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(54) METHOD AND APPARATUS FOR PROVIDING REALISTIC GUN MOTION INPUT TO A VIDEO GAME

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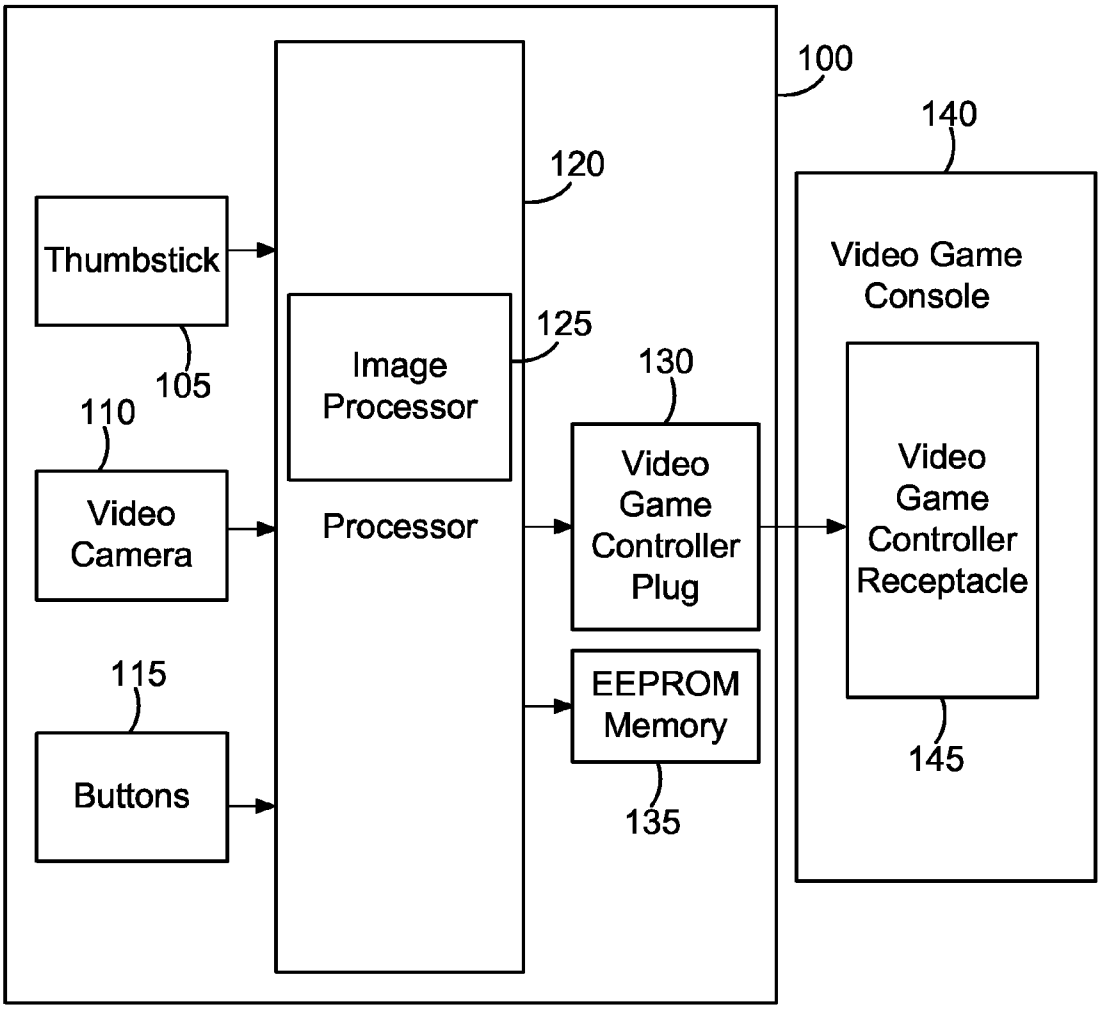
(57) **ABSTRACT**

