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(54) INTERACTIVE COMMAND-REPEATER TOY SYSTEM

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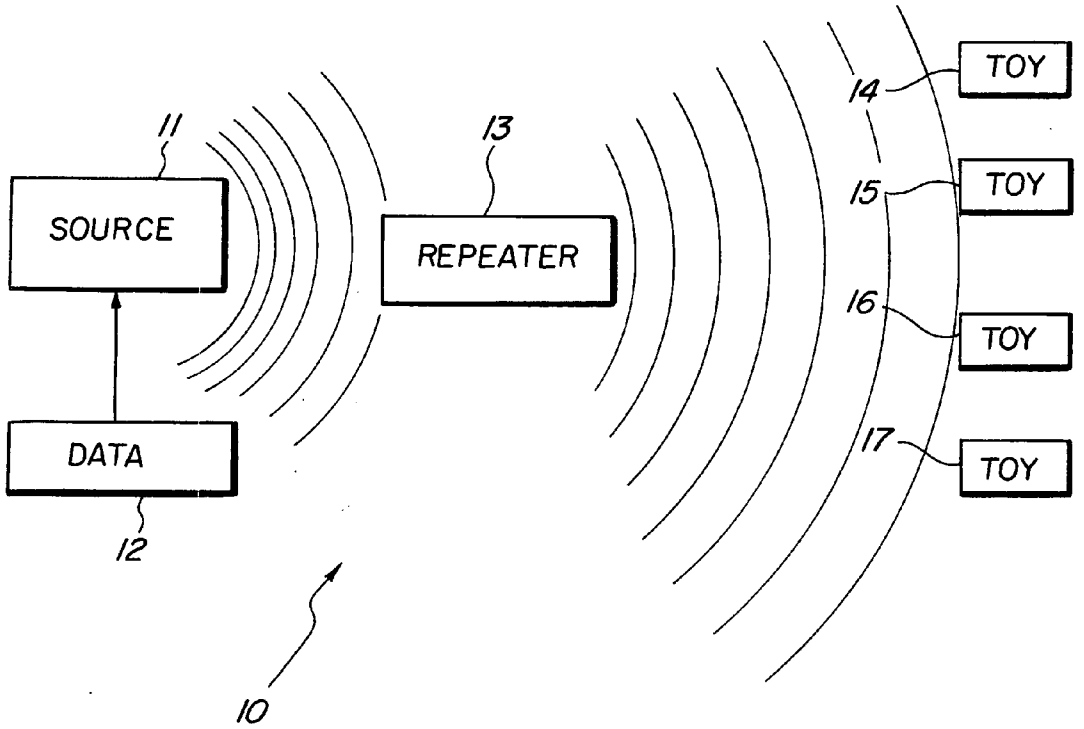
(57) **ABSTRACT**

A toy system includes a data source operative in combination with a communication device such as a television receiver or the like. The data source applies data to a watermarking system which in turn embeds the data within the audio information processed by the television receiver. A repeater positioned in communication with the television receiver senses the watermarked audio information and recovers the embedded data therefrom. The repeater then modulates the recovered data upon a radio frequency carrier which is then broadcast throughout a play environment. A plurality of toys positioned about the play environment include apparatus for receiving, decoding and responding to the data within the broadcast radio frequency signal.



