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AN AUDIO ANIMATION SYSTEM

Field of the Invention

5 The present invention relates to the field of animation. More particularly, the invention relates to an audio animation system.

Background of the Invention

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 The term “audio-animation” refers herein to an act of creating the illusion of life to a non-biotic figure.

 A talking puppet is an example of audio-animation. A
15 talking puppet is actually a non-biotic figure adapted to play or imitate human voices. Since talking puppets are individual figures, there is no coordination between the sounds voiced by one puppet and the sounds of another puppet.

20 Another example of voice animation is puppet shows, very common at Disneyland and other mass entertainment centers, in which a plurality of non-biotic figures perform a show. In this case, there is coordination between the figures. A computer controls the limited movement of the puppets in coordination
25 with a soundtrack. Since the “acting” figures and the audience

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are not deployed in vicinity with each other, and since the figures have a limited range of movement upon which the audience may distinguish between the talking figure and the other figures on stage, a mono sound is adequate.

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It is an object of the present invention to provide a system and method for voice animation, which provides a better quality of voice animation than in the prior art.

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Other objects and advantages of the invention will become apparent as the description proceeds.

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Summary of the Invention

The following embodiments and aspects thereof are described and illustrated in conjunction with systems, tools and methods, which are meant to be merely illustrative, not limiting in scope. In various embodiments, one or more of the above-described problems have been reduced or eliminated, while other embodiments are directed to other advantages or improvements.

In one aspect, the present invention is directed to an audio animation system, comprising:

- two or more non-biotic figures;
- an audio player, having two or more audio sources correspondingly to the two or more non-biotic figures, for simultaneously playing the audio signals associated with the two or more non-biotic figures; and
- two or more speaker units corresponding to the two or more audio sources.

Preferably, each of the speaker units is deployed closer to the non-biotic figure associated with the speaker unit than to any other of the non-biotic figures, thereby allowing to audience to associate an audio signal with the non-biotic figure thereof.

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The non-biotic figure may be a two-dimensional, three-dimensional figure, and so on.

The audio player may be a computer, a DVD, an MP3
5 player, a cassette player, a TV set, a cellular telephone, and so forth.

The system may further comprise means for wireless
transmission of the audio signal of at least one of the audio
10 sources to a remote speaker unit thereof. The means for
wireless transmission may comprise a wireless transmission
unit deployed at the audio player, and a wireless receiving unit
deployed at the speaker unit.

15 The system may further comprise interaction means with
a user. Beyond well-known interaction means such as buttons,
sliders, GUI, and so on, the interaction means may comprise
also speech recognition means, speech-to-text converter, and so
on.

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Preferably, the two or more audio sources are of a
stereophonic device, thereby using a well known technology
available on the market.

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In one embodiment of the invention, the content of the two or more audio sources is provided by a remote server over a network. The network may be a telephone network, a cable TV network, the Internet, and so forth. The system may further
5 comprise means for selecting the content to be provided by the server, such as an SMS analyzer (a facility for analyzing the content of an SMS message and the like in order to “understand” to which content the user refers), analyzer of data sent from a Web page, and so on.

10 The content may be provided also by a memory card, such as SDCARD.

In another aspect, the present invention is directed to an
15 apparatus for operating a non-biotic figure of an audio animation system, the apparatus comprising:

a casing comprising:

- an audio inlet, to which an audio outlet of an audio player is connected;
- 20 - an RF transmitter, for transmitting the audio signal entered through the inlet;

a circuitry installed in the non-biotic figure, the circuitry comprising:

- an RF receiver, for receiving an RF signal transmitted by
25 the transmitter;
- an amplifier, for amplifying the signal; and

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- a speaker unit, for playing the audio signal.

In one embodiment of the invention, the apparatus further comprises means for moving one or more organs of the non-
5 biotic figures.

In addition to the exemplary aspects and embodiments described above, further aspects and embodiments will become apparent by reference to the figures and by study of the
10 following detailed description.

