TOUCH SENSITIVE TOY SYSTEM

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ABSTRACT
A touch sensitive toy comprising a car body; a sensor having a surface sensitive to the touch of a person, wherein the sensor is attached to the card body such that the surface sensitive to the touch of a person is outwardly facing; a circuit electrically coupled to the sensor, wherein the circuit is programmed to react based on a measurement taken by the sensor.

100

102
DRIVES FORWARD
W/ TAIL LIGHTS & SOUND EFFECTS

106
DRIVES BACKWARDS
W/ TAIL LIGHTS & SOUND EFFECTS

CHARACTER QUOTES (2)

104
LIGHTS & SOUND EFFECTS

108
AUDIO CLIP W/ LIGHTS

110
TOUCH DRIVER SIDE WINDOW TO:
- HEAR CHARACTER QUOTES
- WINDOW LIGHTS UP & REVEALS CHARACTER
FIG. 5

Audio Driver

DACO
CAPACITOR
R1

R2

U2 INN
4

6

3

3

VREF

VSS

VSS

CE

502

SPN

SPI

504

SPKR

GFC0030

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Light Driver
Awaken
Power Driver

FIG. 10
TOUCH SENSORS ON BOTH SIDES TO CHARGE UP CAR
-INCLUDES ENGINE REVVING SOUND EFFECTS

FILL UP CHARGE METER FOR MAXIMUM DISTANCE

LET GO AND WATCH THEM DRIVE OFF
-INCLUDES PEEL OUT AND ACCELERATION SOUND EFFECTS

-THE LONGER YOU CHARGE THEM, THE FURTHER THEY GO (MAX CHARGE: 5 SECONDS, MAX DISTANCE: 20 FT)

FIG. 12
TOUCH SENSITIVE TOY SYSTEM

BACKGROUND

I. Field

[0001] The following description relates generally to toys, and more particularly to a system for implementing touch sensitive toys.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] FIG. 1 is a perspective view of a touch sensitive toy system as embodied with a plurality of touch sensitive areas on a toy car.

[0003] FIG. 2 is a location diagram of the plurality of touch sensitive areas on the toy car of FIG. 1.

[0004] FIG. 3 is a functional block diagram of a touch sensitive toy system configured in accordance with one preferred approach.

[0005] FIG. 4 is a diagram of a media cartridge unit (MCU) circuit used to implement the processing system of the touch sensitive toy system of FIG. 3.

[0006] FIG. 5 is a diagram of an audio driver circuit used to implement the audio feedback system of the touch sensitive toy system of FIG. 3.

[0007] FIG. 6 is a diagram of a light driver circuit used to implement the visual feedback system of the touch sensitive toy system of FIG. 3.

[0008] FIG. 7 is a diagram of a sensor circuit used to implement the sensor system of the touch sensitive toy system of FIG. 3.

[0009] FIG. 8 is a diagram of an Auto ON circuit used to implement the awakener feature of the touch sensitive toy system of FIG. 3.

[0010] FIG. 9 is a diagram of a motor driver circuit used to implement the motor system of the touch sensitive toy system of FIG. 3.

[0011] FIG. 10 is a diagram of a power driver circuit used to implement the power system of the touch sensitive toy system of FIG. 3.

[0012] FIG. 11 is a flow diagram of an exemplary operation of the touch sensitive toy system of FIG. 3.

[0013] FIG. 12 is a diagram illustrating a feature of operation of the touch sensitive toy system of FIG. 3.

[0014] FIG. 13 is a diagram illustrating another feature of operation of the touch sensitive toy system of FIG. 3.

DETAILED DESCRIPTION

[0015] Various aspects are now described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of one or more aspects. It may be evident, however, that such aspect(s) may be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to facilitate describing one or more aspects.

[0016] The exemplary touch sensitive toy system disclosed herein provides a touch sensitive mechanism that may be implemented for any device in general, and, more specifically, for any toy. The touch sensitive mechanism can be used to provide the user input component of an interactive toy while being unobtrusive because no buttons need be physically shown on the toy, which for many toys can reduce the realism or faithful reproduction of the original article on which it is based. For example, the touch sensitive mechanism may be used for toy cars that normally have mechanical switches or buttons for operating the vehicle, such as move "Forward" or "Backward" buttons. These buttons and other switches are normally located on the surface of the vehicle and often needs to protrude from the surface thereof so that the user can operate it. Although these switches, along with other switches such as the ON/OFF (i.e., power) switch, can be recessed and hidden on the bottom of the toy car, this will add complexity to the design and operation of the toy car. Preferably, many switches and buttons need to be placed on an easy-to-access location on the toy car. The touch sensitive mechanism replaces these unsightly switches.