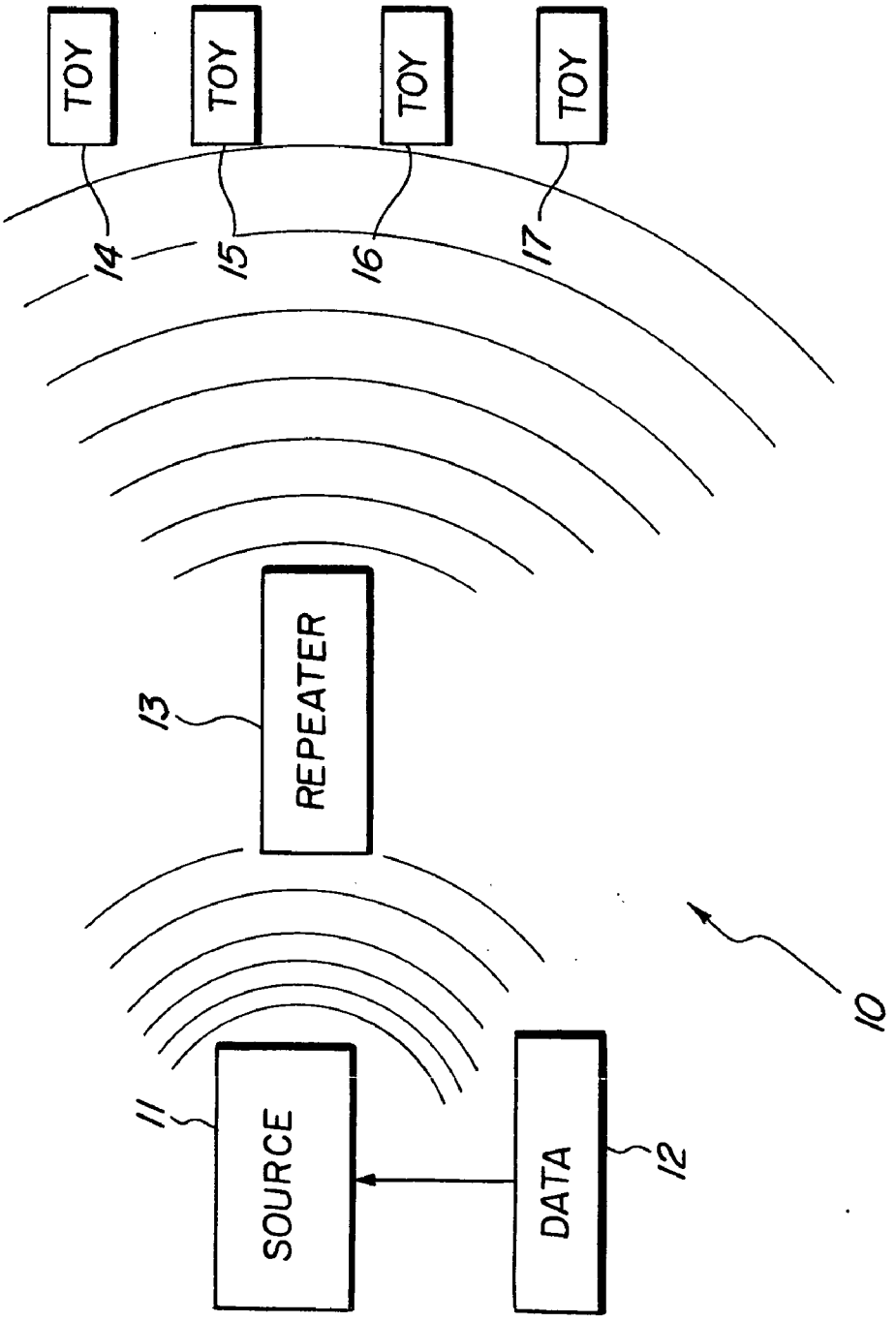


FIG. 1

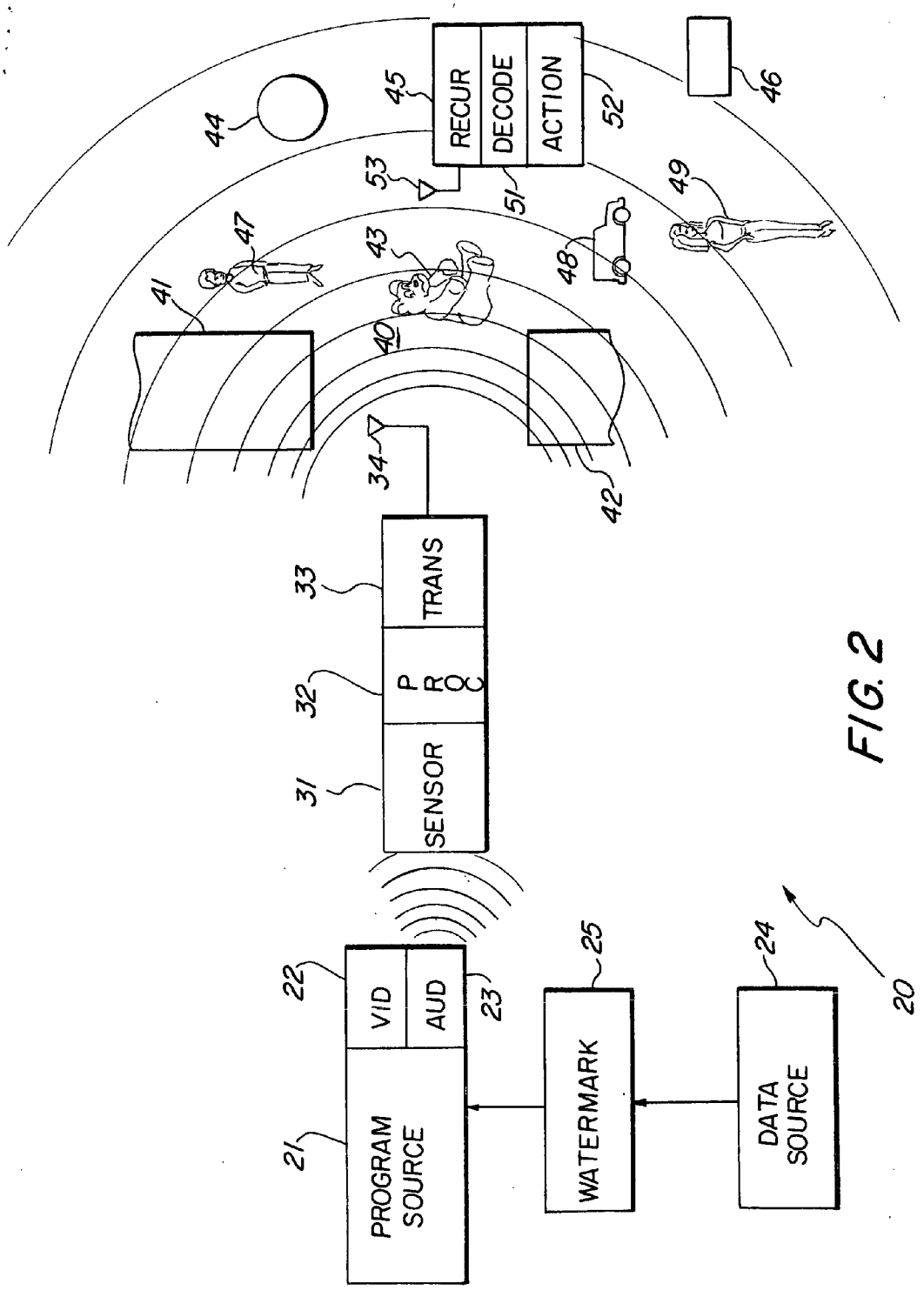

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FIG. 2

INTERACTIVE COMMAND-REPEATER TOY SYSTEM

FIELD OF THE INVENTION

[0001] This invention relates generally to interactive toy systems and particularly to systems employing a plurality of interactive devices responsive to a common command source.

BACKGROUND OF THE INVENTION

[0002] With the rapid and almost astonishing development of low-cost compact digital electronic systems and devices, the level and complexity of toys have dramatically increased. Complete digital systems which include a microprocessor, associated memory, display devices and motor controls have become compact and practical and mass-produced relatively low-cost toys. As a result, toys have been provided which are often extremely life-like and exhibit a surprising number of movements and activities. Such movements and activities readily include the creation of complex sound effects, various light interactive patterns and movement of the toy. The complex responses and behavior patterns created by such toys enables manufactures to provide a great variety of toys in a massed produced environment.

[0003] In a parallel and related art, the systems utilized in digital electronic communication have enjoyed a corresponding development rate. Practitioners have provided digital communication systems which are extremely compact and relatively low-cost. Perhaps more importantly such systems have been provided with the capability to operate at extremely low power levels effectively. The latter is particularly important in the implementation of such systems in the battery powered toy environment.

[0004] With the development of such compact low-cost and effective digital communication systems, communication between toys utilizing radio frequency signals, infrared energy, sound energy, ultrasonic energy and magnetic energy have become state-of-the-art and in most instances common place within toy devices. Such systems facilitate the communication of digitally encoded commands and data to a toy throughout a room environment.

[0005] In a more recent development trend within the toy arts, practitioners have in essence combined the advances in complex microprocessor systems and digital communication systems to produce a category of toys often referred to as "interactive" toys. Such toys are referred to as interactive due to their ability to respond to commands and data digitally communicated between toys or among toys. With proper programming, such responses often create the perception of interaction between the toys. Still other devices are truly interactive in that the systems are sufficiently complex to actually to respond to a digital communication with a unique and appropriate response. Thus, toy figures and dolls as well as other devices such as toy vehicles and games and the like have been provided which are either truly interactive or provide an appearance of interactive behavior.

