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and
 - an actuator control module (30) configured to control the actuator to generate the stimulation determined by the stimulation module;
- the system being **characterised in that** the one or more sensors are configured to generate the output signals by monitoring motion of the user in space.
2. The system of claim 1, wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.
3. The system of claim 1, wherein the control gesture further includes a second

intermediate portion, and wherein the stimulation module is configured such that the

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haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

5 4. The system of claim 3, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.

10 5. The system of claim 1, wherein the gesture module is configured to identify a control gesture failure responsive to the users commencing performance of the control gesture and not successfully performing all of the portions of the control gesture, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to identification of a control
15 gesture failure by the gesture module.

6. A method of providing haptic stimulation to a user of a system, the method comprising:

monitoring (46, 52, 64), by one or more sensors of the system,
performance of a control gesture by a user,

wherein the control gesture is a gesture associated with a single and discrete command input to the system, and includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input;

25 determining (48, 54), by one or more processors of the system, a haptic stimulation associated with performance of the control gesture to be generated for the user,

wherein determining the haptic stimulation includes determining (48) a first stimulation determined responsive to performance (46) of the initial portion of the control gesture, and determining (54) a second stimulation that is different from the first stimulation and is determined responsive to performance (52) of the

30 first intermediate portion of the control gesture; and

generating (50, 56), by an actuator of the system, the determined stimulation during performance of the control gesture; the method being **characterised in that** the control gesture comprises a motion of the user in space.

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7. The method of claim 6, wherein the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

8. The method of claim 6, wherein the control gesture further includes a second intermediate portion, and wherein the haptic stimulation associated with the control gesture further includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

9. The method of claim 6, wherein responsive to identification of a control gesture failure during monitoring of performance of the control gesture determining the haptic stimulation

associated with the control gesture includes determining a third stimulation different from the first stimulation and the second stimulation.

10. The method of any of claims 6 to 9, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

11. The method of any of claims 6 to 10, wherein the intermediate portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at

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a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

12. The method of any of claims 6 to 11, wherein the ending portion of the control
5 gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, moving or motioning at a specific
10 acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

13. The system of any of claims 1 to 5, wherein the initial portion of the control
gesture includes one or more of facing a specific direction, motioning or moving in a
15 specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

20

14. The system of any of claims 1 to 5 and claim 13, wherein the intermediate
portion of the control gesture includes one or more of changing orientation of the head or
other body parts to a specific direction, motioning or moving in a specific direction,
motioning with a specific one or more appendages, motioning with body parts to move in
25 a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

30 15. The system of any of claims 1 to 5 and any of claims 13 and 14, wherein the ending portion of the control gesture includes one or more of changing orientation of the

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head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, moving
5 or motioning at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

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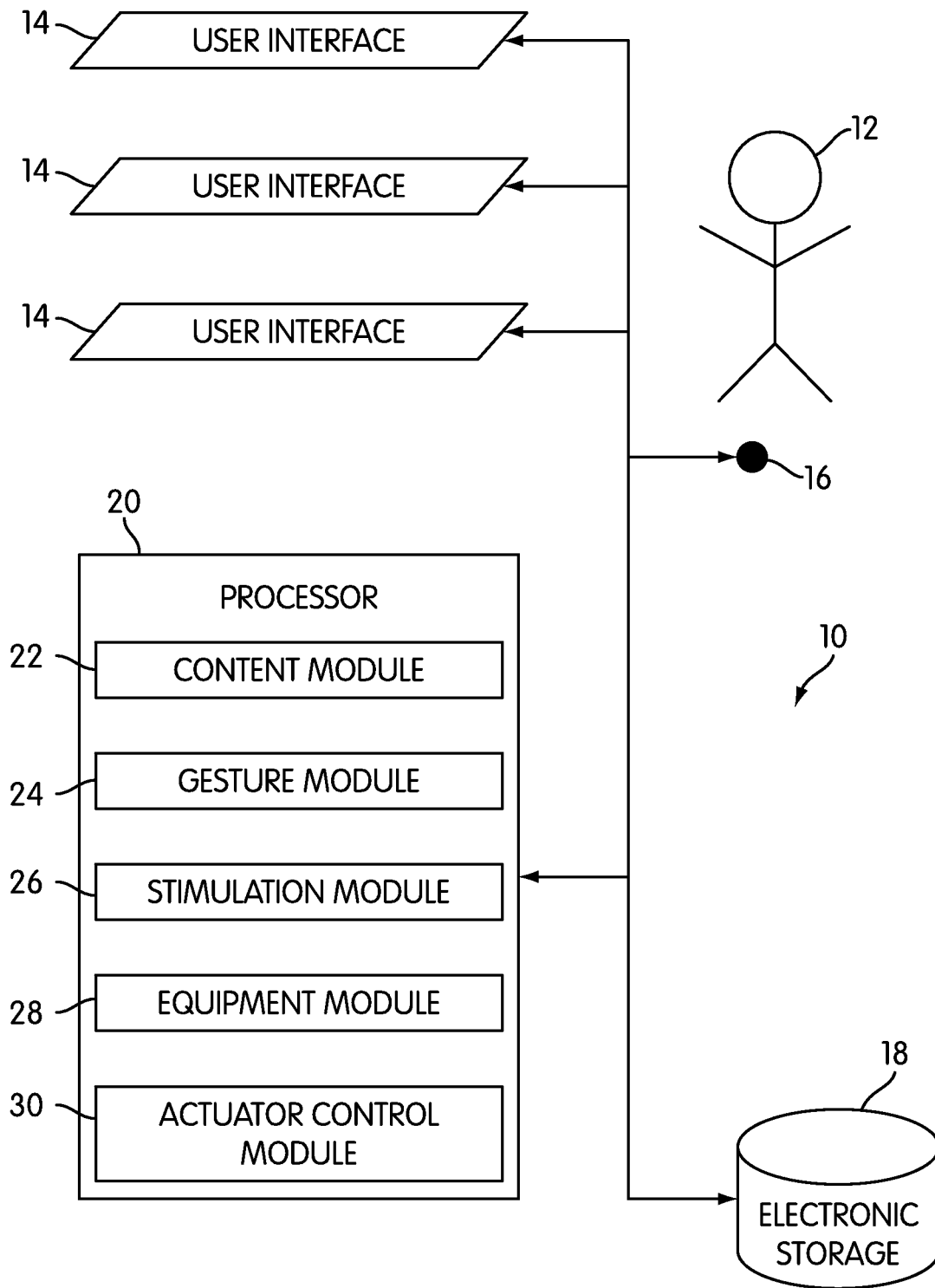


FIG. 1

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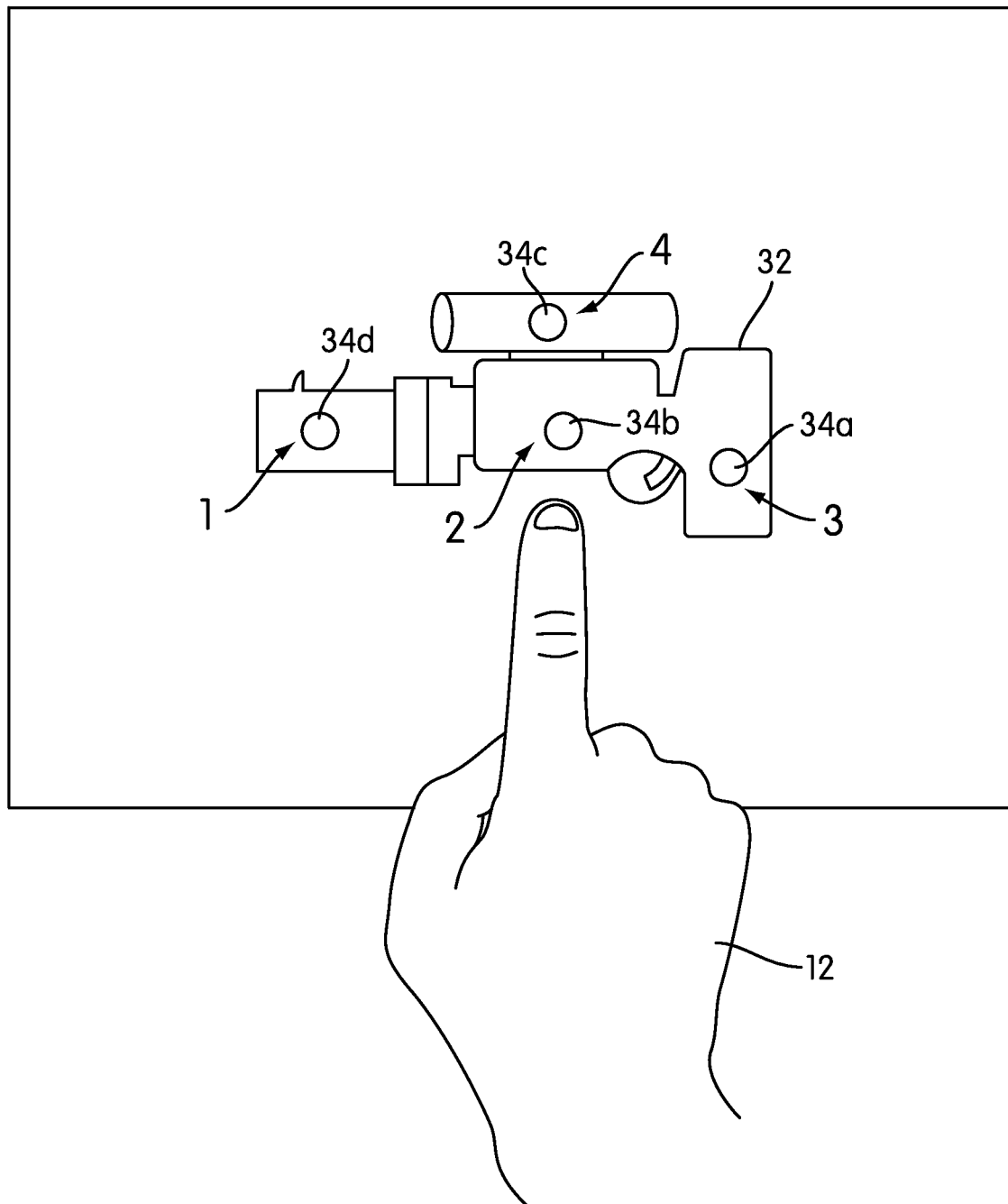


FIG. 2

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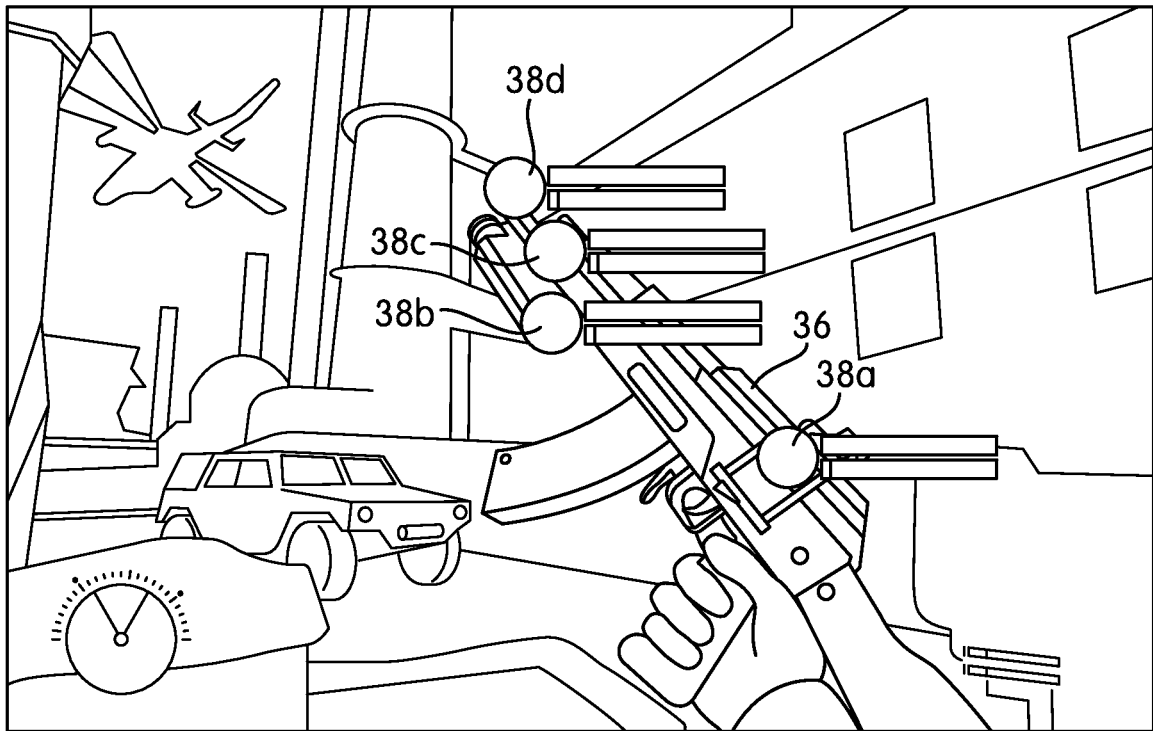