A method and apparatus for providing realistic gun motion input to a video game. In one embodiment, a plastic enclosure houses a video camera, PCB, microcontroller processor, and many buttons for controlling various aspects of a video game. The processor examines images from the video camera using various feature tracking algorithms and determines the direction and magnitude of motion of the video camera, and hence the motion of plastic gun shaped enclosure in which the video camera is mounted, and that the game player is wielding. This motion data is translated into motion data that a video game running on a video game console can understand, and transmitted to the video game console. The end result is that a user pointing and moving the plastic gun will cause the in game character of the video game to move and point its gun in concert with the game player, thereby providing an intuitive and fun aiming mechanism for playing video games. The button presses that the game player initiates on the apparatus are also reported to the video game and also affect various actions therein.



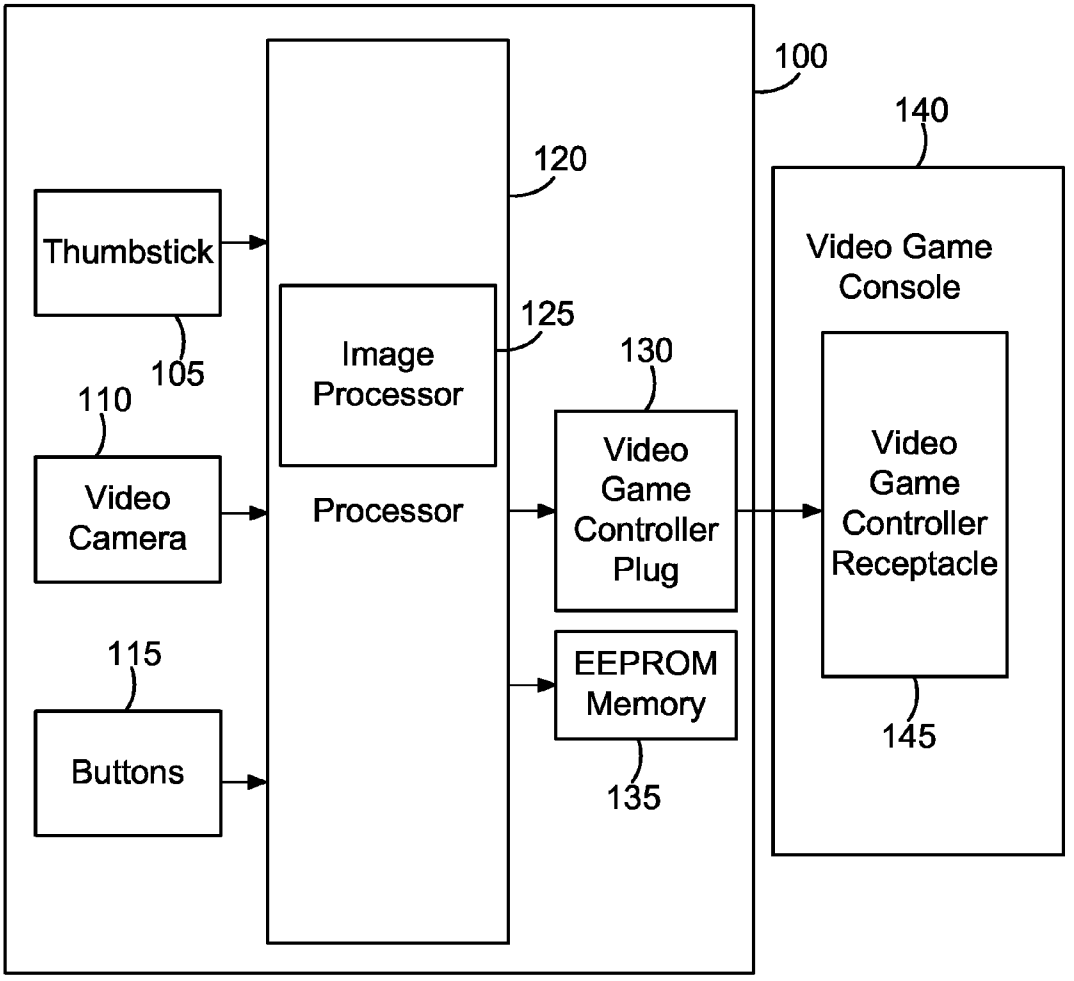

100
140
120
Thumbstick
105
Image Processor
125
130
110
Video Camera
Processor
Video Game Controller Plug
Video Game Controller Receptacle
115
Buttons
EEPROM Memory
135
145
Video Game Console