[0006] As interactive toys proved to be extremely popular with consumers, practitioners in the art responded with the rapid development of a virtually endless variety of interactive games and toys. For example, U.S. Pat. No. 6,238,262 issued to Pracas sets forth an ELECTRONIC INTERACTIVE PUPPET having a puppet like body resembling a human figure. Within the electronic system of the puppet, a source of video information is utilized in communicating with the puppet. The communication is carried forward by utilizing the vertical synchronization signal of the video system. Detection of the vertical synchronization system within the puppet triggers a cassette player within the toy. The result is the appearance of interaction rather than actual interaction.

[0007] U.S. Pat. No. 4,840,602 issued to Rose sets forth a TALKING DOLL RESPONSIVE TO EXTERNAL SIGNAL in which a doll cooperates with a remote signal source which provides a narration with which the doll interacts. The doll has a stored vocabulary within memory which is accessed to cause speech production within the doll to simulate a speech response. The doll has a radio frequency receiver which receives encoded data from a remote signal source. Data may be embedded within a video source such as a television or VCR for communication of information to the doll.

[0008] U.S. Pat. No. 5,191,619 issued to Aldava et al sets forth an INTERELATIONAL AUDIO KINETIC ENTERTAINMENT SYSTEM in which moveable and audible toys and other animated devices spaced apart from a television screen are provided with program synchronized audio and controlled data to interact with the program.

[0009] U.S. Pat. No. 4,807,031 issued to Broughton et al sets forth an INTERACTIVE VIDEO METHOD AND APPARATUS in which a toy such as a toy vehicle receives commands from a base unit operatively coupled to the video output of a television receiver. Command data is embedded within the television display video. The base unit is housed in a box secured near the television receiver which detects modulated video fields by illumination detection and broadcasts commands to the toy vehicle. As a result, the toy vehicle can be made to appear to interact with the video display information on the television receiver.

[0010] U.S. Pat. No. 4,846,693 issued to Bear sets forth a VIDEO BASED INSTRUCTIONAL AND ENTERTAINMENT SYSTEM USING ANIMATED FIGURE includes a figure resembling a teddy bear which is coupled to a control unit by a tether. A second tether is coupled to a user input unit allowing the player to input various commands. A source of video information such as a VCR is connected to a conventional television receiver. Data is embedded within the video information of the television signal while audio is extracted from the audio track of the program material.

[0011] U.S. Pat. No. 6,415,439 issued to Randell et al sets forth a PROTOCOL FOR A WIRELESS CONTROL SYSTEM which enables unidirectional communication in a simplex environment or bi-directional communication in a duplex environment between a controller or one or more controlled devices. The controller transmits data and control data which may include voice synthesis information and motor movement for use by the controlled devices.

[0012] U.S. Pat. No. 5,213,337 issued to Sherman sets forth a SYSTEM FOR COMMUNICATION USING A BROADCAST AUDIO SIGNAL in which data is embedded within the audio communication path of a television program or the like. A game box receives the embedded audio data and produces a corresponding set of controllable signals for operative game devices.

[0013] U.S. Pat. No. 5,655,945 issued to Jani sets forth a VIDEO AND RADIO CONTROLLED MOVING AND TALKING DEVICE which includes at least one moving and talking remote device together with a source of video information such as a video cassette recorder. Data is embedded within unused portions of the program information typically referred to as vertical interval space. The encoded signal is displayed when the VCR tape is played and detected by a control box coupled between the VCR and a conventional television. The control box in turn generates a radio frequency signal within which data and commands are encoded. A toy such as a toy bear includes circuitry responsive to the transmitted commands and data.

[0014] U.S. Pat. No. 6,317,714 issued to Del Castillo et al sets forth a CONTROLLER AND ASSOCIATED MECHANICAL CHARACTERS OPERABLE FOR CONTINUOUSLY PERFORMING RECEIVED CONTROLLED DATA WHILE ENGAGING IN BI-DIRECTIONAL COMMUNICATION OVER A SINGLE COMMUNICATIONS CHANNEL which provide efficient bi-directional communication despite substantial bandwidth limitations. A radio frequency unit is connected to a personal computer. The personal computer controls direction and activity of a responsive toy such as a toy figure or doll via the radio frequency link.

[0015] U.S. Pat. No. 6,319,010 issued to Kikinis sets forth a PC PERIPHERAL INTERACTIVE DOLL utilized in teaching, entertaining and habituating a child. The system utilizes an interactive entity such as doll having input and output elements and control circuitry for responding to data and commands received by a link to a personal computer.