FIG. 3

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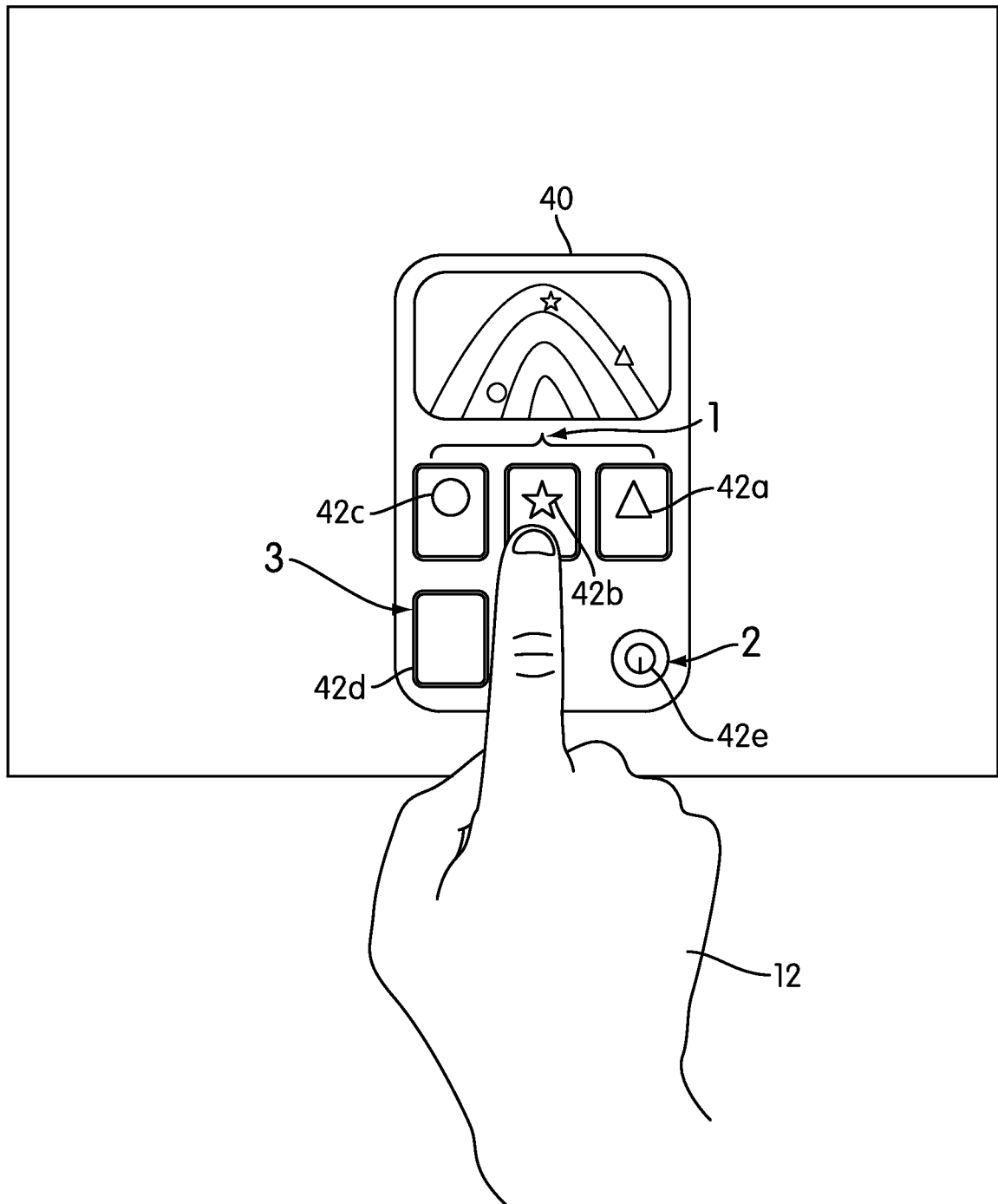


FIG. 4

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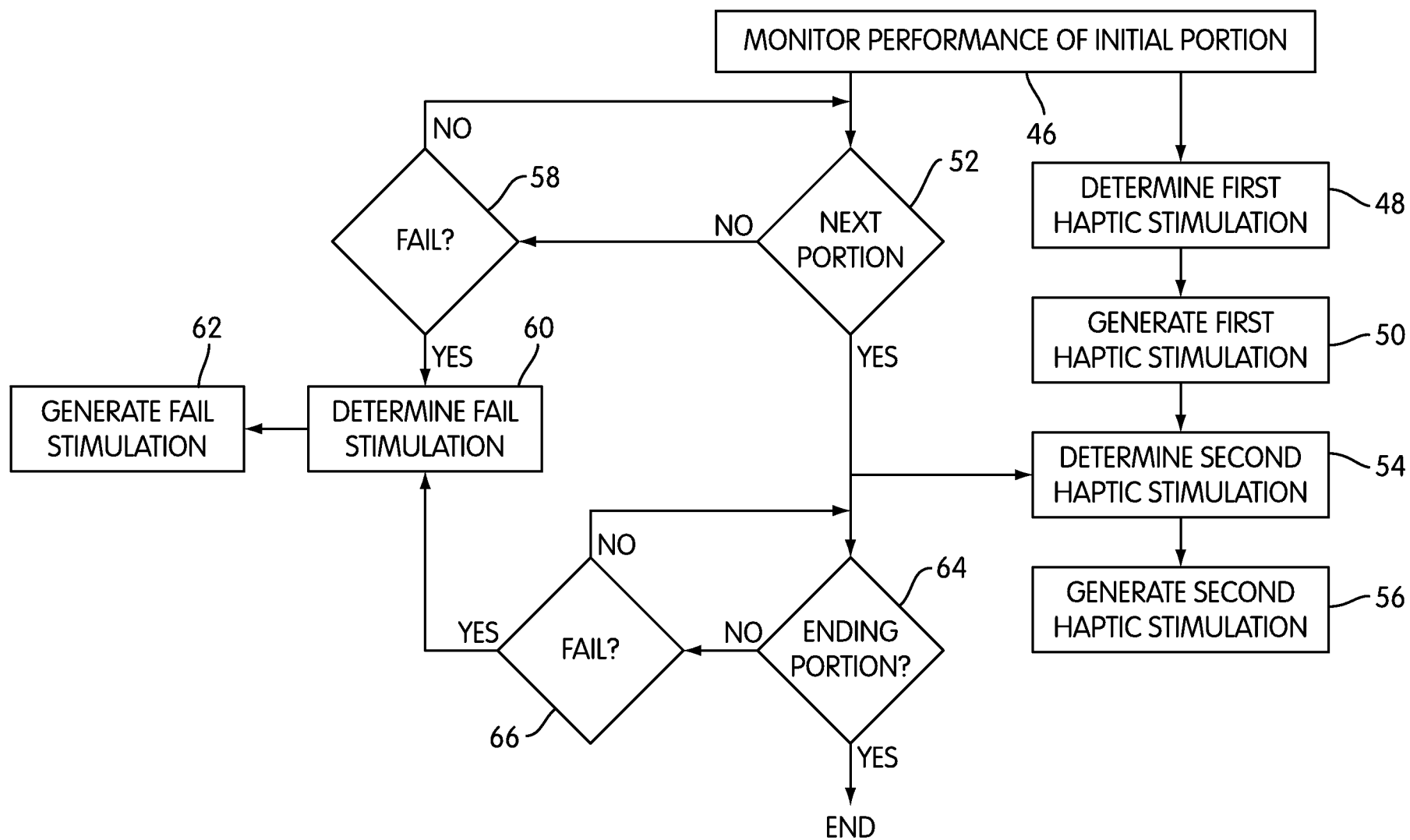


FIG. 5

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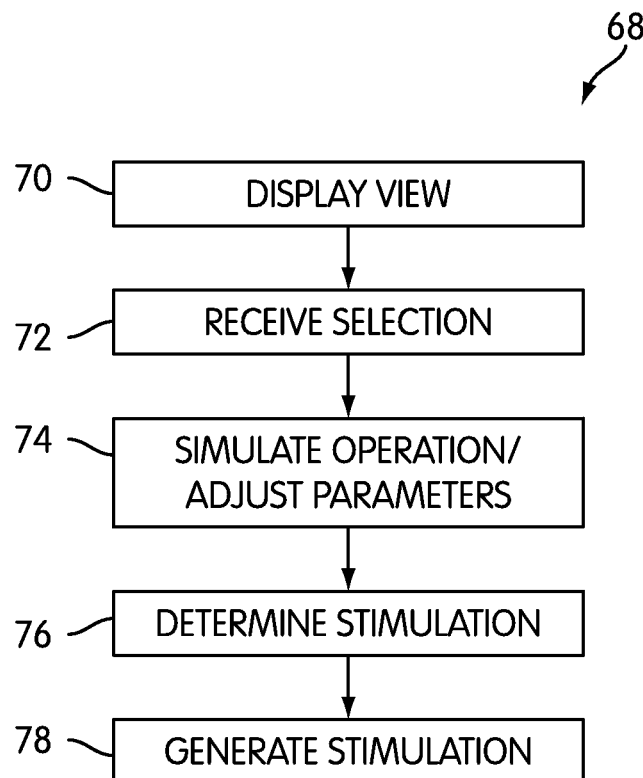


FIG. 6

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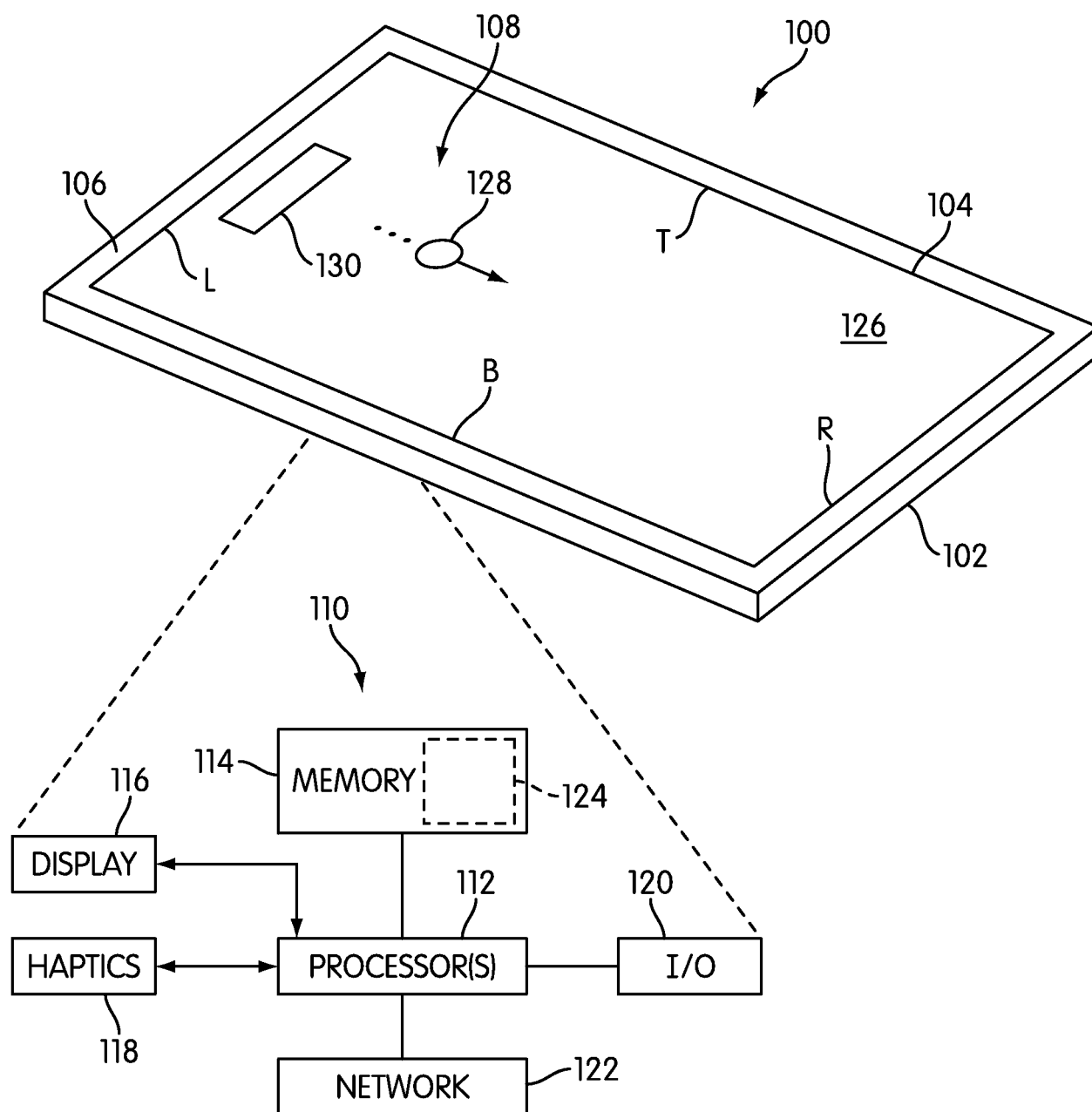


FIG. 7

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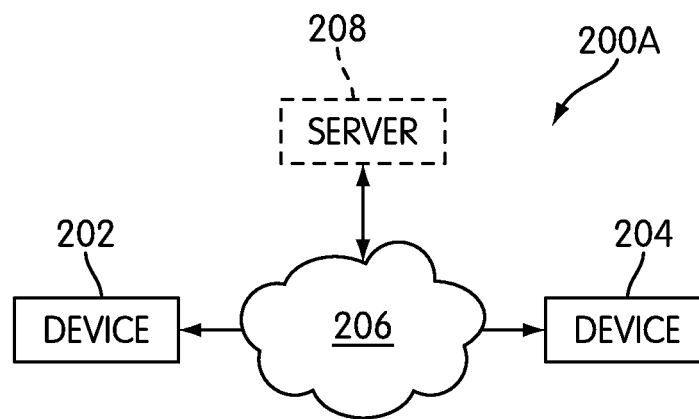