FIG. 1

METHOD AND APPARATUS FOR PROVIDING REALISTIC GUN MOTION INPUT TO A VIDEO GAME

BACKGROUND OF THE INVENTION

[0001] This invention relates to the field of video games, specifically allowing a user to play a video game by moving and pressing buttons on a peripheral that is shaped like a gun.

[0002] There is a class of video games known as "first person shooters", abbreviated FPS. In these FPS games the video game screen generally shows the view point of a character and generally there is a cross-hair or other type of reticule to show where the character is currently looking and aiming their weapon.

[0003] Since approximately the middle 1990's the preferred control mechanism for FPS games played on a personal computer (PC) has been using a mouse and a keyboard. The mouse is used to control the aiming and direction of view, which is usually indicated on screen by a small reticule, and the keyboard keys are used to make the character move forward, backward, left, right, and diagonal throughout 3D world.

[0004] On video game consoles these FPS games are played with a gamepad type controller. These gamepad controllers are gripped with both hands and have two small joysticks mounted on the top side which are operated by the user's thumbs. These joysticks are typically referred to as "thumbsticks". There are also several buttons located on various other locations of these gamepad type controllers.

[0005] When playing an FPS game with a gamepad controller usually one of the thumbsticks is used for controlling the wind age and elevation of the in-game character's reticule, and therefore it controls the direction of view and aiming of the in-game character. The other thumbstick controls the character's movement throughout the 3D world in the forward, backward, left, right, and diagonal directions.

[0006] Gamepad type controllers do not provide very precise control. With the gamepad type controllers that come with most video game consoles the aiming and movement are controlled with the user's thumbs using two thumbsticks. These thumbsticks usually are internally composed of two potentiometers: one to measure the X-axis motion of the thumbstick and one to measure the Y-axis motion of the thumbstick. Using these thumbsticks adversely affects aiming and movement precision in several ways. One of these ways is that controlling a thumbstick with a single thumb lacks the opposing forces granted by the use of multiple fingers applied to a single input mechanism. Another disadvantage, of this two axis per thumbstick configuration, is that there is an inherent motion bias due to friction along both of these axes. Controllers that offer equal freedom of movement in any given direction provide a more fluid, intuitive, and accurate input means.

[0007] Furthermore the gamepads are unsatisfactory to many game players because one has to have two thumbs on the thumbsticks controlling the direction of view and movement, and the remaining fingers wrapped around the underside of the controller to grip it. This leaves no available fingers to push the buttons on the top side of the controller. This is especially problematic in FPS games because there are many important functions that are assigned to these top buttons that are needed while one's thumbs are busy aiming and moving. This leaves the gamepad user no other choice but to remove a thumb from a thumbstick to press a button when needed. This causes the user's in-game character to momentarily stop moving or aiming, thereby leaving the player's character more vulnerable to the hazards in the video game, such as enemies in the video game firing their weapons at the user's character.

[0008] A disadvantage of the keyboard and mouse method of controlling video games is that it is a cumbersome method to play a video game in a living room setting. This is mainly because a smooth and flat surface is necessary for the mouse, and a sturdy surface is necessary for the keyboard. Both of these surfaces need to be in close proximity to one another and the game player, and positioned for good ergonomics. Such a configuration is unlikely to be found in most living room environments.