[0017] FIG. 1 illustrates an exemplary implementation of a touch sensitive toy system for a toy vehicle to allow a user to activate various functions thereon. For example, the toy car can drive forward and provide visual (e.g., headlights lighting up) and sound effects (e.g., "peeling out") when the hood of the toy car is touched 102; emit sounds of an engine running and shake when the engine compartment is touched 104; drive backward with corresponding visual (e.g., taillights lighting up) and sound effects when the back of the toy car is touched 106; play a song or melody when the side of the toy car is touched 110; and/or play a voice recording when the window is touched 108.

[0018] FIG. 2 illustrates another view of the exemplary implementation of the touch sensitive toy system for a toy vehicle to further show the placement of the touch sensitive locations on the vehicle, including driving forward 202; reverse 206; and engine sound effects 204. To assist the user in locating the controls, the touch sensitive areas may be marked with graphics or indicators, preferably in a fashion that is not obtrusive.

[0019] FIG. 3 illustrates a functional block diagram of an exemplary touch sensitive toy system 300. The touch sensitive toy system 300 is comprised of several components, including a sensor system 302 that can receive inputs from the user; a processing system 304 coupled to the sensor system 302 to detect the received inputs; a visual feedback system 306 and an audio feedback system 308 to provide visual and audio feedback, respectively, to the user based on the detection of the user input on the sensor system 302 and processing by the processing system 304. A motor system 310 is also included in the exemplary touch sensitive toy system 300 for operating moving parts. Power for the system is provided by a power system 312 that is shown to be coupled to the processing system 304, but may be coupled to the other components shown in FIG. 3 to power them as well.

[0020] FIG. 4 illustrates a media control unit (MCU) circuit 400 that can be used to process the signals received from the sensor system 302 and provide responsive, interactive feedback using the various other circuits and systems described herein. In one preferred embodiment, the MCU circuit 400 includes a processor 402 that may be programmed to playback various sounds, activate certain lights and/or activate various other circuits based on detected input. In one aspect, the processor 402 includes memory for storing a plurality of audio tracks or sound effects and other information necessary for the playback of sound effects, etc. The processor 402 also provides processing and timing functions necessary to implement the various modes of operation of the toy car as discussed herein. For example, the processor 402 may detect
user input on a CAP SENSOR 1 input pin 86, and, in response, activate LED 1 on output pin 97 and, at the same time, activate the motor system 310 using the MOTOR+ and MOTOR- output pins 2 and 10, respectively. Other uses of the processor 402 may include providing a sequence of operations that may be pre-programmed or customized by the user, each operation being carried out by a circuit that is directly (e.g., hardwired) or indirectly wired (e.g., using an RF transmitter or transceiver) to communicate with the processor 402.

[0021] The MCU circuit 400 also contains various switches and buttons necessary to operate the car vehicle. The MCU circuit 400 may include a connector so that additional hardware can interface with the processor 402 to extend or alter the capabilities of the processor 402, including additional processors, memory, or electronic circuitry, e.g., wireless control of other output circuits such as a remote light or audio generating devices or motors, or other input circuits such as remote switches or dials that may be used to control the processor 402.

[0022] FIG. 5 illustrates an audio driver circuit 500 of the touch sensitive system that includes an audio chip 502 for driving a speaker 504 based on signals received from a DAC output pin 47 of the processor 102 of the MCU circuit 400. Other devices may be used to generate sound or audio feedback.

[0023] FIG. 6 illustrates a light driver circuit 600 that includes a plurality of LEDs 602, 604 and 606 that may be used by the MCU circuit 400 to provide visual feedback. Other visual feedback devices may be contemplated, including lights or liquid crystal display (LCD) screens.

[0024] Although visual and audio feedback has been discussed, tactile feedback is also implemented as part of the toy car. For example, the toy car may shake and rumble based on the user touching the engine portion of the toy car as discussed above.

[0025] FIG. 7 illustrates a sensor circuit 700 that includes a plurality of sensors 702-716 that the user may touch to initiate various lights, sounds, motions, and various action functions instead of traditional switches or buttons. The plurality of sensors 702-716 operates by sensing the static from human body's static electricity. In one preferred aspect, the sensors are placed in areas that, when touched, will initiate functions related to the area. For example, touching the driver-side window will initiate a voice/phrase from the driver. If the driver is a well-known figure, the voice will be his/her famous saying. Another example is that if the headlights are touched, the headlight will blink or otherwise light up. The operation of each function may be varied by length of time that the user touches the area before letting go. For example, when touched and held for certain time (seconds) before letting go, the toy car may be triggered to move forward for various pre-programmed lengths, speed, and/or actions. Referring to FIG. 12, by touching and holding the appropriate area for a first length of time before letting go 1202 will cause the toy car to move a first distance and/or time; a second length of time before letting go 1204 will cause the toy car to move a second distance and/or time; and a third length of time before letting go 1206 will cause the toy car to move a third distance and/or time. A visual indicator on the toy car, such as a sequence of LED's lighting up, may also provide feedback to the user of how much "charge" the toy car has accumulated. Again, the area for touch can be invisible or labeled with various artwork or marks. FIG. 13 illustrates other implementations of the charge indication feature.