FIG. 8A

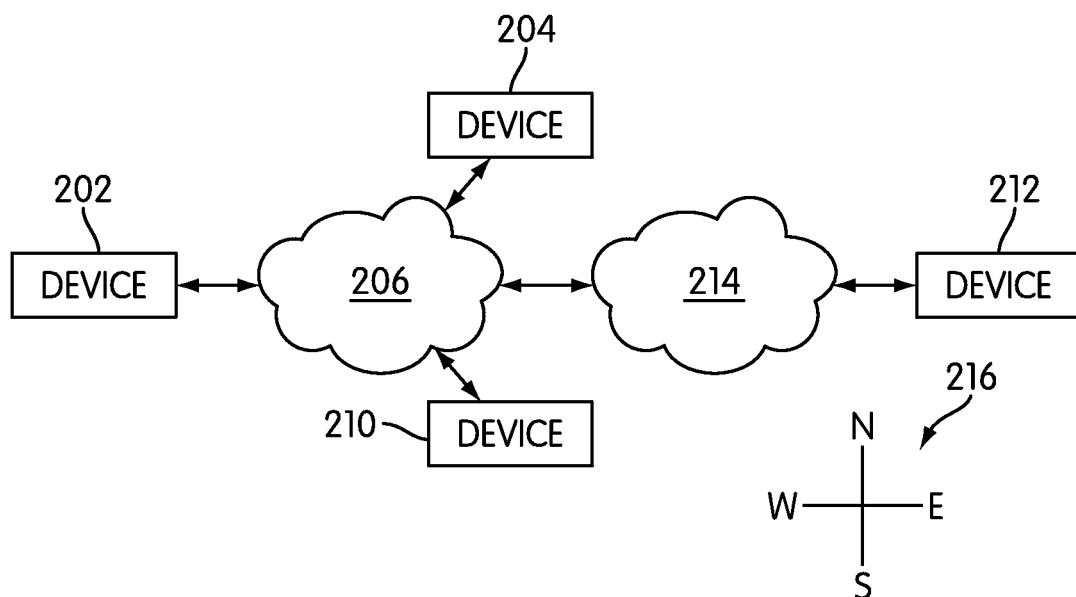


FIG. 8B

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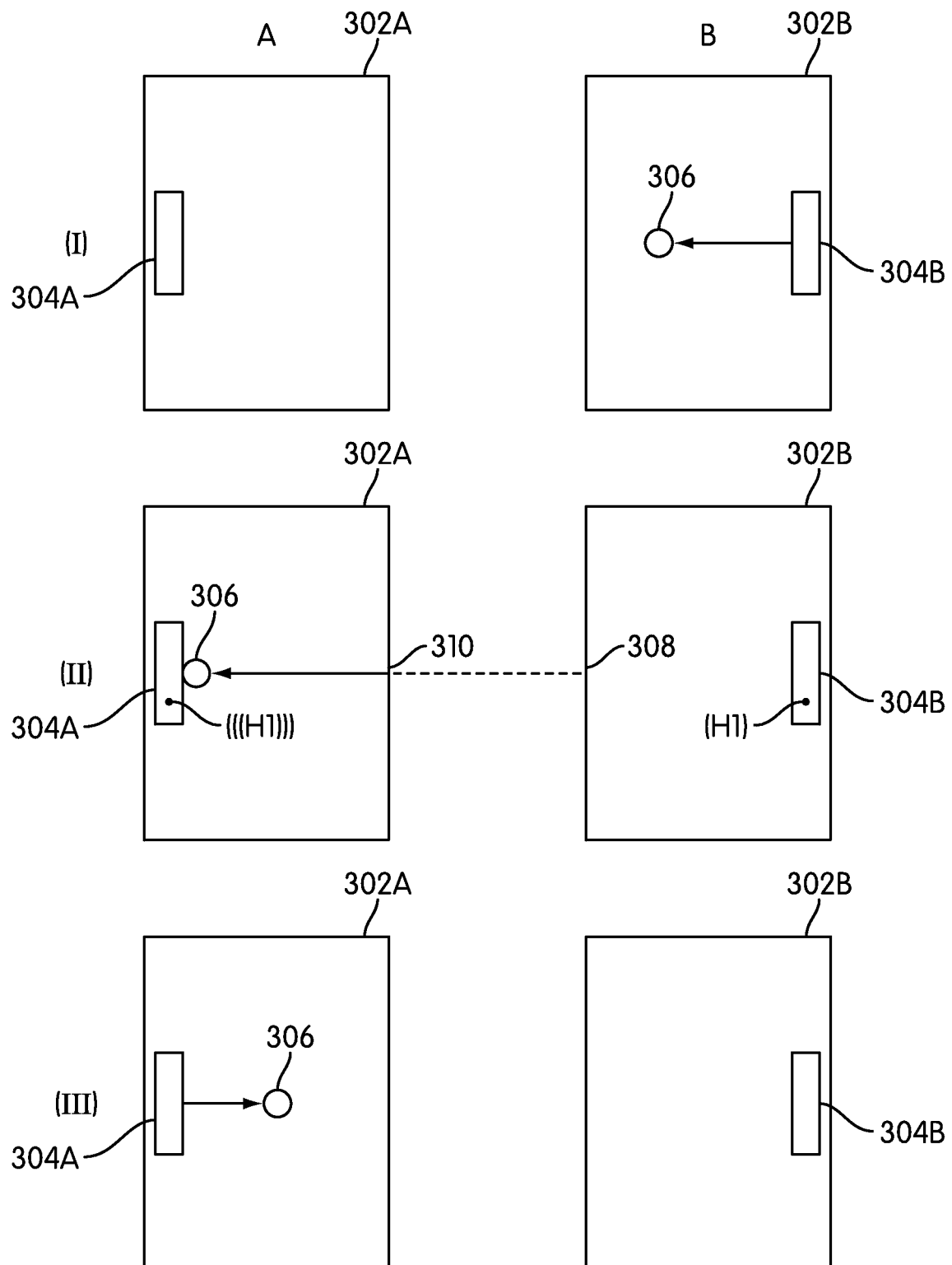


FIG. 9

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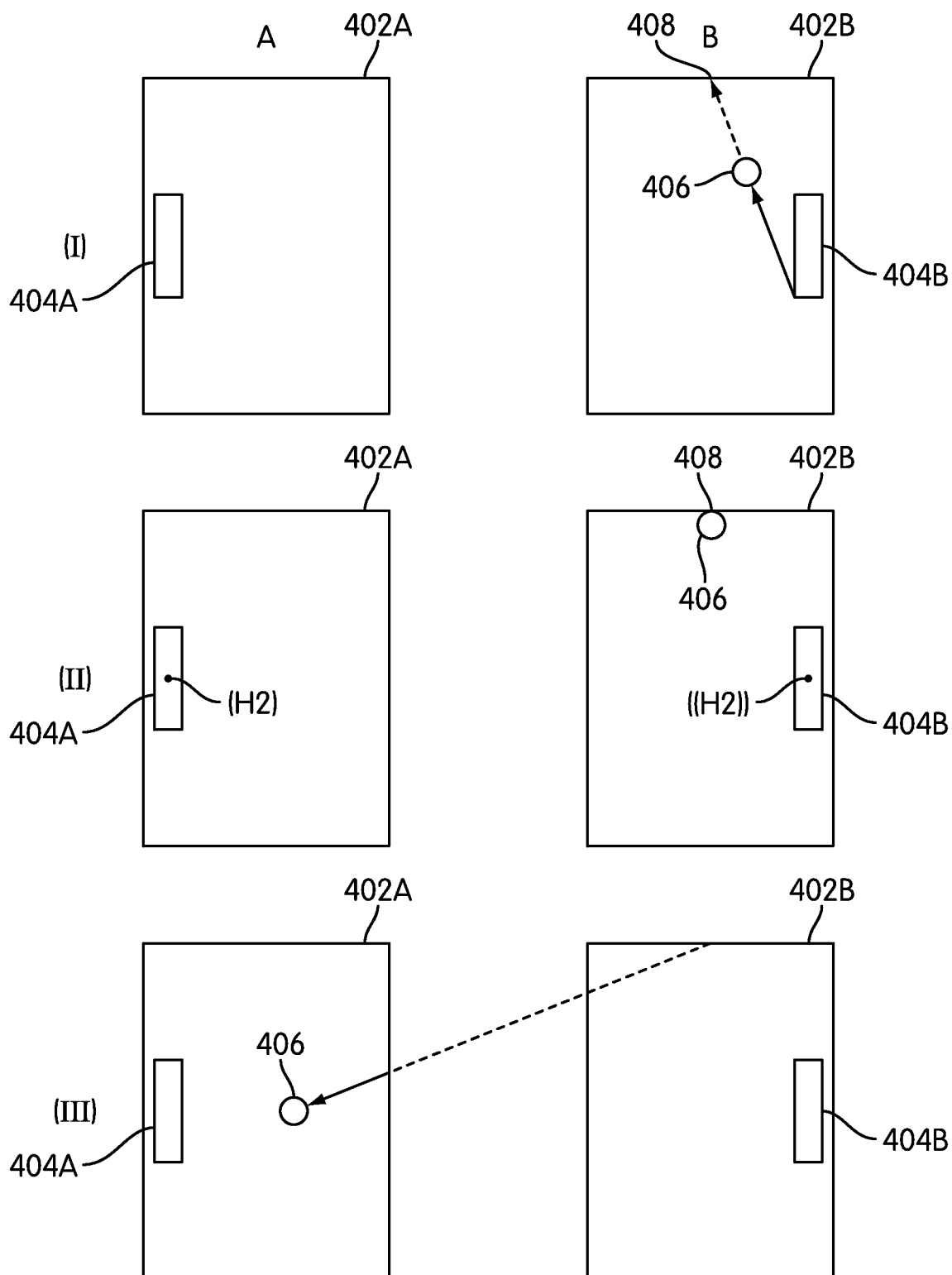


FIG. 10

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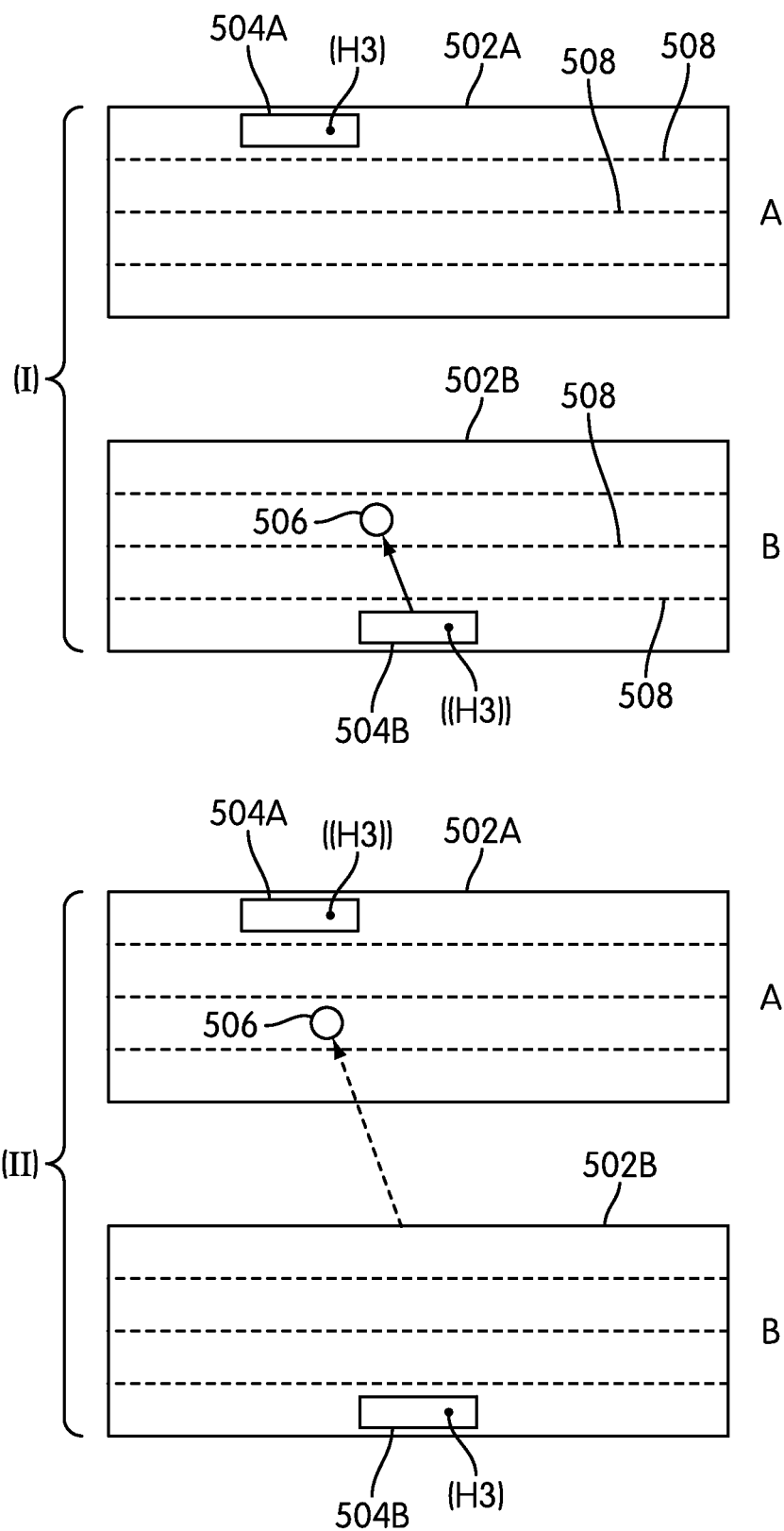


FIG. 11

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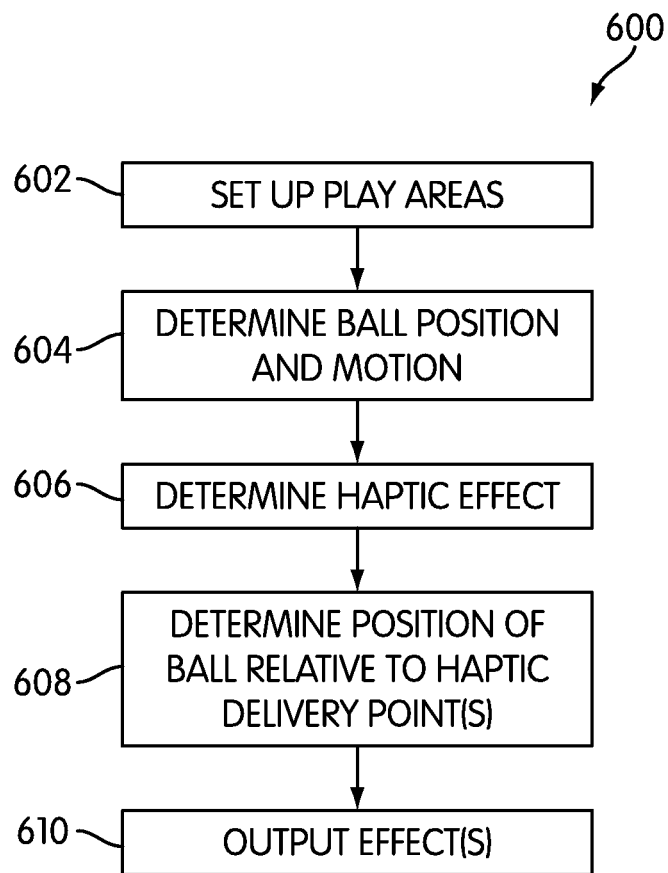