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Brief Description of the Drawings

The objects and features of the present invention will become apparent from the following detailed description
5 considered in conjunction with the accompanying drawings, in which:

Fig. 1 pictorially illustrates an audio animation system,
according to one embodiment of the invention.

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Fig. 2 is a more detailed illustration of the audio
animation system illustrated in Fig. 1.

Fig. 3 is a block diagram that schematically illustrates the
15 electronic structure of an audio animation system, according to
one embodiment of the invention.

Fig. 4 is schematically illustrates two non-biotic figures
“having a conversation”, according to one embodiment of the
20 invention.

Fig. 5a is an electronic scheme which illustrates the
circuitry embedded inside the puppet of Boots of Fig. 4.

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Fig. 5b is an electronic scheme which illustrates the circuitry embedded inside the puppet of Dora of Fig. 4.

Each of Figs. 6 to 8 schematically illustrates an audio
5 animation system which plays content provided over a network,
according to one embodiment of the invention.

In Fig. 6 the network is the Internet, in Fig. 7 the network
is a cable TV network, and in Fig. 8 the network is a cellular
10 network.

It is to be understood, however, that the drawings are
designed solely for purposes of illustration and not as a
definition of the limits of the invention, for which reference
15 should be made to the appended claims. It should be further
understood that the drawings are not necessarily drawn to scale
and that, unless otherwise indicated, they are merely intended
to conceptually illustrate the structures and procedures
described herein. Reference numerals may be repeated among
20 the figures to indicate corresponding or analogous elements.

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Detailed Description of Preferred Embodiments

In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the disclosure. However, it will be understood by those skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known methods, procedures, components and circuits have not been described in detail, so as not to obscure the present disclosure.

The term “**audio player**” refers herein to a system for playing audio signals.

15 The term “**audio amplifier**” refers herein to an electronic system for amplifying an audio signal.

The term “**speaker unit**” refers herein to a system of one or more speakers for playing an audio signal. For example, a speaker unit may comprise a bass speaker and a treble speaker.

For instance, an audio system may comprise an audio player such as a CD player, cassette player and so forth; an audio amplifier; and a plurality of speaker units.

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The terms “audio source” and “audio channel” as used herein are equivalent.

According to embodiments of the present invention, an
5 audio animation system comprises:

- An audio player capable of playing simultaneously audio signals of two or more audio sources.
- 10 - Two or more audio amplifiers corresponding to the audio sources, for amplifying the audio signals of the two or more audio sources.
- Two or more speaker units, corresponding to the audio
15 sources, each of the speaker units being deployed in the vicinity of a figure associated with the audio signal from the speaker. A figure may be three-dimensional such as a puppet, two-dimensional such as a computer displaying a figure, and so forth.

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The transmitted signal from the audio player and a speaker unit thereof may be through wired transmission, as well as through wireless transmission such as radio and infrared signals.

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Fig. 1 pictorially illustrates an audio animation system, according to one embodiment of the invention. The illustration demonstrates the system from a user's point of view.

5 Fig. 2 is a more detailed illustration of the audio animation system illustrated in Fig. 1.

10 In the system illustrated in Figs. 1 and 2, a user, such as an infant, may participate in a lesson, for example, a singing lesson. In the lesson, there is a teaching figure 18, and two pupils: the user (not illustrated) and the bear puppet 10.

15 During the lesson teacher figure 18 may ask bear puppet 10 to sing a song, and afterwards ask the user (the infant) to repeat the song. The user may communicate with the teaching figure through the user interface of the computer. For example, the teaching figure 18 may ask the user "Shall we practice today the song 'Marry Had a Little Lamb'?" Two animated icons may appear on display 16, such as a clown that nods his head
20 for "yes", and another clown that shakes his head for "no". The user may point on the desired icon. The presence of an additional puppet 10 in the lesson may be relaxing, since the puppet itself is a friendly figure.