[0016] U.S. Pat. No. 3,493,674 issued to Houghton sets forth a TELEVISION MESSAGE SYSTEM FOR TRANSMITTING AUXILIARY INFORMATION DURING THE VERTICAL BLANKING INTERVAL OF EACH TELEVISION FIELD in which data is embedded within television broadcast information by utilizing the unused time interval corresponding to the vertical blanking period.

[0017] U.S. Pat. No. 6,022,273 issued to Gabai et al sets forth an INTERACTIVE DOLL in which a computer system is operative to transmit a first transmission via a first wireless transmitter and at least one toy including a first wireless receiver receives the transmitted signal and is operative to carry out action based responses. Direct commands from the computer are transmitted via this transmission system to the responsive toy figure or figures.

[0018] U.S. Pat. No. 6,064,854 issued to Peters et al sets forth a COMPUTER ASSISTED INTERACTIVE ENTERTAINMENT/EDUCATION CHARACTER GOODS in which a computer is linked to a toy via cable or wireless communication. The toy responds to the transmitted communications in a predetermined manner.

[0019] U.S. Pat. No. 5,733,131 issued to Park sets forth an EDUCATION AND ENTERTAINMENT DEVICE WITH DYNAMIC CONFIGURATION AND OPERATION in which a toy receives data directly from the high power broadcast transmitters in a television broadcast environment.

[0020] While the above-described prior art devices have to some extent improved the art and in some instances enjoyed commercial success and usage, there remains nonetheless a continuing need for ever more improved and amusing and entertaining interactive toy systems.

SUMMARY OF THE INVENTION

[0021] Accordingly, it is a general object of the present invention to provide an interactive toy system. It is a more particular object of the present invention to provide an improved interactive toy system which facilitates the use of multiple responsive toy responses in combination with one or more command units. It is a still more particular object of the present invention to provide an improved interactive toy system in which the command integrity operative between the toys and the source of commands is maintained in an improved range of locals within a given environment.

[0022] In accordance with the present invention, there is provided a source of communicated data providing data in a first communication link; a plurality of toys each having means for receiving and recovering data via a second communication link; action means within each of the toys responsive to recovered data to create toy activity such as sound, movement or light; and a repeater having means for communicating with the source via the first communication link, means for recovering data, means for applying the data to the second communication link and means for transmitting the data to the toys via the second communication link.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The features of the present invention, which are believed to be novel, are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings, in the several figures of which like reference numerals identify like elements and in which:

[0024] **FIG. 1** sets forth a generalized block diagram of the present invention interactive command repeater toy system;

[0025] **FIG. 2** sets forth a block diagram of a preferred embodiment of the present invention interactive command repeater toy system;

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[0026] **FIG. 1** sets forth a block diagram of a generalized version of the present invention interactive command repeater toy system generally referenced by numeral **10**. System **10** includes a data source **11** having a data input **12** coupled thereto. Source **11** is fabricated to provide a communication link to a repeater **13**. A plurality of responsive toys **14**, **15**, **16** and **17** are positioned in the general environment of repeater **13** and are responsive to communications from repeater **13**.

[0027] In operation, source **11** may be any one of a variety of communication devices including a television receiver, a computer, an audio system such as radio, or the like. Data input **12** comprises apparatus for applying data to source **11** which is communicated by source **11** to repeater **13**. Thus, data **12** may comprise apparatus for user input of various commands intended to eventually be communicated to one or more of toys **14** through **17**.

[0028] Repeater **13** includes apparatus for receiving communication from source **11** together with apparatus for communicating directly with toys **14** through **17**. In the preferred fabrication of the present invention, repeater **13** is positioned proximate source **11** while toys **14** through **17** may be substantially displaced from source **11** receiving their command information from repeater **13** rather directly from source **11**. In the preferred fabrication of the present invention, the communication link between source **11** and repeater **13** may utilize one communication mechanism while the communication link between repeater **13** and toys **14** through **17** may utilize a different mechanism. In addition, the modulation method or data encoding of information between source **11** and repeater **13** may utilize an entirely different protocol or system than the data communication method used between repeater **13** and toys **14** through **17**.