FIG. 12

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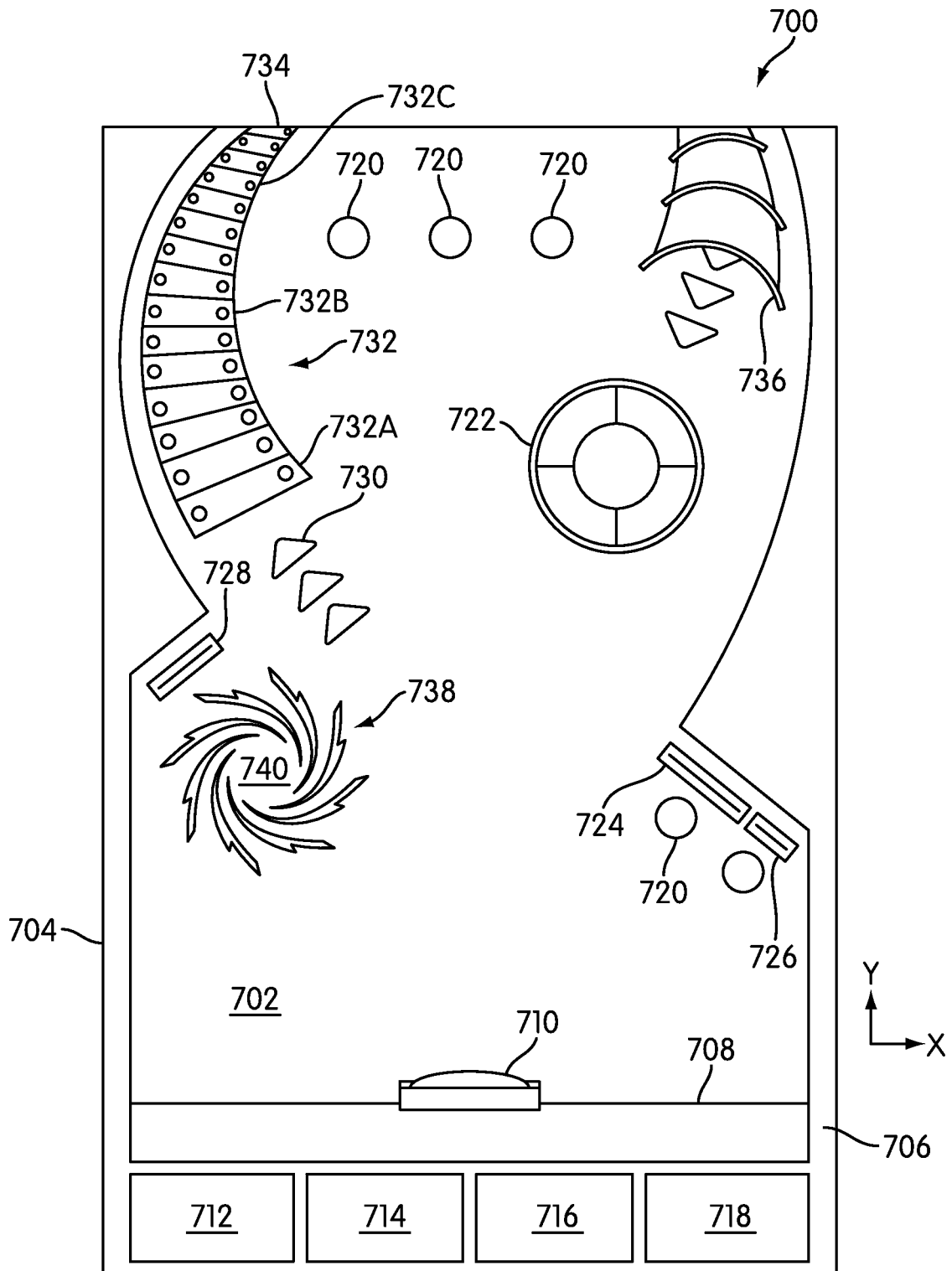


FIG. 13

**Telefonische Rücksprache mit dem Anmelder / Vertreter
Consultation by telephone with applicant / representative
Entretien téléphonique avec le demandeur / le mandataire**

Anmeldung Nr. / Application No. / Demande n° 10742626.4

Teilnehmer / Participant(s) / Participant(s)

Anmelder / Applicant / Demandeur:

Vertreter / Representative / Mandataire:

Ergebnis der Rücksprache / Result of consultation / Résultat de l'entretien

The representative has been informed that the oral proceedings by videoconference on 05.12.2019 are cancelled.

21.11.2019.....
Datum / Date

Eich, Martine.....
Formalprüfer
Formalities Officer
L'agent chargé des formalités

SECOND AUXILIARY REQUEST

What is claimed is:

1. A system configured to provide haptic stimulation to a user, the system comprising:

5 a user interface including one or more sensors configured to monitor motion of the user in three dimensions in space and to generate output signals related to the gestures-motion of thea user;

an actuator configured to generate haptic stimulation to the user; and

one or more processors configured to execute computer program modules, the computer program modules comprising:

10 a gesture module configured to monitor performance of a control gesture by the user based on the output signals of the user interface,

wherein the control gesture is a gesture associated with a single and discrete command input to the system which is a function of gaming content being conveyed to the user, and which includes an initial portion, a first intermediate portion, and an ending
15 portion which must be performed in a specific order to achieve the command input;

a stimulation module configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture,

20 wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module.

25

2. The system of claim 1, wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

30

SECOND AUXILIARY REQUEST

3. The system of claim 1, wherein the control gesture further includes a second intermediate portion, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

4. The system of claim 3, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.

~~5. The system of claim 1, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.~~

~~6. The system of claim 1, wherein the first intermediate portion of the control gesture includes maintaining contact with a touch sensitive surface for a predetermined period of time.~~

~~7.~~ 7. The system of claim 1, wherein the gesture module is configured to identify a control gesture failure responsive to the users commencing performance of the control gesture and not successfully performing all of the portions of the control gesture, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to identification of a control gesture failure by the gesture module.

~~8.~~ 8. A method of providing haptic stimulation to a user of a system, the method comprising:

~~Monitoring, by one or more sensors configured to monitor the movement of a user in three dimensions in space, performance of a control gesture by a user, the control gesture comprising a movement of the user,~~

SECOND AUXILIARY REQUEST

wherein the control gesture is a gesture associated with a single and discrete command input to the system which is a function of gaming content being conveyed to the user, and which includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input;

5 determining haptic stimulation associated with performance of the control gesture to be generated for the user,

 wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the
10 first intermediate portion of the control gesture; and

 generating the determined stimulation during performance of the control gesture.

79. The method of claim 68, wherein the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the
15 second stimulation that is determined responsive to performance of the ending portion of the control gesture.

810. The method of claim 68, wherein the control gesture further includes a second intermediate portion, and wherein the haptic stimulation associated with the control
20 gesture further includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

~~11. The method of claim 8, wherein the second stimulation is determined by~~
25 ~~adjusting one or more parameters of the first stimulation.~~

~~12. The method of claim 8, wherein the first intermediate portion of the control~~
~~gesture includes maintaining contact with an interface surface of a touch sensitive~~
~~surface for a predetermined period of time.~~

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SECOND AUXILIARY REQUEST

943. The method of claim 68, wherein responsive to identification of a control gesture failure during monitoring of performance of the control gesture the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation.

5

10. The method of any of claims 6 to 9, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

10

11. The method of any of claims 6 to 10, wherein the intermediate portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

15

20

12. The method of any of claims 6 to 11, wherein the ending portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, moving or motioning at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

25

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SECOND AUXILIARY REQUEST

13. The system of any of claims 1 to 5, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

14. The system of any of claims 1 to 5 and claim 13, wherein the intermediate portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

15. The system of any of claims 1 to 5 and any of claims 13 and 14, wherein the ending portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, moving or motioning at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

FOURTH AUXILIARY REQUEST

What is claimed is:

1. A system configured to provide haptic stimulation to a user, the system comprising:

5 a user interface including one or more sensors configured to monitor motion of the user in three dimensions in space and to generate output signals related to the gestures-motion of thea user;

an actuator configured to generate haptic stimulation to the user; and

one or more processors configured to execute computer program modules, the computer program modules comprising:

10 a gesture module configured to monitor performance of a control gesture by the user based on the output signals of the user interface,

wherein the control gesture is a gesture associated with a single and discrete command input to the system which causes a change in content forming part of a virtual game environment, and which includes an initial portion, a first intermediate portion, and
15 an ending portion which must be performed in a specific order to achieve the command input, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of
20 time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner and wherein the first intermediate portion of the control gesture and the ending portion of the control gesture each include one or more of changing orientation of the head or other
25 body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts;

FOURTH AUXILIARY REQUEST

a stimulation module configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture,

5 wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module.

10

2. The system of claim 1, wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

15

3. The system of claim 1, wherein the control gesture further includes a second intermediate portion, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

20

4. The system of claim 3, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.

25

~~5. The system of claim 1, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.~~

30

~~6. The system of claim 1, wherein the first intermediate portion of the control gesture includes maintaining contact with a touch sensitive surface for a predetermined period of time.~~

FOURTH AUXILIARY REQUEST

57. The system of claim 1, wherein the gesture module is configured to identify a control gesture failure responsive to the users commencing performance of the control gesture and not successfully performing all of the portions of the control gesture, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to identification of a control gesture failure by the gesture module.

68. A method of providing haptic stimulation to a user of a system, the method comprising:

Monitoring, by one or more sensors configured to monitor the movement of a user in three dimensions in space, performance of a control gesture by a user, the control gesture comprising a movement of the user,

wherein the control gesture is a gesture associated with a single and discrete command input to the system which causes a change in content forming part of a virtual game environment, and which includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner and wherein the first intermediate portion of the control gesture and the ending portion of the control gesture each include one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at

FOURTH AUXILIARY REQUEST

a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts;

determining haptic stimulation associated with performance of the control gesture to be generated for the user,

5 wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

generating the determined stimulation during performance of the control gesture.

10

79. The method of claim 68, wherein the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

15

810. The method of claim 68, wherein the control gesture further includes a second intermediate portion, and wherein the haptic stimulation associated with the control gesture further includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second

20 intermediate portion of the control gesture.

~~11. — The method of claim 8, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.~~

25 ~~12. — The method of claim 8, wherein the first intermediate portion of the control gesture includes maintaining contact with an interface surface of a touch sensitive surface for a predetermined period of time.~~

913. The method of claim 68, wherein responsive to identification of a control gesture failure during monitoring of performance of the control gesture the haptic stimulation

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FOURTH AUXILIARY REQUEST

associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation.

FIRST AUXILIARY REQUEST

What is claimed is:

1. A system configured to provide haptic stimulation to a user, the system comprising:

5 a user interface including one or more sensors configured to monitor motion of the user in space and to generate output signals related to the gestures of a user;

an actuator configured to generate haptic stimulation to the user; and

one or more processors configured to execute computer program modules, the computer program modules comprising:

10 a gesture module configured to monitor performance of a control gesture by the user based on the output signals of the user interface,

wherein the control gesture is a gesture associated with a single and discrete command input to the system, and includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input;

15 a stimulation module configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture,

20 wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module.

25 2. The system of claim 1, wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

30 3. The system of claim 1, wherein the control gesture further includes a second intermediate portion, and wherein the stimulation module is configured such that the

FIRST AUXILIARY REQUEST

haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

- 5 4. The system of claim 3, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.

10 ~~5. The system of claim 1, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.~~

15 ~~6. The system of claim 1, wherein the first intermediate portion of the control gesture includes maintaining contact with a touch sensitive surface for a predetermined period of time.~~

- 20 57. The system of claim 1, wherein the gesture module is configured to identify a control gesture failure responsive to the users commencing performance of the control gesture and not successfully performing all of the portions of the control gesture, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to identification of a control gesture failure by the gesture module.

- 25 68. A method of providing haptic stimulation to a user of a system, the method comprising:

Monitoring, by one or more sensors, performance of a control gesture by a user, the control gesture comprising a movement of the user in space,

- 30 wherein the control gesture is a gesture associated with a single and discrete command input to the system, and includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input;

FIRST AUXILIARY REQUEST

determining haptic stimulation associated with performance of the control gesture to be generated for the user,

wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that
5 is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

generating the determined stimulation during performance of the control gesture.

79. The method of claim 68, wherein the haptic stimulation associated with the
10 control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

810. The method of claim 68, wherein the control gesture further includes a second
15 intermediate portion, and wherein the haptic stimulation associated with the control gesture further includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

20 ~~11. The method of claim 8, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.~~

~~12. The method of claim 8, wherein the first intermediate portion of the control gesture includes maintaining contact with an interface surface of a touch sensitive
25 surface for a predetermined period of time.~~

~~913.~~ The method of claim 68, wherein responsive to identification of a control gesture failure during monitoring of performance of the control gesture the haptic stimulation associated with the control gesture includes a third stimulation different from the first
30 stimulation and the second stimulation.

FIRST AUXILIARY REQUEST

10. The method of any of claims 6 to 9, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

11. The method of any of claims 6 to 10, wherein the intermediate portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

12. The method of any of claims 6 to 11, wherein the ending portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, moving or motioning at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

13. The system of any of claims 1 to 5, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate,

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motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

14. The system of any of claims 1 to 5 and claim 13, wherein the intermediate
5 portion of the control gesture includes one or more of changing orientation of the head or
other body parts to a specific direction, motioning or moving in a specific direction,
motioning with a specific one or more appendages, motioning with body parts to move in
a specific relationship to each other, motioning or moving in a specific shape, motioning
10 for a specific amount of time, motioning or moving at a specific rate, motioning or
moving at a specific acceleration, changing a direction of motion or movement in a
specific manner, and halting motion or movement by one or more body parts.

15. The system of any of claims 1 to 5 and any of claims 13 and 14, wherein the
ending portion of the control gesture includes one or more of changing orientation of the
15 head or other body parts to a specific direction, motioning or moving in a specific
direction, motioning with a specific one or more appendages, motioning with body parts
to move in a specific relationship to each other, motioning or moving in a specific shape,
motioning for a specific amount of time, motioning or moving at a specific rate, moving
or motioning at a specific acceleration, changing a direction of motion or movement in a
20 specific manner, and halting motion or movement by one or more body parts.