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From the technical point of view, apparatus 4 is an audio player which comprises two audio channels. The output of one of the audio channels is played by a speaker 6 which is connected to apparatus 4 by wired connection, and the output of the other channel is played by a speaker 28, which is connected to apparatus 4 by wireless connection.

Apparatus 4 is referred to herein also as “control unit”.

Speaker 6 is associated with teaching figure 18, and therefore preferably it is placed in proximity to figure 18. However, for the sake of clarity, in Fig. 1 speaker 6 is not placed in close proximity to display 16 (which displays figure 18).

Plug 20 of the stereo cord 12 has to be connected to the left or right exit of an audio player, which in Fig. 1 is the computer 2. The audio player may also be an MP3 (MPEG-1 Audio Layer-3) player, a cassette player, a DVD (Digital Versatile Disc) system, and so forth.

The control unit 4 comprises two audio channels and a radio transmitter for transmitting the audio signal of one of the channels. A user may control the output volume of the audio channels by knobs 34 and 36. In order to be associated with a stereophonic audio system, volume knobs 34 and 36 are marked

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as "LEFT" and "RIGHT", correspondingly. The user may adjust the volume of all audio channels by a single knob 32, while the volume ratio between the channels is maintained. Antenna 8 transmits the audio signal of the "left" audio channel. Button 38
5 turns apparatus 4 on and off.

The remote speaker unit, which resides inside bear puppet 10, operates as follows: an antenna 22 receives the transmitted signal from apparatus 4; the audio signal received through
10 antenna 22 reaches receiver 24; the received audio signal is amplified by amplifier 26 and played by speaker unit 28. Elements 24, 26 and 28 are displayed in dashed lines, in order to emphasize that they are deployed inside puppet 10, and therefore are not seen.

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Fig. 3 is a block diagram that schematically illustrates the electronic structure of an audio animation system, according to one embodiment of the invention.

20 In this scheme, two audio channels are employed, one referred as "left" and the other as "right", as in stereophonic equipment. However, it should be understood that more audio channels may be used.

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The input source, such as an MP3 player (not illustrated), must be connected to the audio input jack 20.

According to this embodiment, control unit 4 is a stereo
5 audio player, the "left" audio channel of which is coupled with a transmitter 46 for transmitting by wireless transmission the output audio signal thereof to a corresponding remote receiver 24 (in order to be played by speaker 28). The "right" input signal is played by speaker 6, which is connected to apparatus 4
10 by wires.

As per the "left" audio channel, the input signal from the audio input jack 20 is amplified by amplifier 50, and transmitted via transmitter 46 and the corresponding antenna
15 8. The transmission (marked herein as numeral 30) is received by receiver 24 through the antenna 22 thereof, and amplified by amplifier 26. The amplified audio signal is played by speaker 28. The volume of the played signal is adjustable by the left volume knob 36.

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As per the "right" audio channel, the input from the audio input jack 20 is amplified by amplifier 48, and played by speaker 6, which is connected to the control unit by wires. The volume of the played signal is adjustable by the right volume
25 knob 34.

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The volume of both speakers is adjustable by the “main” volume knob 32, while the ratio between the volume of the “left” and “right” output signal is maintained.

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An important advantage of the design illustrated in Fig. 3 is that it employs a stereophonic audio system. Nowadays stereophonic audio systems are very common, and therefore they may be employed in an audio animation system of two speakers without - or almost without - further modifications. Furthermore, since stereophonic audio systems are so common, their price is relatively inexpensive.

Nevertheless, it should be noted that stereophonic display is merely an example, and other systems, featuring more audio channels, may be employed in audio animation systems.

According to one embodiment of the invention, speaker 6 may be embedded within control unit 4. In this way, the same casing may be used for control unit 4 and speaker 6.

Fig. 4 is schematically illustrates two non-biotic figures “having a conversation”, according to one embodiment of the invention.