[0026] FIG. 8 illustrates a power circuit 800 for use with the MCU circuit 400. The Auto ON circuit 800 is used to conserve energy of the MCU circuit 400 by preventing the MCU circuit 400 from being engaged in an always ON status. Depending on the various electronic components (e.g., capacitors and resistors) used on this circuit, the Auto ON circuit 800 will trigger the MCU circuit 400 to periodically "wake-up" and check if there has been any sensor that has been touched. In the current implementation, the MCU circuit 400 is to be awakened every 15 ms by the Auto ON circuit 800.

[0027] FIG. 9 illustrates a motor driver circuit 900 that operates by driving a motor 902 to move the toy car based on a signal received from the MCU circuit 400. Although only one motor is illustrated, multiple motors and/or servos may be actuated depending on the toy. For example, a robot may move both arms using separate motors. Thus, multiple motor and actuation systems may be used.

[0028] FIG. 10 illustrates a power driver circuit 1000 that may be implemented for the power system 312 to provide regulated power to the various components in the system, including the MCU circuit 400 and the motor driver circuit 900. In one aspect, the power driver circuit 1000 is implemented using a power regulator integrated circuit (IC) 1002. A switch 1004 is also illustrated to control the closing of the circuit between a battery 1006 and the power regulator IC 1002.

Normal Operation

[0029] FIG. 11 is a flow diagram illustrating an exemplary mode of operation 1100 of the exemplary touch sensitive toy system 300. Initially, in step 1102, the hardware (e.g., touch sensitive toy system 300) is initialized upon power being provided to the touch sensitive toy system 300 (e.g., a power switch being switched from OFF to ON). Thereafter, the touch sensitive toy system 300 will enter into a sleep mode, whereby no active processing is performed. In one aspect, every so often the touch sensitive toy system 300 will awaken in step 1106 to perform a scan of the sensor system 302 to determine if an input has been received. In one aspect the touch sensitive toy system 300 may be awakened every 15 ms. Other power-saving modes may be contemplated. If a sensor touch has been detected in step 1108, then operation will continue to step 1110 where it is determined which sensor has been touched.

[0030] A plurality of actions 1-6, labeled 1112A-F, respectively, may be implemented based on the sensor that is touched. For example, as discussed above, if a first sensor located on the hood of the toy car is touched, the action 1 1112A may be activated. After the action 1 1112A is activated, the touch sensitive toy system 300 will determine if a sensor is being touched in step 1114A, and return to step 1110 to determine which sensor is being touched. Otherwise, touch sensitive toy system 300 will continue to step 1116A, where it is determined if the action triggered by the touching of the sensor (e.g., first sensor) has been completed. If so, then operation returns to step 1104, where the touch sensitive toy system 300 goes to sleep to conserve power.

[0031] As discussed herein, the various aspects of the touch sensitive system has been demonstrated using a toy car. However, it should be noted that the system may be extended to other vehicles, such as airplane, boat, etc. Further, the system may be used with toys such as robots, action figures, and dolls. For example, with regard to dolls, it is typical that a switch is embedded in a hand or other body part of a doll, and
that switch has to be squeezed to activate a predetermined function (e.g., the doll making a noise). Using the touch sensitive system as disclosed herein, the user may simply brush against the surface of the hand of the doll to activate the same function.

CONCLUSION

[0032] The various illustrative logical blocks, modules, and circuits described in connection with the aspects disclosed herein may be implemented within or performed by an integrated circuit ("IC"), an access terminal, or an access point. The IC may comprise a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, electrical components, optical components, mechanical components, or any combination thereof designed to perform the functions described herein, and may execute codes or instructions that reside within the IC, outside of the IC, or both. A general purpose processor may be a microprocessor, but in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[0033] The steps of a method or algorithm described in connection with the aspects disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in random access memory (RAM), flash memory, read only memory (ROM), electronically programmable ROM (EPROM), electronically erasable and programmable ROM (EEPROM), registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to the processor such the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. Moreover, in some aspects any suitable computer-program product may comprise a computer-readable medium comprising codes (e.g., executable by at least one computer) relating to one or more of the aspects of the disclosure. In some aspects a computer program product may comprise packaging materials.

[0034] The previous description of the disclosed aspects is provided to enable any person skilled in the art to make or use the present disclosure. Various modifications to these aspects will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other aspects without departing from the scope of the present disclosure. Thus, the present disclosure is not intended to be limited to the aspects shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

What is claimed is:

1. A touch sensitive toy comprising:
   a car body;
   a sensor having a surface sensitive to the touch of a person, wherein the sensor is attached to the car body such that the surface sensitive to the touch of a person is outwardly facing;
   a circuit electrically coupled to the sensor, wherein the circuit is programmed to react based on a measurement taken by the sensor.

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