THIRD AUXILIARY REQUEST

What is claimed is:

1. A system configured to provide haptic stimulation to a user, the system comprising:

5 a user interface including one or more sensors configured to monitor motion of the user in three dimensions in space and to generate output signals related to the gestures-motion of thea user;

an actuator configured to generate haptic stimulation to the user; and

one or more processors configured to execute computer program modules, the computer program modules comprising:

10 a gesture module configured to monitor performance of a control gesture by the user based on the output signals of the user interface,

wherein the control gesture is a gesture associated with a single and discrete

command input to the system which causes a change in content forming part of a virtual game environment, and which includes an initial portion, a first intermediate portion, and

15 an ending portion which must be performed in a specific order to achieve the command input;

a stimulation module configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture,

20 wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

25 an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module.

2. The system of claim 1, wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined
30 responsive to performance of the ending portion of the control gesture.

THIRD AUXILIARY REQUEST

3. The system of claim 1, wherein the control gesture further includes a second intermediate portion, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

4. The system of claim 3, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.

~~5. The system of claim 1, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.~~

~~6. The system of claim 1, wherein the first intermediate portion of the control gesture includes maintaining contact with a touch sensitive surface for a predetermined period of time.~~

~~7.~~ 7. The system of claim 1, wherein the gesture module is configured to identify a control gesture failure responsive to the users commencing performance of the control gesture and not successfully performing all of the portions of the control gesture, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to identification of a control gesture failure by the gesture module.

~~8.~~ 8. A method of providing haptic stimulation to a user of a system, the method comprising:

~~Monitoring, by one or more sensors configured to monitor the movement of a user in three dimensions in space, performance of a control gesture by a user, the control gesture comprising a movement of the user,~~

THIRD AUXILIARY REQUEST

wherein the control gesture is a gesture associated with a single and discrete command input to the system which causes a change in content forming part of a virtual game environment, and which includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input;

determining haptic stimulation associated with performance of the control gesture to be generated for the user,

wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

generating the determined stimulation during performance of the control gesture.

79. The method of claim 68, wherein the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

840. The method of claim 68, wherein the control gesture further includes a second intermediate portion, and wherein the haptic stimulation associated with the control gesture further includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

~~11. — The method of claim 8, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.~~

~~12. — The method of claim 8, wherein the first intermediate portion of the control gesture includes maintaining contact with an interface surface of a touch sensitive surface for a predetermined period of time.~~

THIRD AUXILIARY REQUEST

943. The method of claim 68, wherein responsive to identification of a control gesture failure during monitoring of performance of the control gesture the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation.

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10. The method of any of claims 6 to 9, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

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11. The method of any of claims 6 to 10, wherein the intermediate portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

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12. The method of any of claims 6 to 11, wherein the ending portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, moving or motioning at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

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THIRD AUXILIARY REQUEST

13. The system of any of claims 1 to 5, wherein the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner.

14. The system of any of claims 1 to 5 and claim 13, wherein the intermediate portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.

15. The system of any of claims 1 to 5 and any of claims 13 and 14, wherein the ending portion of the control gesture includes one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, moving or motioning at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts.



Letter accompanying subsequently filed items

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The document(s) listed below is (are) subsequently filed documents pertaining to the following application:

Application number and/or EP publication number

EP10742626.4

Reference

HC/P17407EP-W

Procedural phase

All procedures

Name of represented party

Immersion Corporation

	Description of document	Original file name	Assigned file name
1	Amended claims (clean copy)	P17407EP-W_Claims Amended Clean_First Auxiliary_05-11-19.pdf	CLMS-1.pdf
2	Amended claims with annotations	P17407EP-W_Claims Amended Tracked_First Auxiliary_05-11-19.pdf	CLMS-HWA-1.pdf
3	Amended claims (clean copy)	P17407EP-W_Claims Amended Clean_Second Auxiliary_05-11-19.pdf	CLMS-2.pdf
4	Amended claims with annotations	P17407EP-W_Claims Amended Tracked_Second Auxiliary_05-11-19.pdf	CLMS-HWA-2.pdf
5	Amended claims (clean copy)	P17407EP-W_Claims Amended Clean_Third Auxiliary_05-11-19.pdf	CLMS-3.pdf
6	Amended claims with annotations	P17407EP-W_Claims Amended Tracked_Third Auxiliary_05-11-19.pdf	CLMS-HWA-3.pdf
7	Amended claims (clean copy)	P17407EP-W_Claims Amended Clean_Fourth Auxiliary_05-11-19.pdf	CLMS-4.pdf
8	Amended claims with annotations	P17407EP-W_Claims Amended Tracked_Fourth Auxiliary_05-11-19.pdf	CLMS-HWA-4.pdf
9	Letter dealing with oral proceedings	P17407EP-W Response to Summons 5-11-19.pdf	ORAL.pdf

Signature 1

Place: London, UK
Date: 05 November 2019
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Our Ref: JM/HC/P17407EP-W
Date: 5 November 2019

Dear Sirs

European Patent Application No. 10742626.4 - 1216
Immersion Corporation

We are writing in response to the summons to attend oral proceedings dated 27 June 2019.

Oral proceedings are scheduled for 5 December 2019, and a final date of 5 November 2019 has been set for making written submissions and/or amendments pursuant to R.116 EPC. In response to the Summons, we file herewith a Main Request and a First, Second, Third, and Fourth Auxiliary Requests.

The Main Request is that a patent be granted on the basis of the application documents as presently on file.

In the event that the Examining Division is not minded to allow the Main Request, it is respectfully invited to consider the First Auxiliary Request submitted herewith. The First Auxiliary Request is that a patent be granted on the basis of the application documents amended as shown in the enclosed pages marked with First Auxiliary Request. In the event that the Examining Division is not minded to allow the Main Request or the First Auxiliary Request, it is respectfully invited to consider the Second Auxiliary Request submitted herewith. The Second Auxiliary Request is that a patent be granted on the basis of the application documents amended as shown in the enclosed pages marked with Second Auxiliary Request. In the event that the Examining Division is not minded to allow the Main Request or the First or Second Auxiliary Requests, it is respectfully invited to consider the Third Auxiliary Request submitted herewith. The Third Auxiliary Request is that a patent be granted on the basis of the application documents amended as shown in the enclosed pages marked with Third Auxiliary Request. In the event that the Examining Division is not minded to allow the Main Request or the First, Second, or Third Auxiliary Requests, it is respectfully invited to consider the Fourth Auxiliary Request submitted herewith. The Fourth Auxiliary Request is that a patent be granted on the basis of the application documents amended as shown in the enclosed pages marked with Fourth Auxiliary Request.

In the event that the Examining Division is minded to allow either the Main Request or any of the Auxiliary Requests with minor amendments, the Examining Division is requested to telephone the undersigned attorney or to issue a further written Communication. The amendments made in the requests filed herewith are intended to address the issues raised in the Summons in full and it is kindly requested that any outstanding matters may be addressed in writing without recourse to Oral Proceedings.

For the avoidance of doubt, and as a precaution, if the Examining Division is minded to refuse the Main Request and the First, Second, Third, and Fourth Auxiliary Requests and is unwilling to continue the process in writing or by telephone, our request for Oral Proceedings is maintained.

Details of our video conferencing equipment are provided below.

MAIN REQUEST

The main request is that the claims as presently on file be allowed. Below, we respond to specific objections raised in the summons and present our arguments in respect of novelty and inventive step of the claims as on file.

Novelty and Inventive Step

The division is of the opinion that the subject matter of the independent claims as now on file is not novel over US-A-024459 (Poupyrev; hereafter D1), and is not inventive over US-A-2007/150826 (Anzures; hereafter D3). It is submitted, for the reasons set out below, that this is not the case and that the subject matter of the claims as now on file is both novel and inventive over the cited art.

Novelty and Inventive Step Starting from D1

D1 discloses, e.g., at paragraph [0119], providing different haptic outputs in response to a user providing different amounts of pressure for selecting, actuating, and/or confirming selection of an object in a GUI. In D1, the provision of a first pressure or an additional pressure to provide input correspond to separate and different command inputs to the system, e.g., for selecting, actuating, and confirming the selection of an object.

Arguments in our letter of 29 May 2019 should also be referred to here. In addition, it is submitted that selecting, actuating, and confirming selection of an object are each separate command inputs that cause a particular response in the system. Thus, in D1, the different amounts of pressure are not portions of a control gesture associated with a “single discrete command input,” but separate individual gestures, each associated with its own command input. Accordingly, the pending claims of the main request are novel. The missing feature of providing haptic feedback for different parts of a compound gesture is not disclosed in any of the additional cited prior art.

Inventive Step Starting from D3

D3 relates to user interaction with interface objects on a touch screen as for D1 above. The document describes a method for indicating progress towards transition of a device into a second state from a first state by slowly increasing brightness of items on screen.

In some embodiments, haptic feedback may be provided to indicate an unlock action as described at paragraph [0061]. Although the particular form of the feedback is not described it is stated that “the electronic device [may supply] non-visual feedback to indicate process towards completion of the unlock action”. In context, the skilled person would assume such feedback to comprise something like a vibration which continuously increases in amplitude as the horizontal part of the unlock movement progresses to emphasise the effect of gradually increasing brightness of parts of the screen. There is no disclosure of providing feedback to support three individual portions of a single control gesture.

As noted by the division, D3 does not disclose the use of separate haptic feedback effects to emphasise three separate parts of a compound control gesture which relates to a single and discrete command input to the system. D3 also does not disclose that the control gesture is “includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input”.

It is unclear which three parts of the gestures described in D3 could be usefully provided with a distinct haptic feedback. D3 describes use of a slide bar to unlock a device. The progress of an icon which can be dragged by the user along the slide bar is monitored and the brightness of the image of the slider may increase as the slider is pulled along the screen by the user to indicate this progress. At paragraph [0053] it is described how the gesture for unlocking may include contact, a horizontal movement, and then breaking of contact. If these can be considered as three parts of a complex control gesture then there would be no motivation for providing a haptic effect associated at least with breaking contact since this would not be felt by the user who is no longer in contact with the surface.

Remaining claims

It is submitted that the dependent claims of this application are allowable by virtue of at least their dependency from allowable independent claims. For this reason, and in the interest of conciseness, the individual merits of the dependent claims will not be discussed any further here.

Summary

It is respectfully submitted that the present application is now in order for grant on the basis of this Main Request. Nevertheless, if the Examining Division does have any outstanding objections, it is requested to consider the remaining Auxiliary Requests.

It should be noted for the avoidance of doubt that the applicant is specifically not abandoning any subject matter which may be regarded as deleted by the filing of these replacement claims. The Applicant reserves the right to file one or more divisional applications directed to any subject matter deleted by this amendment, whether alone or in combination with any remaining subject matter. Any deletion of subject matter is made without prejudice to the right of the applicant to reintroduce the subject matter, either in this application or in any divisional application. Furthermore, the applicant specifically reserves the right to revert to the wording of the originally-filed claims.

FIRST AUXILIARY REQUEST

In response to the Summons to attend Oral Proceedings dated 27 June 2019, we file herewith amended claims pages 42 to 46 to replace those currently on file. These pages are marked "FIRST AUXILIARY REQUEST".

In order to assist the Examining Division, please find enclosed copies of the relevant pages showing the amendments using tracked changes.

Below, we outline the amendments now made to the claims and provide support for these amendments, as well as responding to specific objections raised in the summons.

Amendments and Support

Claim 1 is amended to require that the user interface includes "one or more sensors configured to monitor motion of the user in space and to generate output signals related to the motion of the user". Paragraph [0044] states that in an embodiment the user interface "includes one or more sensors configured to monitor motion of user 12 in space". Paragraph [0029] also refers to a user interface which "may include...a position detecting device". Examples of position detecting devices including several which detect motion in 3D space are then provided.

Claims 5 and 6 are deleted and claims 7 to 10 are renumbered as new claims 5 to 8.

Claim 6 (corresponding to previous claim 8) is amended as for claim 1 above.

Claims 11 and 12 are deleted and claim 13 is renumbered as new claim 9.

New claims 10 to 15 are added, and these are supported at paragraph [0044] of the application as filed.

Novelty and Inventive Step

Arguments presented above in respect of the main request apply equally in respect of the first auxiliary request, and it is asked that these be referred to also here.

In addition, the claims of the first auxiliary request are amended to require that the user interface includes sensors configured to "monitor motion of the user in space and to generate output signals related to the gestures of a user". These same output signals are then required to be monitored by a gesture module to monitor performance of a control gesture.

In D1 it is taught that the output signals used to determine the control gesture are pressure signals. Accepting that these relate to a single compound control gesture, the first to third portions of the gesture described in D1 correspond to pressing down on a virtual button to above a first, second, and third threshold to activate the function of the button.

D1 focusses on providing a realistic representation of a real button as stated at paragraph [0024]: “the method allows a user to have interactive operations similar to ones with physical operation means”. Clearly, in order to achieve this, a virtual button must be operated based on pressure readings rather than movements in space in order to allow activation by a realistic pressing motion by the user. The skilled person would not therefore switch out the pressure sensor used to provide output signals representing the control gesture in D1 with a motion sensor to detect movement in space.

D3 also detects contact at a point on a touch screen rather than detecting movement of the user in space (e.g. paragraph [0032] states that contact may be detected “using any of a plurality of touch sensitivity technologies, including but not limited to capacitive, resistive, infrared, and surface acoustic wave technologies, as well as other proximity sensor arrays or other elements for determining one or more points of contact with the touch screen”).

Remaining claims

It is submitted that the dependent claims of this application are allowable by virtue of at least their dependency from allowable independent claims.

Claims 10 to 15 describe specific types of motion in space which may form part of each portion of the control gesture. Clearly, such movements as part of a control gesture are incompatible with the disclosures of both D1 and D3 which relate to devices such as mobile phones and tablets including touch screens.

Summary

It is respectfully submitted that the present application is now in order for grant in view of the amendments made in the First Auxiliary Request. Nevertheless, if the Examining Division does have any outstanding objections, it is requested to telephone the writer to discuss the matter or to issue a further written communication.

It should be noted for the avoidance of doubt that the applicant is specifically not abandoning any subject matter which may be regarded as deleted by the filing of these replacement claims. The Applicant reserves the right to file one or more divisional applications directed to any subject matter deleted by this amendment, whether alone or in combination with any remaining subject matter. Any deletion of subject matter is made without prejudice to the right of the applicant to reintroduce the subject matter, either in this application or in any divisional application. Furthermore, the applicant specifically reserves the right to revert to the wording of the originally-filed claims.