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In this case the non-biotic figures are puppets. One figure is referred to as “Dora”, and the other figure is referred to as “Boots”. The “conversation” may be such as an English lesson, a chat, and so forth.

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Fig. 5a is an electronic scheme which illustrates the circuitry embedded inside the puppet of Boots of Fig. 4.

The audio player device 2 is an MP3 player, and the like.

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The left speaker of the MP3 player 20 is connected to an RF transmitter 46, which transmits via antenna 8 the audio to be played by the “left” speaker 28. The right speaker 6 of the MP3 player 20 is deployed inside the puppet of Boots.

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Fig. 5b is an electronic scheme which illustrates the circuitry embedded inside the puppet of Dora of Fig. 4.

The RF signal transmitted by the RF transmitter 46 of Boots is received by the RF receiver 24 of Dora through antenna 22, and played by speaker 28.

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Each of Figs. 6 to 8 schematically illustrates an audio animation system which plays content provided over a network, according to one embodiment of the invention.

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According to these embodiments of the invention, a content server 52 provides the content to be played / displayed by the audio animation system. The content server may send
5 digital data as well as analog information, such as audio and/or video signals. The content sever may comprise a computerized system, circuitry, and so on, for transmitting the content to a user's control unit 4. The transmission may be carried out via a network such as data network (e.g., the Internet), telephone
10 network such as cellular network, cable TV network, and so on.

Fig. 6 schematically illustrates an audio animation system in which the content server 52 communicates with user's personal computer 2 via the Internet network 56.

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In this embodiment the control unit 4 may be embedded within computer 2, or alternatively added externally to the computer, as explained above. Of course a relay and the like may switch between the connection with the speaker or with
20 the control unit.

Fig. 7 schematically illustrates an audio animation system in which the content server 52 communicates with user's TV set 60 via a cable TV network 58.

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In this embodiment the control unit 4 may be embedded within the TV set 60, or alternatively added externally to the TV set, as explained above. Of course a relay and the like may switch between the connection of the TV set with its speaker or
5 with the control unit.

Fig. 8 schematically illustrates an audio animation system in which the content server 52 communicates with a user's cellular telephone 62 via a cellular network 56.

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In this embodiment the control unit 4 may be embedded within the cellular telephone 62, or alternatively added externally to the telephone, as explained above. Of course a relay and the like may switch between the connection of the
15 telephone with its speaker or with the control unit.

It should be noted that presently cellular telephones comprise also audio abilities, such as MP3 player coupled with stereophonic exits to headphones, speakers, and the like.

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The use of a cellular telephone with regard to an audio animation system may be employed for determining the content sent from the content server to the control unit 4. For example, a user may select an audio animated lesson by an SMS (Short
25 Message Service) message, a Web page, and so on.

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The use of a content server may be applied in commercial models which employ the invented audio animation technology disclosed herein. For example, a user may be charged for a live
5 broadcast or uploaded information from the content server to the control unit of the user.

The content transmitted by the content server to the user's control unit of the audio animated system may be
10 transmitted as a live broadcast or streaming media (a multimedia continuously received by, and normally displayed to, the end-user while it is being delivered by the provider), or as information to be downloaded.

15 According to embodiments of the invention, the audio signal played to a user may be controlled by an input signal provided by the user, e.g., by interaction means thereof. The interaction means may include a user interface, such as mouse, keyboard, display, buttons, and so on.

20 According to one embodiment of the invention, the interaction means comprise speech recognition means alternatively or additionally to other interaction means. The speech recognition means provide to the system ability to
25 interact with infants and other illiterate individuals, and

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therefore is suitable for carrying out interactive lessons for such persons. In such a lesson a pupils may provide an answer to a question he is asked by content played / displayed by the control unit.

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Furthermore, when the system is connected to the Internet, the speech recognition means may be used also as means for interacting with an Internet browser and the like, therefore enabling an infant to interact with the browser, the
10 Web server that operates a Web site, and so on.