[0009] Another disadvantage of the keyboard and mouse configuration is that left/right and forward/back movement within the video game is performed using keys on the keyboard. Since keys on a keyboard only have two states, on and off, the speed of movement cannot be modulated smoothly and precisely.

[0010] Lastly, and most important, a disadvantage of both the gamepad and keyboard/mouse methods of controlling FPS games is that they are not realistic methods of aiming a gun.

BRIEF SUMMARY OF THE INVENTION

[0011] The present invention is generally directed to a gun shaped peripheral that makes it possible for a game player to control FPS (and other) video games in a very natural, intuitive, precise, and fun manner. Several objects and advantages of the present invention include, but are not limited to:

[0012] (a) to allow players to use a peripheral that is shaped like, and is held like, a real firearm;

[0013] (b) to provide an intuitive method of aiming the in-game gun by simply aiming a gun shaped peripheral;

[0014] (c) to allow keyboard/mouse players to play games in a more relaxed posture, rather than being bound to a desk;

[0015] (d) to allow a player to fire the in-game gun by pressing a button that is actuated in a similar manner as the trigger on a real gun;

[0016] (e) to provide well located buttons and actuators for controlling a video game on a gun shaped peripheral;

[0017] (f) to provide a very immersive game playing experience.

[0018] In one embodiment of the present invention, the gun shaped peripheral plugs into a video game console. The peripheral has a microprocessor which outputs signals to the video game console that are in the format of a standard gamepad type controller for that video game console. Before outputting the signals to the video game console, the user actions are processed in accordance with user defined settings and mappings. For instance, a user may decide that a button on the peripheral should produce the same effect as would pressing the "A" button of the standard controller for

that video game console. This and other user defined information is stored in a non-volatile memory such that it will be stored even after the device is unplugged and without power. These settings can be configured by using a special button mapping button. This embodiment also has a thumbstick mounted on the pistol grip area, such that it is operated by the player's thumb.

[0019] In another embodiment of the present invention the gun shaped peripheral communicates to the game system via a wireless connection. Also, the sensitivity of the motion of the gun shaped peripheral as reported to the video game system can be adjusted to suit the player's preference. The plastic enclosure has an expandable stock so that the user can brace it against their shoulder for added precision and realism. A solenoid is attached that produces a percussive kick back when the trigger is depressed, in order to simulate a rifle recoil force. Buttons are located on the fore grip and trigger area of the peripheral for easy access.

[0020] Note that the invention is not limited to the aforementioned embodiments, but rather these are examples meant to help crystallize the invention in the mind of the reader. For instance, the device itself can be connected to the console via many different physical and wireless means.

BRIEF DESCRIPTION OF DRAWINGS

[0021] FIG. **1** is a block diagram showing important elements and signal flow for a preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] The present invention is related to an apparatus and method to allow a user to aim in a video game by holding and aiming a gun shaped peripheral. Referring to FIG. **1**, in a first embodiment **100**, a video camera **110**, microcontroller processor **120**, fifteen buttons **115**, a video game controller plug **130**, an EEPROM memory chip **135**, and a thumbstick **105** are mounted to a PCB (Printed Circuit Board) which connects the aforementioned components via electrically conductive traces. The PCB board is mounted in a plastic enclosure that is shaped like a sub-machine gun. The camera **110** is mounted such that it is at the front of the apparatus and can take images of what is in front of the apparatus. When the video game controller plug **130** is plugged into the video game controller receptacle **145** of a video game console **140**, the electricity from the video game console **140** provides power to the components on the PCB of the apparatus. The camera **110** continually generates images of the environment in front of the apparatus. The images are read by the processor **120**. The processor **120** feeds the images to the image processor **125**. The image processor **125** examines the images in order to detect the direction and magnitude of the motion of the camera **110** and thus the direction and magnitude of the motion of the front end of the apparatus. The image processor **125** does this by identifying trackable features within the images, locating those features in subsequent images, and calculating the displacement of the features along the X and Y axes from one frame to the next. The displacement information is then translated by the processor **120** into the type of displacement information that the video game console **140** understands. The displacement information is optionally modified according to a sensitivity adjustment setting prior to sending it to the video game console **140**. The processor **120** then sends the displacement information to the video game console **140** via the video game controller plug **130** and video game controller receptacle **145**. The aforementioned sensitivity setting allows the user to configure the apparatus to produce larger displacement values for a given movement of the apparatus, or smaller displacement value for a given movement of the apparatus. The displacement values as modified by this sensitivity setting are sent to the video game console **140**. The displacement values are modified by the sensitivity setting by multiplying the displacement values by a sensitivity value. A sensitivity value of less than 1.0 will shrink the displacement value, and a sensitivity value of greater than 1.0 will amplify the displacement value, and therefore increase the distance the in game character move their weapon per unit of distance the game player moves the plastic gun.