[0029] By way of example, source **11** may comprise a conventional television receiver having capability for providing video display and audio output. Correspondingly, data input **12** may comprise a video or audio watermarking system which in accordance with conventional fabrication techniques utilizes portions of the displayed video information or portions of the audio information displayed or outputted by source **11**. Correspondingly, repeater **13** is configured to receive the data encoded video or audio information and remove or decode the information therefrom. The decoded information is then communicated by repeater **13** using a selected medium and protocol to toys **14** through **17**.

[0030] Thus, in the above-described example in which source **11** comprises a conventional television receiver, data input **12** may comprise a source of program material such as a video disk or video tape upon which a digitally encoded water mark signal has been placed. The response of source **11** to the input information is carried forward such that water marked video or audio is produced by the television receiver.

[0031] Within repeater **13** a video detector responsive to water marked data in the event a video water marked communication system is used, receives the water marked video information and decodes the data therefrom. In the event an audio watermarking system is utilized by source **11**, then repeater **13** is suitably configured to receive and decode the audio information and thereafter remove and recover the encoded data from the audio information. In either case, repeater **13** encodes the recovered data on the appropriate communication link utilized between repeater **13** and toys **14** through **17**. By way of example, repeater **13** may utilize a radio frequency communication with toys **14** through **17**. In this case, repeater **13** includes a conventional RF transmitting unit as well as appropriate modulating apparatus for modulating the radio frequency carrier utilized by repeater **13** with the desired encoded data. Conversely, toys **14** through **17** utilize conventional radio frequency receiving and decoding apparatus for receiving the radio frequency communication from repeater **13** and decoding or demodulating the information therefrom. Thereafter, toys **14** through **17** respond in accordance with the command data and perform their various operations or activities.

[0032] By way of additional example, repeater **13** may communicate with toys **14** through **17** using an ultrasound link in which ultrasound encoded information is transmitted by repeater **13** to toys **14** through **17**. In this case, toys **14** through **17** employ conventional ultrasound receiving and decoding apparatus to again recover the encoded command data and respond accordingly.

[0033] It will be apparent to those skilled in the art that considerable latitude exists in selecting the type of source **11** utilized in the present invention system. Further, it will be apparent that considerable latitude exists in selecting the communication link to be utilized between source **11** and repeater **13** as well as the link between repeater **13** and toys **14** through **17**.

[0034] In accordance with an important aspect of the present invention, and as is illustrated below in **FIG. 2**, the communication mechanism used between source **11** and repeater **13** may be selected with the intent of employing a short range communication in which the position of repeater **13** with respect to source **11** may be selected to optimize the communication capability therebetween. Conversely, and in further accordance with the present invention, the communication mechanism selected for use between repeater **13** and toys **14** through **17** may result from considerations of play value and activity. For example, in the anticipated use of the present invention system, the range of locations within which repeater **13** is able to communicate with toys **14** through **17** may be selected to optimize the ability of **14** through **17** to remain in communication with repeater **13** throughout extended areas of the play environment without the need to maintain line of sight communication with repeater **13**. Accordingly, in this circumstance and as is illustrated in the preferred embodiment set forth below in **FIG. 2**, repeater **13** and toys **14** through **17** communicate via a radio frequency communication link. This provides substantial range of communication as well as the ability of communication without extensive concern for intervening objects such as furniture or walls or the like.

[0035] **FIG. 2** sets forth a block diagram of a preferred embodiment of the present invention interactive command repeater toy system generally referenced by numeral **20**. By way of overview, system **20** is selected primarily to optimize the utilization of the present invention system in the operation of a plurality of toys within an extended play environment such as a home or the like. In addition, the systems set forth in **FIG. 20** are also selected to utilize a substantially close relationship between repeater **30** and program source **21**. Thus, in the example shown, communication between the program source and the repeater utilizes a water marked audio communication while the communication link between repeater **30** and toys **43** through **49** employs a modulated radio frequency signal allowing substantial movement of toys **43** through **49**.

[0036] More specifically, system **20** includes a program source **21** which comprises a conventional television receiver. Television receiver **21** includes a video display **22** and an audio output **23** which may for example comprise a conventional speaker. System **20** further includes a data source **24** which provides the command data intended to be communicated to the plurality of toys within system **20**. Data source **24** is coupled to a watermarking system **25**. Watermarking system **25** utilizes a selected one of well known watermarking methods to embed the provided by data source **24** into the audio information channel of television **21**. The watermarked audio and embedded data then forms the audio information output for audio system **23** of

program source **21**. In the preferred fabrication of the present invention, watermark system **25** is selected to maintain useful audio communication for television receiver **21** and in the best of circumstances the embedded data within the audio output of television **21** is not heard by the user.