SECOND AUXILIARY REQUEST

In response to the Summons to attend Oral Proceedings dated 27 June 2019, we file herewith amended claims pages 42 to 46 to replace those currently on file. These pages are marked "SECOND AUXILIARY REQUEST".

In order to assist the Examining Division, please find enclosed copies of the relevant pages showing the amendments using tracked changes.

Below, we outline the amendments now made to the claims and provide support for these amendments, as well as responding to specific objections raised in the summons.

Amendments and Support

Support for amendments also made in respect of the first auxiliary request are outlined above.

Claim 1 of the second auxiliary request is further amended to require that the motion sensor is configured to "monitor motion of the user in three dimensions in space and to generate output signals related to the motion of the user". The examples of motion sensors provided at paragraph [0043] are capable of monitoring the motion of a user in three dimensions in space (this is in contrast to earlier examples of sensors which do not have this capability). Example movements listed in paragraph [0044] which can form an initial, intermediate, or ending portion of the control gesture involve movement in three dimensions and so, implicitly at least, the motion sensor must be able to sense motion in three dimensions.

Claim 1 of the second auxiliary request is amended to require that the control gesture relates to a command input "is a function of gaming content being conveyed to the user". Paragraph [0045] states that "one or more of the control gestures may be a function of the content being conveyed to the user 12 via user interface 14 by content module 22. For example, one or more of the control gestures may be a function of a game being conveyed to a user 12 via user interface 14".

Claim 6 (corresponding to previous claim 8) is amended as for claim 1 above.

Novelty and Inventive Step

Arguments presented above in support of the main and first auxiliary requests are relevant here and it is asked that these be referred to also in consideration of the second auxiliary request.

Furthermore, the system of D1 is designed for use with a touch screen interface and includes pressure sensors to determine whether a specific pressure threshold has been reached. If motion in space can be said to be detected in D1, this motion is sensed in only two dimensions with respect to the screen and the objects thereon. Paragraph [0046], for example, states that: "touch screen is a transparent screen-type position sensing device capable of detecting a touch position on the screen surface, at which a user's finger or any

pointing device is touching” and paragraph [0053] describes the capability of the sensor in D1 as a “2D position sensing unit”). 3D gestures are particularly advantageous in a virtual gaming environment to increase a user’s feeling that they are really within the environment and performing physical actions in response to and in order to effect that environment.

The sensing of a touch position in D1 is not used to provide output related to the motion of the user for use in determining performance of a control gesture. Effects are provided using piezoelectric actuators which are also used to take pressure readings for detecting the performance of the control gesture (paragraph [0013]: “at least one of the piezoelectric elements may be used for generating the haptic feedback and detecting the pressure applied by the user”). Once the finger is in contact with the screen, the system needs only to know whether the user’s finger is located within the area of an interface object or not, and then whether the user is pressing at or above a particular pressure.

As described above, where compound effects are provided in D1 this is in response to a change in pressure on the touch surface in a single region corresponding to a virtual button. This must necessarily be the case in order to represent, as desired, the action of a real button which the user can press to activate a function (paragraph [0076]: “it is desirable to provide the user interface mechanism capable of realizing more intuitive interaction method that is closer to the interaction with the physical controllers”).

Sensing in 3D would provide no benefit in such a case because of an inherent incompatibility with the touch screen devices for which the systems of both D1 and D3 are designed. These by definition accept input by a user touching the screen at various locations and in different ways. To select or activate an icon on a flat screen, the most intuitive action is to touch the screen and press or drag that icon and the skilled person would not consider including a (potentially complex) 3D motion sensor in such a situation because. The user also needs to be touching the screen of the device in order to feel the haptic effects being provided. In D1 this feedback is provided by the same piezoelectric actuators used to measure the pressure (taught as an advantageous feature of D1). In D3 it is not specified how the feedback is produced but to provide instructive feedback this must be by vibration of the part of the screen of the device which the user is touching.

Remaining claims

It is submitted that the dependent claims of this application are allowable by virtue of at least their dependency from allowable independent claims. For this reason, and in the interest of conciseness, the individual merits of the dependent claims will not be discussed any further here.

Arguments made in respect of new claims 10 to 15 in the section relating to the first auxiliary request are relevant here and it is asked that these be referred to in considering the second auxiliary request.

Summary

It is respectfully submitted that the present application is now in order for grant in view of the amendments made in the Second Auxiliary Request. Nevertheless, if the Examining Division does have any outstanding objections, it is requested to telephone the writer to discuss the matter or to issue a further written communication.

It should be noted for the avoidance of doubt that the applicant is specifically not abandoning any subject matter which may be regarded as deleted by the filing of these replacement claims. The Applicant reserves the right to file one or more divisional applications directed to any subject matter deleted by this amendment, whether alone or in combination with any remaining subject matter. Any deletion of subject matter is made without prejudice to the right of the applicant to reintroduce the subject matter, either in this application or in any divisional application. Furthermore, the applicant specifically reserves the right to revert to the wording of the originally-filed claims.

THIRD AUXILIARY REQUEST

In response to the Summons to attend Oral Proceedings dated 27 June 2019, we file herewith amended claims pages 42 to 46 to replace those currently on file. These pages are marked "THIRD AUXILIARY REQUEST".

In order to assist the Examining Division, please find enclosed copies of the relevant pages showing the amendments using tracked changes.

Below, we outline the amendments now made to the claims and provide support for these amendments, as well as responding to specific objections raised in the summons.

Amendments and Support

Support for amendments also made in respect of the second auxiliary request are outlined above.

Claim 1 of the third auxiliary request is amended to require that the control gesture relates to a command input "which causes a change in content forming part of a virtual game environment". Paragraph [0038] discloses use of the system within a "game, virtual world, simulation, etc." Paragraph [0045] states that "one or more of the control gestures may be a function of the content being conveyed to the user 12 via user interface 14 by content module 22. For example, one or more of the control gestures may be a function of a game being conveyed to a user 12 via user interface 14".

This clearly refers to the fact that the control gesture is used to respond to content provided as part of the virtual environment and in order to effect elements of the virtual environment. Paragraph [0026] states that "this disclosure primarily describes the provision of haptic stimulation in conjunction with control gestures performed to control a game". Paragraph [0039] states that content provided by the content module may be content associated with a game. Specific examples of casting a spell within a gaming environment (paragraph [0054]) or use of weapons during combat (paragraph [0056]) are provided. These are clearly representative and the skilled person would understand the control gesture to be a movement of the user which causes a change in the gaming environment (casting a spell or injuring an enemy being only examples of the type of change in content which can be effected).

Claim 6 (corresponding to previous claim 8) is amended as for claim 1 above.

Novelty and Inventive Step

We refer to arguments presented above in support of the second auxiliary and ask that these be referred to also in consideration of the third auxiliary request.

Remaining claims

Again, it is asked that arguments presented in respect of the second auxiliary request be referred to also in consideration of the third auxiliary request with respect to new claims 10 to 15.

Summary

It is respectfully submitted that the present application is now in order for grant in view of the amendments made in the Third Auxiliary Request. Nevertheless, if the Examining Division does have any outstanding objections, it is requested to telephone the writer to discuss the matter or to issue a further written communication.

It should be noted for the avoidance of doubt that the applicant is specifically not abandoning any subject matter which may be regarded as deleted by the filing of these replacement claims. The Applicant reserves the right to file one or more divisional applications directed to any subject matter deleted by this amendment, whether alone or in combination with any remaining subject matter. Any deletion of subject matter is made without prejudice to the right of the applicant to reintroduce the subject matter, either in this application or in any divisional application. Furthermore, the applicant specifically reserves the right to revert to the wording of the originally-filed claims.

FOURTH AUXILIARY REQUEST

In response to the Summons to attend Oral Proceedings dated 27 June 2019, we file herewith amended claims pages 42 to 45 to replace those currently on file. These pages are marked "FOURTH AUXILIARY REQUEST".

In order to assist the Examining Division, please find enclosed copies of the relevant pages showing the amendments using tracked changes.

Below, we outline the amendments now made to the claims and provide support for these amendments, as well as responding to specific objections raised in the summons.

Amendments and Support

Support for amendments also made in respect of the third auxiliary request are outlined above.

Claim 1 is also amended to require that "the initial portion of the control gesture includes one or more of facing a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, positioning body parts with respect to each other in a specific manner, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, and changing a direction of motion or movement in a specific manner and wherein the first intermediate portion of the control gesture and the ending portion of the control gesture each include one or more of changing orientation of the head or other body parts to a specific direction, motioning or moving in a specific direction, motioning with a specific one or more appendages, motioning with body parts to move in a specific relationship to each other, motioning or moving in a specific shape, motioning for a specific amount of time, motioning or moving at a specific rate, motioning or moving at a specific acceleration, changing a direction of motion or movement in a specific manner, and halting motion or movement by one or more body parts". This amendment is supported at paragraph [0044] of the application as filed.

Claim 6 is amended as for claim 1 above.

Novelty and Inventive Step

Arguments presented above in support of the third auxiliary request are relevant here and it is asked that these be referred to also in consideration of the fourth auxiliary request.

Claims are also amended to describe specific types of motion in space which form part of each portion of the control gesture. These relate to movements of the body of the user in 3D space. In a virtual gaming environment using this type of movement as a control gesture is particularly advantageous because it allows the user to feel more immersed in the virtual environment (they are physically performing gestures which correspond to gestures performed by their character in the game).

Clearly, such movements as part of a control gesture are incompatible with the disclosures of both D1 and D3 which relate to devices such as mobile phones and tablets including touch screens. Touch screen devices such as tablets require input to open applications or to unlock the device as described in D1 and D3. Generally icons representing the applications or representing a button or object to be moved in order to activate a particular function are visible on the screen and so the most intuitive way to interact with these is to touch the screen and either press or drag. There would be no motivation to the skilled person to introduce means by which input could be effected by a movement of the user's body in 3D in the case of such a device.

Remaining claims

It is submitted that the dependent claims of this application are allowable by virtue of at least their dependency from allowable independent claims. For this reason, and in the interest of conciseness, the individual merits of the dependent claims will not be discussed any further here.

Summary

It is respectfully submitted that the present application is now in order for grant in view of the amendments made in the Fourth Auxiliary Request. Nevertheless, if the Examining Division does have any outstanding objections, it is requested to telephone the writer to discuss the matter or to issue a further written communication.

It should be noted for the avoidance of doubt that the applicant is specifically not abandoning any subject matter which may be regarded as deleted by the filing of these replacement claims. The Applicant reserves the right to file one or more divisional applications directed to any subject matter deleted by this amendment, whether alone or in combination with any remaining subject matter. Any deletion of subject matter is made without prejudice to the right of the applicant to reintroduce the subject matter, either in this application or in any divisional application. Furthermore, the applicant specifically reserves the right to revert to the wording of the originally-filed claims.

Summary of Requests

It is submitted that the requests filed herewith meet all of the requirements of the Convention. Consequently, it is our intention that a patent be granted on the basis of one of the requests filed herewith.

In view of the amendments made herewith, the Examining Division is kindly requested to continue the procedure in writing.

However, if Oral Proceedings are still deemed necessary, we hereby request the ability to file further Auxiliary Requests if occasioned by developments prior to or during the Oral Proceedings. Finally, we request that we be afforded an opportunity to amend the description for consistency with the amended claims, either at the Oral Proceedings, or following the Oral Proceedings.

Yours faithfully

A handwritten signature in black ink, appearing to read 'H. Christie', with a long horizontal flourish extending to the right.

Dr. Helen Christie
Beck Greener (Association Registration No. 518)

We enclose herewith details of our video conference system

Name of Video Conference System:	Polycom VSX 7000
Name of your Video Conference Studio:	Beck Greener Vid. Con.
Studio Telephone Number:	+ 44 20 7693 5603
Studio fax Number:	+ 44 20 7693 5667
Video Conference Number:	+ 44 20 7693 5655
Name of technical contact:	Mr Jago Fulford jfulford@beckgreener.com +44 20 7693 5600
System Transmission Speed:	Maximum 8 Channels (512 kb/s)
Video dial in with 384 kb/s – 768 kb/s:	Maximum 8 Channels (512 kb/s)
Multipoint conferences are possible:	No
Video conference tests carried out successfully at 384 kb/s with the EPO offices in Munich.	