Such a system may further comprise speech-to-text converter, thereby providing a user with ability to provide through the user interface textual information, even without
15 typing the text. An older user may use the text-to-speech ability for interacting with a Web site, such as a search engine, even without typing the keywords of a search.

In the description and figures herein, the following
20 numerals have been mentioned:

- Numeral 2 denotes an audio player, such as a CD player, a personal computer, and so forth;
- Numeral 4 denotes a control unit;

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- Numeral 6 denotes a speaker connected to an audio system by wired means;
- Numeral 8 denotes an antenna of a transmitter;
- Numeral 10 denotes a puppet comprising a receiver, an audio
5 amplifier for amplifying signal received by the receiver, and
a speaker playing the amplified signal;
- Numeral 12 denotes a stereo cord (i.e., composed of two pairs
of wires);
- Numeral 14 denotes a cable for connecting a speaker to an
10 amplifier;
- Numeral 16 denotes a computer's display;
- Numeral 18 denotes an animated figure;
- Numeral 20 denotes a jack;
- Numeral 22 denotes an antenna of a radio receiver;
- 15 - Numeral 24 denotes a radio receiver;
- Numeral 26 denotes an amplifier;
- Numeral 28 denotes a speaker unit;
- Numeral 30 denotes a signal of radio transmission;
- Numeral 32 denotes a knob for adjusting the volume of all
20 the channels;
- Each of numerals 34 and 36 denotes a knob for adjusting the
volume of an audio channel;
- Numeral 38 denotes a button to turn apparatus 4 on and off;
- Numeral 40 denotes a user (an infant);
- 25 - Numeral 42 denotes a box;

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- Numeral 44 denotes a system comprising a receiver, an amplifier and speaker;
- Numeral 46 denotes a radio transmitter;
- Each of numerals 48 and 50 denotes an amplifier;
- 5 - Numeral 52 denotes a content server;
- Numeral 54 denotes the Internet network;
- Numeral 56 denotes a cellular network;
- Numeral 57 denotes a base station of cellular network 56;
- Numeral 58 denotes a cable TV network;
- 10 - Numeral 60 denotes a television set; and
- Numeral 62 denotes a cellular telephone.

While certain features of the invention have been
15 illustrated and described herein, the invention can be embodied
in other forms, ways, modifications, substitutions, changes,
equivalents, and so forth. The embodiments described herein
should be considered as illustrative and not restrictive.

1. An audio animation system, comprising:
 - (a) two or more three-dimensional non-biotic figures, each of the non-biotic figures having circuitry, the circuitry including a radio frequency receiver for receiving a radio frequency audio signal transmitted by a radio frequency transmitter, an amplifier for amplifying said signal and a speaker unit for playing said audio signal, the two or more non-biotic figures situated close enough to one another to be seen by a child as interacting with one another in a conversation; and
 - (b) an audio player having a radio frequency transmitter configured to broadcast radio frequency audio signals to be received by the radio frequency receiver of each non-biotic figure without making use of the Internet or of the World Wide Web, the audio player having two or more audio channels including one audio channel corresponding to each of said two or more non-biotic figures, for simultaneously playing the radio frequency audio signals of said two or more audio channels- associated with said two or more non-biotic figures, the audio channels providing synchronized audio content configured to present to a child a conversation between the two or more non-biotic figures,
the at least two non-biotic figures and the audio player all situated close enough to one another to transmit between them radio frequency signals that do not travel through a network.
2. A system according to claim 1, wherein each of said speaker units is deployed closer to the non-biotic figure thereof associated with said speaker unit than to any other of said

non-biotic figures, for associating an audio signal with the non-biotic figure thereof.