[0023] Features are selected by the image processor **125** that are highly trackable. A highly trackable feature is one that is significantly different from another image (of the same number of pixels) that is only a small distance away, for instance one pixel away. So to find a highly trackable feature, the pixels of the feature are compared with every set of pixels that is one pixel in distance away. If all sets of pixels are significantly different than the feature, then the feature is selected for tracking. Once a feature has been selected it is then searched for in subsequent images. A search is done in a subsequent image by comparing the feature to many sets of pixels that are within a certain pixel distance of where the feature was originally found. Because of computational limitations a full search for the feature is not done on the entire image. If the feature that is being tracked has moved outside of the search radius in a subsequent image, then a lower resolution version of the image can be searched for the same feature, or optionally a different feature. The advantage of using the lower resolution image is that it has far fewer pixels and therefore more of the image can be searched, and therefore features can be tracked when they are moving faster (objects moving faster generally require a larger search radius because they travel more distance between frames). The disadvantage of this method is that once the feature is found then its displacement can only be reported using the lower resolution granularity of the smaller resolution image. Therefore the precision of movement is diminished compared with the higher resolution image. However, using the rough displacement/location value that the lower resolution image has yielded for the feature, this provides a rough idea of where the feature is within the higher resolution image. Therefore the higher resolution image can be searched for within a much smaller search radius. This now makes searching the high resolution image computationally feasible. When combining the search of the low resolution image with the search of the high resolution image, the image processor **125** is not only able to track fast moving objects, but the image processor **125** is also able to track these objects with high precision as well.

[0024] The processor **120** also reads the status of several buttons **115** that are attached to the PCB. The buttons **115** are for controlling various actions within a video game. The pressed or released status of all of the buttons **115** are read, and then a non-volatile EEPROM memory **135** is read to determine to which function of the video game each button is mapped. The status of these video game function values

are then sent to the video game console **140** via the video game controller plug **130**. This mapping within the EEPROM memory **135** allows a game player to assign each button to a chosen function. Also, the game player can choose to save a collection of these button mappings to the EEPROM memory **135**. The game player can then cause the processor **120** to recall the collection of mappings and a later time. The user can store many such collections in the EEPROM memory **135**, and then instruct the apparatus to use a specific mapping set depending upon which game the game player has chosen to play. These mappings and other settings are stored in an area of the EEPROM memory **135** known as a profile. The user can recall the appropriate profile for a particular game at any time.

[**0025**] The processor **120** also monitors the position of a thumbstick **105** that is attached to the PCB, and sends its value to the video game console **140** via the video game controller plug **130**. This thumbstick is used to control the forward, backward, left, and right movement of the in game character within the video game's 3D world.