The examination is being carried out on the **following application documents**

Description, Pages

1-41 as published

Claims, Numbers

1-13 filed in electronic form on 30-05-2019

Drawings, Sheets

1/13-13/13 as published

PRELIMINARY CONSIDERATIONS

- I. It appears that no meaningful progress is being made with the present application. Indeed, after failing to reply to the invitation pursuant to Rule 161(1) EPC and further failing to reply to the later invitation under Rule 164(2) (a) EPC, at least by limiting the claims to the searched invention, the applicant has now, in response to the communication under Article 94(3) EPC dated 21.01.2019, filed amendments and arguments that however fail to successfully address the initial novelty and inventive step objections. Further taking into account the contents of the application and the relevance of the available prior art, it is considered that oral proceedings are the most appropriate course of action.
- II. The following documents cited in the search report have been referred to:
- D1 US 2008/024459 A1 (POUPYREV IVAN [JP] ET AL) 31 January 2008 (2008-01-31)
- D2 WO 2009/071750 A1 (NOKIA CORP [FI]; MAEENPAEAE JANI CHRISTIAN [FI]) 11 June 2009 (2009-06-11)
- D3 US 2007/150826 A1 (ANZURES FREDDY A [US] ET AL ANZURES FREDDY ALLEN [US] ET AL) 28 June 2007 (2007-06-28)
- D4 US 2005/212760 A1 (MARVIT DAVID L [US] ET AL) 29 September 2005 (2005-09-29)

REASONS FOR THE CURRENT OPINION

1 Independent claims

1.1 Claim 1 is not new (Article 54 EPC) over D1 because D1 discloses:

A system configured to provide haptic stimulation to a user (Fig. 1), the system comprising:

- a user interface configured to generate output signals related to the gestures of a user ([56]: "pressure sensing unit 10"; [57]: "2D position sensing unit 105"; Fig. 1);

- an actuator configured to generate haptic stimulation to the user ([55]: "haptic feedback generating unit 102... formed with... actuators"); and

- one or more processors ([59], [62]: "controller section 20"; Fig. 1) configured to execute computer program modules ([60]: "Various functions may be realized by executing corresponding software"), the computer program modules comprising:

- a gesture module configured to monitor performance of a control gesture by the user based on the output signals of the user interface ([18]: "determine that the GUI object is in the activated state by using a plurality of pressure thresholds"; [68]: "depending on... pressure value applied to the GUI object... For example... the GUI controller 112 can calculate if there was enough pressure... on the screen to change the state of the button"; [119]: "several thresholds are used in actuation [...] user touches... to pass a selection threshold... presses further to pass the actuation threshold... press further to the confirmation threshold"; Fig. 11),

wherein the control gesture is a gesture associated with a single and discrete command input to the system ([47]: "actuated state in which the corresponding... processing is performed"; [119]: "actuation"), and includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input ([119]: "The user touches... to pass a selection threshold, ... presses further to pass the actuation threshold... however... To actuate the GUI object, the user should press further to the confirmation threshold"; [68]: "depending on a) the current state of the GUI object and b) pressure value applied to the GUI object, the GUI controller 112 determines an appropriate change in the state of the

GUI object"; see also [12]: "the logical state of GUI object is allowed to change to the actuated state only after the selected state"; see [90], [92], [94] as well; i.e. the logical states are achieved in sequence);

- a stimulation module configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture ([70]: "The GUI controller 112... sends the commands to the tactile interface controller that generates appropriate commands for driving the tactile signal generation unit"; Fig. 1),

wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture ([119]: "As the user touches and pushes the GUI object to pass a selection threshold, a tactile feedback is provided... The user presses further to pass the actuation threshold where a different tactile feedback is provided... however, the GUI object is not actuated yet. To actuate the GUI object, the user should press further to the confirmation threshold that also provides still another tactile feedback"); and

- an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module ([63]: "The signal generating unit 106 generates and provides a signal... for driving... the... actuators"; Fig. 1).

1.2 For completeness and in view of the applicant's arguments in the letter of 30.05.2019, the following points are emphasized:

1.2.1 In D1 the control gesture also includes an initial portion, a first intermediate portion and an ending portion, which must be performed in a specific order to achieve the command input. The gesture portions correspond e.g. to reaching pressures above respective thresholds required to transition across the logical states (Fig. 11, [119]). Moreover, D1 expects a specific order of the logical states and corresponding gesture portions ([68]: "depending on a) the current state [and hence last gesture portion]... and pressure value applied [i.e. current portion]"), which is considered to be inherent to a plurality of pressure thresholds (Fig. 11; [119]: "touches... presses further... press

further"), as also apparent from the choice of the term 'confirmation'. Even further, D1 contemplates ([90]) the specific case where the actuation threshold could be reached directly upon a user sliding its finger into the GUI object, but explicitly teaches the possibility of maintaining/imposing, also in this context, the natural order of logical states associated with increasing pressure levels before issuing the actuation command input ([92], [94]; [12]: "the logical state of the GUI object is allowed to change to the actuated state only after the selected state").

1.2.2 In D1 the command input to the system is a single and discrete command, namely the operation associated with actuation of the GUI object/button. In the previous 'selected' and 'non-confirmed actuated' states the relevant operation/command is not triggered (D1, [47], [81], [87]).

1.3 The above objection against claim 1 applies *mutatis mutandis* against the independent claim 8 for a corresponding method, which hence also lacks novelty (Article 54 EPC) over D1.

2 Dependent claims

The dependent claims 2-7 and 9-13 do not meet the requirements of novelty (Art. 54 EPC) and/or inventive step (Art. 56 EPC), see D1-D4 and respective passages cited in the search report. More specifically:

2.1 Claims 2, 9: D1 discloses ([119]) a third haptic stimulation for the ending portion of the control gesture, as claimed.

2.2 Claims 3, 10: as a mere matter of design, in accordance with circumstances and without the exercise of inventive activity, the skilled person departing from D1 would define gestures with further intermediate portions and associate further tactile feedback to each of these portions (see also D1, [18], [104] and [107]).

2.3 Claim 4: in D1 the different tactile feedback sensations signal to the user that the respective gesture portion is completed and that the following gesture portion, if any, should be commenced, as claimed.

2.4 Claims 5, 16: in D1 the haptic stimulations are defined by a common set of parameters (see [63]), such that any stimulation can be regarded as an adjustment of the parameters of another one, as claimed. D1 even explicitly teaches ([105]) to map pressure into tactile feedback intensity.

- 2.5 Claims 6, 12: D1 also discloses (§[89]) an intermediate gesture portion requiring the user to maintain touch contact for a predetermined period of time, as claimed.
- 2.6 Claims 7, 13: it is well known to provide specific feedback associated with failure to complete an input gesture (see e.g. §[104] in D4, or §[92] in D3).

CURRENT OPINION

In view of the above, the examining division considers that, based on the current state of the file, the application should be refused under Article 97(2) EPC because none of the claims meets the requirements of Art. 52(1) EPC: the independent claims lack novelty (Art. 54 EPC) and the dependent claims lack novelty (Art. 54 EPC) and/or inventive step (Art. 56 EPC).

FURTHER REMARKS

- 3 The following deficiencies are also present in the application, although they are not part of the reasons for the above-stated current negative opinion.
- 3.1 The independent claims further lack an inventive step (Art. 56 EPC) over D3 (see in particular §[53] and [61]) from which the claims only differ in that they require different haptic stimulations for the initial and first intermediate portions of the multi-portion gesture, which is however considered as a straightforward implementation choice that the skilled person would consider in accordance with circumstances and without recourse to inventive skills.
- 3.2 The claims should include reference signs (Rule 43(7) EPC).
- 3.3 Documents D1-D3 and their relevant teachings should be identified in the description (Rule 42(1)(b) EPC).

PROCEDURAL ASPECTS

- 4 The attention of the applicant is drawn to the following:
- 4.1 The examining division took the time to consider the application in its entirety in an effort to identify subject-matter that may become the basis of patentable claims in the light of the available prior art and the common general knowledge, but such efforts have been unsuccessful. Accordingly, the examining division is of the opinion that oral proceedings are the most appropriate course of action for an efficient prosecution of this application.

- 4.2 Any argumentation or amendments should be presented prior to the final date set for this purpose in the summons (Rule 116 EPC) and will be allowed into the procedure at the examining division's discretion (Rule 137(3) EPC). The clear identification of any amendments carried out and of their basis in the application as filed should be expected to be a point of consideration.
- 4.3 Should the applicant decide not to attend oral proceedings, then it must be expected that a decision based on objections which arise during oral proceedings against amended claims or in view of any submissions following these summons is taken in her/his absence (OJ 10/2008, p. 471).
- 4.4 If so wished, an appealable decision on the file as it stands (i.e. a speedy decision without further debate and based on the current status of the application and current arguments) may be requested (GL. C-V 15, E-X 2.5) in an explicit and unambiguous manner, accompanied by a withdrawal of pending requests for oral proceedings, and without further submissions.

Questions about this communication ?

Contact Customer Services at www.epo.org/contact



Eich, Martine

Beck Greener LLP
Fulwood House
12 Fulwood Place
London WC1V 6HR
ROYAUME UNI

Date

27.06.2019

Reference AF2/P17407EP-W	Application No./Patent No. 10742626.4 - 1216 / 2457141
Applicant/Proprietor Immersion Corporation	

Summons to attend oral proceedings pursuant to Rule 115(1) EPC

You are hereby summoned to attend oral proceedings arranged in connection with the above-mentioned European patent application.

The matters to be discussed are set out in the communication accompanying this summons (EPO Form 2906).

The oral proceedings, which will not be public, will take place before the Examining Division

on 05.12.19 at 09.00 hrs as a video-conference

No changes to the date of the oral proceedings can be made, except on serious grounds (see OJ EPO 2009, 68). If you do not appear as summoned, the oral proceedings may continue without you (R. 115(2) EPC, see also OJ EPO 2008, 471).

Your attention is drawn to Rule 4 EPC, regarding the language of the oral proceedings, and to Special edition No. 3 OJ EPO 2007, L.1, concerning the filing of authorisations for company employees and lawyers acting as representatives before the EPO.

The final date for making written submissions and/or amendments (R. 116 EPC) is 05.11.19.

In this respect, you are informed that the EPO video-conference studios employ IP technology (SIP or H.323, Videocoding CIF H.261, H.263, H.264, Audiocoding G.711, G.722, max. transmission rate 1024 Kbit/s). Your video-conference equipment should meet a minimum transmission rate of at least 256 Kbit/s, but at least 384 Kbit/s is preferred.

The European Patent Office provides the applicant or his representative with the opportunity to test the video conferencing system in advance of the oral proceedings. It is possible to check the connection in advance using the EPO test system. The SIP/H.323 address is EPOdemo@cvc.epo.org or 69072068@cvc.epo.org.

In case of questions concerning testing or connection to the EPO test system please contact Operators@epo.org.

Please supply the EPO as soon as possible with the following information concerning your videoconference studio:

- type and name of VICO equipment,
- telephone and fax number of the studio including country and area code,
- dialling number to reach the studio including country and area code,
- transmission speed in Kbit/s,
- name of contact person with telephone number and email address to be used by the EPO for communicating the detailed information about the videoconference connection.

IMPORTANT:

Please inform the EPO without delay in the event that the detailed information about the videoconference connection has not been received at least ten days before the scheduled date of the oral proceedings to be held via videoconference.

Please note that the oral proceedings will always take place as scheduled unless you are otherwise informed. The EPO will generally not send a reminder or a further communication prior to the date of oral proceedings.

1st Examiner:
Charcos Lloréns, Vic

2nd Examiner:
Seifert, Julian Jo-A

Chairman:
Quesson, Christophe

For the Examining Division



Annexes:
Confirmation of receipt (Form 2936)
Communication (EPO Form 2906)

What is claimed is:

1. A system configured to provide haptic stimulation to a user, the system comprising:

a user interface configured to generate output signals related to the gestures of a user;

an actuator configured to generate haptic stimulation to the user; and

one or more processors configured to execute computer program modules, the computer program modules comprising:

a gesture module configured to monitor performance of a control gesture by the user based on the output signals of the user interface,

wherein the control gesture is a gesture associated with a single and discrete command input to the system, and includes an initial portion, a first intermediate portion, and an ending portion which must be performed in a specific order to achieve the command input;

a stimulation module configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture,

wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module.

2. The system of claim 1, wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

3. The system of claim 1, wherein the control gesture further includes a second intermediate portion, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation

different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.

4. The system of claim 3, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.

5. The system of claim 1, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.

6. The system of claim 1, wherein the first intermediate portion of the control gesture includes maintaining contact with a touch sensitive surface for a predetermined period of time.

7. The system of claim 1, wherein the gesture module is configured to identify a control gesture failure responsive to the users commencing performance of the control gesture and not successfully performing all of the portions of the control gesture, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to identification of a control gesture failure by the gesture module.

~~8. The system of claim 1, wherein the stimulation module is configured such that the first stimulation and/or the second stimulation are determined in part based on one or more of a skill level, fatigue, or injury of a character in a game under the control of the user.~~

89. A method of providing haptic stimulation to a user of a system, the method comprising:
monitoring performance of a control gesture by a user,
wherein the control gesture is a gesture associated with a single and discrete command input to the system, and includes an initial portion, a first intermediate portion,

and an ending portion which must be performed in a specific order to achieve the command input;

determining haptic stimulation associated with performance of the control gesture to be generated for the user,

5 wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and

generating the determined stimulation during performance of the control gesture.

10

940. The method of claim 89, wherein the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

15

104. The method of claim 89, wherein the control gesture further includes a second intermediate portion, and wherein the haptic stimulation associated with the control gesture further includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second

20 intermediate portion of the control gesture.

112. The method of claim 89, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.

25 123. The method of claim 89, wherein the first intermediate portion of the control gesture includes maintaining contact with an interface surface of a touch sensitive surface for a predetermined period of time.

30 134. The method of claim 89, wherein responsive to identification of a control gesture failure during monitoring of performance of the control gesture the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation.

15. — The method of claim 9, wherein the first stimulation and/or the second stimulation are determined in part based on one or more of a skill level, fatigue, or injury of a character in a game under the control of the user.

5



Letter accompanying subsequently filed items

Representative:

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The document(s) listed below is (are) subsequently filed documents pertaining to the following application:

Application number and/or EP publication number

EP10742626.4

Reference

HC/P17407EP-W

Procedural phase

All procedures

Name of represented party

Immersion Corporation

	Description of document	Original file name	Assigned file name
1	Amended claims with annotations	P17407EP-W_Claims Amended Tracked_29-05-19.pdf	CLMS-HWA-1.pdf
2	Amended claims (clean copy)	P17407EP-W_Claims Amended Clean_29-05-19.pdf	CLMS-1.pdf
3	Reply to examination report	P17407EP-W_EPO_29-05-19.pdf	EXRE3-1.pdf

Signature 1

Place: London, UK
Date: 30 May 2019
Signed by: /Helen Christie/
Association: Beck Greener LLP
Capacity: Representative 1

Smart card certificate 1

Common name: Helen Christie 44777
EPO ID: 44777
Issued by: European Patent Office CA G2

European Patent Office
Directorate General 2
D-80298 Munich
Germany

Our Ref: JM/HC/FO/P17407EP-W
Date: 30 May 2019

Dear Sirs

European Patent Application No. 10742626.4 - 1216
Immersion Corporation

We are writing in response to the communication pursuant to Article 94(3) EPC dated 21 January 2019. We are filing herewith replacement pages 42 to 44 with amended claims and we ask that these replace the claims pages as presently on file. Below, we respond to specific comments raised in the report.

Amendments and Support

Claim 1 is amended to require that the control gesture is associated with a “single and discrete command input to the system” and that the three portions “must be performed in a specific order to achieve the command input”.

Support for this amendment is at paragraph [0028] of the application as filed which states that “a ‘control gesture’ refers to a gesture made by a user that is a single and discrete control input having several portions” and that these “must be performed in specific order and/or with a specific timing to effectively achieve the control input associated with the control gesture”. The control input referred to here is clearly equivalent to the claimed control command since it is described as an “input to the system” in the same way that the command input is framed in the claims as an input to the system relating to the control gesture.