[**0037**] System **20** further includes a repeater **30** having an input sensor **31**, a processor **32** and a transmitter **33**. Transmitter **33** is coupled to an antenna **34**. Repeater **30** utilizes the watermarked audio information sensed by sensor **31** and in accordance with the operation of processor **30** decodes the embedded data therein. The embedded data once recovered is applied to transmitter **33** within which a conventional modulation or encoding of the data takes place. The resulting information bearing radio frequency signal is applied to antenna **34** and is broadcast throughout the environment of room **40**. It will be noted that room **40** is typical of room environments of most dwellings in that obstacles such as walls **41** and **42** within the room.

[**0038**] In further accordance with the present invention, a plurality of responsive toys **43** through **49** are variously positioned within room **40**. It will be noted that toys **43**, **44** and **45** may arguably be within the line of sight of television **21** and repeater **30**. However, it will also be noted that toys **46**, **47**, **48** and **49** are not in a line of sight relationship with either repeater **30** or television receiver **21**. This allows the illustration of an important aspect of the present invention. The use of a radio frequency communication link between repeater **30** and toys **43** through **49** removes the need for line of sight positioning of the toys. Despite the intrusion of walls **41** and **42** into the communication path, the well-known radio frequency wave penetration of such obstacles allows the communication with toys **46** through **49** to be maintained.

[**0039**] Toys **43** through **49** are illustrative of a variety of toys which include conventional radio frequency signal receiving apparatus together with decoding apparatus for recovering the command information therefrom. In addition, toys **43** through **49** will be understood to include conventional activity means responsive to such commands. Such response means may include various audio, visual movement responses within toys **43** through **49**.

[**0040**] By way of example, toy **45** is shown in block diagram representation and includes a radio frequency receiver **50** together with a decoder **51** and an action system **52**. Receiver **50** is coupled to a receiving antenna **53**. Accordingly, the information bearing radio frequency signal transmitted by repeater **30** is received at antenna **53** providing an input radio frequency signal to receiver **50**. Receiver **50** includes conventional apparatus for selecting the desire radio frequency signal and communicating it to decoder **51**. Decoder **51** includes conventional apparatus for demodulating or decoding the information bearing received radio frequency signal. Thereafter, the recovered data at decoder **51** is applied to action system **52**. Action system **52** is illustrative of a virtually endless variety of well known toy apparatus which provides some type of movement, sound or light output to produce the desired play effect.

[**0041**] Thus, it will be apparent to those skilled in the art that the present invention system illustrated in **FIG. 2** provides substantial advantages for interactive toy play. An important advantage is found in the use of a relatively low-cost convenient communication mechanism between television **21** and repeater **30**. In addition, the system shown in **FIG. 2** provides substantial advantage in that the use of a radio frequency communication link between repeater **30** and toys **43** through **49** facilitates the continued communication and operation of the toys despite movement to positions behind walls, furniture, doors and the like within the play environment.

[**0042**] While particular embodiments of the invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects. Therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

That which is claimed:

1. A source of communicated data providing data in a first communication link;

a plurality of toys each having means for receiving and recovering data via a second communication link;

action means within each of said toys responsive to recovered data to create toy activity such as sound, movement or light; and

a repeater having means for communicating with said source via said first communication link, means for recovering data, means for applying said data to said second communication link and means for transmitting said data to said toys via said second communication link.

2. The toy system set forth in claim 1 wherein said first communication link is audio.

3. The toy system set forth in claim 2 wherein said second communication link is a radio frequency signal.

4. The toy system set forth in claim 3 wherein said source of communicated data includes a television receiver having an audio output.

5. The toy system set forth in claim 4 wherein said first communication link audio includes audio information having said data embedded therein.

6. The toy system set forth in claim 5 wherein said data is embedded in said audio information utilizes a watermarking process.

7. A toy system comprising:

a television receiver having an output for audio information;

a source of television program information applied to said television and having data embedded in said audio information;

a repeater having means for receiving said audio information and recovering sad data therefrom, means for encoding said data upon a radio frequency signal, and means for transmitting said radio frequency signal; and

a plurality of toys each having action means responsive to said data and means for receiving said radio frequency signal and recovering said data.

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