3. A system according to claim 1, wherein no speech recognition
5 system is utilized.
4. A system according to claim 1, wherein said audio player is an MP3 player.
- 10 5. A system according to claim 1, wherein said audio player is selected from a group comprising: a computer, a DVD, an MP3 player, a cassette player, a TV set, a cellular telephone.
6. A system according to claim 1, further comprising circuitry for
15 wireless transmission of the audio signal of at least one of said audio channels to the speaker units thereof.
7. A system according to claim 6, wherein said circuitry
20 comprises: a wireless transmission unit deployed at said audio player, and wireless receiving units deployed at the speaker units thereof.
8. A system according to claim 7, further comprising interaction
25 means with a user thereof.
9. A system according to claim 1, wherein said two or more audio channels are of a stereophonic device.

10. A system according to claim 1, further comprising means for selecting the content to be provided.
11. A system according to claim 1, wherein the content of said two
5 or more audio sources is provided by a memory card.
12. In an audio animation system, an apparatus for operating a non-biotic figure, the apparatus comprising:
a casing comprising:
10 - an audio inlet, to which an audio outlet of an audio player is connected;
- an RF transmitter, for transmitting the audio signal entered through said inlet;
a circuitry installed in said non-biotic figure, said circuitry
15 comprising:
- an RF receiver, for receiving an RF signal transmitted by said transmitter;
- an amplifier, for amplifying said signal; and
- a speaker unit, for playing said audio signal.
20
13. An apparatus according to claim 12, wherein said non-biotic figure further comprises means for moving one or more organs of said non-biotic figures.
- 25 14. A method for rendering sound animation, the method comprising:
providing two or more three-dimensional non-biotic figures, each of the non-biotic figures having circuitry, the circuitry

including a radio frequency receiver for receiving a radio frequency audio signal transmitted by a radio frequency transmitter, an amplifier for amplifying said signal and a speaker unit for playing said audio signal, the two or more non-biotic figures situated close enough to one another to be seen by a child as interacting with one another in a conversation; and

providing an audio player of two or more audio channels having a radio frequency transmitter configured to broadcast radio frequency audio signals to be received by the radio frequency receiver of each non-biotic figure without making use of the Internet or of the World Wide Web, the audio player having one audio channel corresponding to each of said two or more non-biotic figures for simultaneously playing the radio frequency audio signals of said two or more audio channels associated with said two or more non-biotic figures, the audio channels configured to provide synchronized audio content configured to present to a child a conversation between the two or more non-biotic figures,

the at least two non-biotic figures and the audio player all situated close enough to one another to transmit between them radio frequency signals that do not travel through a network; and

playing simultaneously the audio signal of said two or more audio channels through speaker units of said two or more non-biotic figures so as to present a conversation between the two or more non-biotic figures.

15. A method according to claim 14, further comprising the step of providing means for connecting at least one of said speaker units by wireless connection to the audio source thereof.
- 5 16. A method according to claim 14, wherein one of said sound sources is selected from a group comprising: a computer, a DVD, an MP3 player, a cassette player, a TV.
- 10 17. A method according to claim 14, wherein the audio player is an MP3 player.
18. A method according to claim 14, each of said speaker units is deployed closer to the non-biotic figure thereof than to any other of said non-biotic figures.
- 15 19. A method according to claim 14, further comprising the step of adapting said playing according to the input signal provided by a user thereof.
- 20 20. A method according to claim 14, wherein said input signal is provided by interaction means.
21. A system according to claim 8, wherein each of said non-biotic figures further comprises means for moving one or more organs of said non-biotic figure.
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- 22. A system according to claim 1, wherein the content of said two or more audio sources is provided without use of a cable and without passing through a network.
- 5 23. A system according to claim 8, wherein said system is configured so that a child listening to the non-biotic figures can select and vary audio content.
- 24. A system according to claim 1, further comprising means for
10 selecting the content to be provided.
- 25. A system according to claim 1, wherein broadcasting of the radio frequency audio signals by said audio player to said non-biotic figures does not involve sending the audio signals
15 through any network.