Claim 8 is deleted and claims 9 to 14 are renumbered as new claims 8 to 13.

Claim 8 (corresponding to previous claim 9) is amended as for claim 1 above.

Previous claim 15 is deleted.

Response to Comments

Non-Unity

Previous claims 8 and 15 are now deleted. Only the first of the inventions identified by the examiner is now claimed thus addressing the objection based on lack of unity of the claims.

Novelty and Inventive Step

The examiner objects that the subject matter of claim 1 is not novel over the disclosure in US-A-2008/0024459 (Poupyrev; hereafter D1). It is submitted, for the reasons set out below and particularly in light of the amendments now made to the claims, that this is not the case.

The relevant parts of D1 describe a touch screen and a GUI object displayed on the touch screen. The virtual object can be in any of a number of logical states which represent (according to paragraph [0047] of D1) “distinct states of a graphical user interface object, by which different corresponding operations or processing are triggered”.

Generally, the object has an inactive or neutral state where no interaction is occurring or no interaction can occur, a selected state when a user, for example, touches the object on the screen, and an activated state. The activated state may occur when above a threshold pressure is applied to the area to represent a button press. In this type of example the gesture comprises two actions, touching and pressing. Because D1 aims to achieve as close to the impression of a real physical actuation device as possible, applying above a threshold pressure to an area of the screen should activate the “button” without dependence on previous actions or gestures. Actuation can occur without sliding a finger from one area of the screen to another but as the result of a simple pushing gesture (paragraph [0091]: finger touches area of screen and is above a threshold). Paragraphs [0120] to [0122] describe how if a number of pressure thresholds are used with different feedback, it is still possible to activate the button without presenting a series of different feedbacks. This is advantageous because it avoids “multiple feedbacks” which are “distracting and hamper the user interaction” (paragraph [0121]). In some embodiments the user is required to maintain contact with the screen for a certain length of time before pushing. Again, here only two gestures are required to activate the button.

Arguably also, in order to change the state of an object, for example from a selected to an activated state, a command input must be provided to the system at each stage at which point the new state is recorded along with actions that can now be completed in respect of the GUI object. It is not therefore the case that the control gesture made up of three portions is associated with a single and discrete command input to the system as the claims require.

D1 does not disclose a gesture including three portions which is “the control gesture is a gesture associated with a single and discrete command input to the system” and the three portions of which “must be performed in a specific order to achieve the command input”. This feature means that more complex gestures can be achieved for certain purposes with less confusion as to which stage of the gesture a user has reached and providing some stimulus to indicate to the user to continue the gesture.

D1 focusses on providing an object which provides as close as possible to the experience of a real actuator. The inclusion of any additional or “ending portion” of the gesture would arguably lead to a less realistic actuator (since real world actuators such as buttons are generally purposefully simple and require minimal action to activate). The skilled person would not therefore complicate the gesture required to activate the GUI object in the case of D1, particularly since the aim of preventing accidental actuation has already been achieved.

Conclusions

It is respectfully submitted that the present application is now in order for grant. Nevertheless, if the examiner does have any outstanding objections, he is requested to telephone the writer to discuss the matter or possibly to arrange an interview, or to issue a further written communication. As a precaution against premature rejection, Oral Proceedings are hereby requested before any final rejection of the application. Nevertheless, whilst Oral Proceedings have been requested, we emphasise that this is only as a precaution as it is believed that if there are any outstanding objections, they can be best resolved without the additional delay and expense of Oral Proceedings.

In the unlikely event Oral Proceedings should prove to be necessary, we request that, if possible, such proceedings should take place by video conference using IP technology, in accordance with OJ EPO 2012, 354.

It should be noted for the avoidance of doubt that the applicant is specifically not abandoning any subject matter which may be regarded as deleted by the filing of these replacement claims. The applicant reserves the right to file one or more divisional applications directed to any subject matter deleted by this amendment, whether alone or in combination with any remaining subject matter. Any deletion of subject matter is made without prejudice to the right of the applicant to reintroduce the subject matter, either in this application or in any divisional application. Furthermore, the applicant specifically reserves the right to revert to the wording of the claims as originally filed.

Yours faithfully



Dr. Helen Christie
Beck Greener LLP (Association Registration No. 518)

Enc.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/042795

A. CLASSIFICATION OF SUBJECT MATTER
 INV. G06F3/01 G06F3/048

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/024459 A1 (POUPYREV IVAN [JP] ET AL) 31 January 2008 (2008-01-31) paragraphs [0045] - [0071]; figure 1 paragraphs [0077] - [0089]; figures 3-5 paragraphs [0102] - [0114]; figures 8-9 paragraphs [0118] - [0125], [0128]; figure 11	1-9, 11-19
X	WO 2009/071750 A1 (NOKIA CORP [FI]; MAEENPAEAE JANI CHRISTIAN [FI]) 11 June 2009 (2009-06-11) page 5, line 13 - page 6, line 26; figure 1 page 7, lines 21-34 page 9, line 19 - page 10, line 2; figure 3 ----- -/--	1-9, 11-19



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

1 November 2010

Date of mailing of the international search report

12/01/2011

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Charcos Lloréns, V

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/042795

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/150826 A1 (ANZURES FREDDY A [US] ET AL ANZURES FREDDY ALLEN [US] ET AL) 28 June 2007 (2007-06-28) paragraphs [0050] - [0092]; figures 2-7 -----	1-9, 11-19
A	US 2005/212760 A1 (MARVIT DAVID L [US] ET AL) 29 September 2005 (2005-09-29) abstract paragraph [0104] -----	9,19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/042795

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-9, 11-19

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/042795

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9, 11-19

Relative to the generation of additional stimulations for a further intermediate gesture portion, in order to inform the user of input progress for a complex gesture.

2. claims: 10, 20

Relative to the adaptation of stimulations based on characteristics of a character in a game, in order to provide an indication of application status.

3. claims: 21-40

Relative to the presentation of user selectable sections of virtual equipment in a game, in order to allow user configuration of the virtual equipment and of the haptic stimulations associated thereto.

What is claimed is:

1. A system configured to provide haptic stimulation to a user, the system comprising:
 - a user interface configured to generate output signals related to the gestures of a user;
 - an actuator configured to generate haptic stimulation to the user; and
 - one or more processors configured to execute computer program modules, the computer program modules comprising:
 - a gesture module configured to monitor performance of a control gesture by the user based on the output signals of the user interface,
 - wherein the control gesture is a gesture associated with a command input to the system, and includes an initial portion, a first intermediate portion, and an ending portion;
 - a stimulation module configured to receive information related to performance of the control gesture from the gesture module, and to determine haptic stimulation to be generated for the user associated with the control gesture,
 - wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and
 - an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module.
2. The system of claim 1, wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

3. The system of claim 1, wherein the control gesture further includes a second intermediate portion, and wherein the stimulation module is configured such that the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.
4. The system of claim 3, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.
5. The system of claim 1, wherein the command input associated with the control gesture is a single, discrete command.
6. The system of claim 1, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.
7. The system of claim 6, wherein the one or more parameters of the first stimulation that are adjusted to determine the second stimulation include one or more of periodicity, force, directionality, or location.
8. The system of claim 1, wherein the first intermediate portion of the control gesture includes maintaining contact with a touch sensitive surface for a predetermined period of time.
9. The system of claim 1, wherein the gesture module is configured to identify a control gesture failure responsive to the users commencing performance of the control gesture and not successfully performing all of the portions of the control gesture, and wherein the stimulation module is configured such that the haptic stimulation

associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to identification of a control gesture failure by the gesture module.

10. The system of claim 1, wherein the stimulation module is configured such that the first stimulation and/or the second stimulation are determined in part based on one or more of a skill-level, fatigue, or injury of a character in a game under the control of the user.
11. A method of providing haptic stimulation to a user of a system, the method comprising:
 - monitoring performance of a control gesture by a user,
 - wherein the control gesture is a gesture associated with a command input to the system, and includes an initial portion, a first intermediate portion, and an ending portion;
 - determining haptic stimulation associated with performance of the control gesture to be generated for the user,
 - wherein the haptic stimulation includes a first stimulation determined responsive to performance of the initial portion of the control gesture, and a second stimulation that is different from the first stimulation and is determined responsive to performance of the first intermediate portion of the control gesture; and
 - generating the determined stimulation during performance of the control gesture.
12. The method of claim 11, wherein the haptic stimulation associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the ending portion of the control gesture.

13. The method of claim 11, wherein the control gesture further includes a second intermediate portion, and wherein the haptic stimulation associated with the control gesture further includes a third stimulation different from the first stimulation and the second stimulation that is determined responsive to performance of the second intermediate portion of the control gesture.
14. The method of claim 13, wherein the second stimulation is determined to signal to the user that the second intermediate portion of the control gesture should be commenced.
15. The method of claim 11, wherein the command input associated with the control gesture is a single, discrete command.
16. The method of claim 11, wherein the second stimulation is determined by adjusting one or more parameters of the first stimulation.
17. The method of claim 16, wherein the one or more parameters of the first stimulation that are adjusted to determine the second stimulation include one or more of periodicity, force, directionality, or location.
18. The method of claim 11, wherein the first intermediate portion of the control gesture includes maintaining contact with an interface surface of a touch sensitive surface for a predetermined period of time.
19. The method of claim 11, wherein responsive to identification of a control gesture failure during monitoring of performance of the control gesture the haptic stimulation

associated with the control gesture includes a third stimulation different from the first stimulation and the second stimulation.

20. The method of claim 11, wherein the first stimulation and/or the second stimulation are determined in part based on one or more of a skill-level, fatigue, or injury of a character in a game under the control of the user.

21. A system configured to provide stimulation to a user of a game, the system comprising:

a touch sensitive electronic display having an interface surface accessible for engagement by the user, the touch sensitive user interface being configured to generate output signals related to the position at which the interface surface is engaged, and to present views of the game to the user through the interface surface,

wherein the views presented through the interface surface include views of virtual equipment having user selectable sections that are selectable by the user to interact with the virtual equipment by engaging the interface surface at the user selectable sections of the views of the virtual equipment;

an actuator configured to generate haptic stimulation to the user; and

one or more processors in operative communication with the touch sensitive electronic display and the actuator, the one or more processors being configured to execute computer program modules, the computer program modules comprising:

an equipment module configured to determine the operating parameters of the virtual equipment in the views, and to simulate operation of the virtual equipment,

wherein the equipment module determines the operating parameters of the virtual equipment and/or simulates operation of the virtual equipment based on selections by the user of the user selectable sections of the views of the virtual equipment;

a stimulation module configured to determine haptic stimulation to be generated for the user associated with the operating parameters of the virtual equipment and/or simulated operation of the virtual equipment,

an actuator control module configured to control the actuator to generate the stimulation determined by the stimulation module.

22. The system of claim 21, wherein the virtual equipment includes a projectile weapon.
23. The system of claim 22, wherein the operating parameters of the virtual equipment based on selections by the user of the user selectable sections of the views of the virtual equipment include one or more of an amount of loaded rounds of ammunition, a level of disrepair, a stopping power, a projectile velocity, an ammunition type, or a noise level.
24. The system of claim 21, wherein the actuator is configured to actuate the touch sensitive electronic display.
25. The system of claim 21, wherein the actuator is configured to actuate the interface surface.
26. The system of claim 21, wherein the operating parameters of the virtual equipment include activation and deactivation of individual pieces of virtual equipment.
27. The system of claim 21, wherein the user selectable sections of the views of the virtual equipment correspond to sections of the virtual equipment analogous to sections of equipment that would be engaged in real life to configure operating parameters and/or operate the equipment.

28. The system of claim 21, wherein the equipment module is configured to add or remove one or more components of a piece of virtual equipment based on the user engaging user selectable sections of a view of the piece of virtual equipment.
29. The system of claim 28, wherein the removal and/or addition of one or more components of the piece of virtual equipment are reflected in the views of virtual equipment presented to the user through the interface surface.
30. The system of claim 21, wherein equipment module is configured to change equipment modes of a piece of virtual equipment based on the user engaging user selectable section of a view of the piece of virtual equipment.
31. A method of providing stimulation to a user of a game, the method comprising:
- presenting views of a game through an interface surface of a touch sensitive electronic display that is accessible for engagement by a user,
 - wherein the views presented through the interface surface include views of virtual equipment having user selectable sections that are selectable by the user to interact with the virtual equipment by engaging the interface surface at the user selectable sections of the views of the virtual equipment;
 - receiving selection of one of the user selectable sections via an by the user engagement of the selected user selectable section on the interface surface;
 - determining the operating parameters of the virtual equipment in the views and/or simulating operation of the virtual equipment based on the received selection;
 - determining, responsive to the received selection, haptic stimulation to be generated for the user associated with the operating parameters of the virtual equipment and/or simulated operation of the virtual equipment; and
 - generating the determined haptic stimulation.

32. The method of claim 31, wherein the virtual equipment includes a projectile weapon.
33. The method of claim 32, wherein the operating parameters of the virtual equipment determined based on selection of the selected user selectable section include one or more of an amount of loaded rounds of ammunition, a level of disrepair, a stopping power, a projectile velocity, an ammunition type, or a noise level.
34. The method of claim 31, wherein the haptic stimulation is generated to actuate the touch sensitive electronic display.
35. The method of claim 31, wherein the haptic stimulation is generated to actuate the interface surface.
36. The method of claim 31, wherein the operating parameters of the virtual equipment determined based on selection of the selected user selectable section include activation and deactivation of individual pieces of virtual equipment.
37. The method of claim 31, wherein the user selectable sections of the views of the virtual equipment correspond to sections of the virtual equipment analogous to sections of equipment that would be engaged in real life to configure operating parameters and/or operate the equipment.
38. The method of claim 31, further comprising adding or removing one or more components of a piece of virtual equipment based on the user engaging user selectable sections of a view of the piece of virtual equipment.

39. The method of claim 38, wherein the removal and/or addition of one or more components of the piece of virtual equipment are reflected in the views of virtual equipment presented to the user through the interface surface.
40. The method of claim 31, wherein further comprising changing equipment modes of a piece of virtual equipment based on the user engaging user selectable section of a view of the piece of virtual equipment.