[**0026**] Also in this embodiment, one of the buttons **115** on the plastic enclosure is used by the game player to reposition the apparatus without causing motion in the video game. This is important because the game player could initially be aiming the apparatus in a comfortable direction and position. But then, if the user would like to cause the in game character to look very far to the right, then this might cause the game player to not be able to comfortably move the apparatus far enough to right to cause the in game character to move as far as needed. In this example, the user does not want to continue aiming further to the right, because they will no longer be in a comfortable position, and in fact this may cause them to turn facing away form the video game. But the game player wants to move the in game character further to the right, so what is needed is a button, that when pressed, will allow the apparatus to move in any direction without causing any corresponding motion of the character within the video game. The game player can press this button and then turn aim the gun further to the left, and the in game character will not adjust its aim at all. When the game player then releases this button, subsequently moving the apparatus to the right will cause the in game character to move to the right even further. In this manner, the game player is able to adjust their aim without causing unwanted move in the video game. This is similar in concept to what an FPS game player on a PC does when using a mouse. When the PC player wants to move the mouse without affecting the action on the screen, they simply lift the mouse off the table so that they can move it without causing any input to the PC. If they were not able to do this then they might find themselves in a situation where the mouse is, for example, moved to the far left edge of the desk, and therefore the in game character cannot be moved any further to the left. The processor **120** reads the value of this "movement suspension" button to see if it is pressed or released. If the processor **120** detects that the button is pressed, then the processor **120** reports a motion value of zero to the video game console **140**. If the processor **120** detects that the button is released, then the processor **120** instead reports a motion value to the video game console **140** that is based on the current displacement value that is calculated by the image processor **125** (which is in turn proportional to the motion of the video camera **110**).

[**0027**] In this embodiment there is a button on the right hand side of the gun. This button is near the rear of the trigger guard. The button is placed such that it is located directly under the middle knuckle of the trigger finger of the game player's right hand. The game player can depress this button by pushing it with the underside of the knuckle of their trigger finger. This gives the game player a second button in addition to the trigger button on the gun that they can operate with their trigger finger. A third button that is operated by the game player's trigger finger is located on the interior of the trigger guard right above the actually trigger button. The game player can press this button simply by moving their trigger finger in an upward direction.

[**0028**] In another embodiment of the present invention an expandable rifle stock is attached to the plastic enclosure. This allows the game player to brace the apparatus against their shoulder for greater precision and realism. Also, to enhance realism further, a solenoid is attached to the PCB, and it is instructed by the processor **120** to give a jolt every time the trigger button on the apparatus is pressed.

[**0029**] In another embodiment of the present invention a pressure sensitive foot pad is attached to the PCB via a wired connection. The player stands on the foot pad and the processor **120** reads the steps that the user takes while on the pad. This processor **120**, for example, translates this foot step information into commands that cause the in-game character of a video game to walk in a particular direction. This increases the immersive-ness of the apparatus, and also can give the game player some exercise. A pulse rate sensor is also attached to the PCB, and the pulse rate sensor is connected to metal contacts on the pistol grip of the enclosure. The heart activity of the game player is monitored via this sensor via electrical signals from the user's skin that are conducted through the metal contacts. The user's pulse is reported on an LCD display (that is also attached to the PCB) and is viewable through a hole in the enclosure. This allows the game player to monitor the level of physical workout that they are receiving while playing the game and walking, running, and jumping on the foot pad.

[**0030**] In another embodiment of the present invention, the rotation of the apparatus along an axis that runs through the front to the back of the camera **110**. The rotation information is used to keep track of which direction is up, and therefore keep the lateral movements of the apparatus consistent with a real gun. If this is not done then the direction of motion generated in the video game will be different depending upon the how the apparatus is tilted along its Z axis.

[**0031**] In another embodiment of the present invention, a beacon is use in order to give the image processor **125** an easy to track reference point for tracking motion and rotation. Without the beacon the image processor **125** would have to rely on there being very trackable objects within every environment, and there is no guarantee of this. In this embodiment the beacon is in the form of a reflector. A light source is generated by an LED attached to the PCB. This light is reflected off of the reflector to produce a very trackable land mark for the image processor **125**.

[**0032**] In another embodiment of the present invention an LED is contained in a separate enclosure from the gun shaped housing. The LED generates light that is detectable by the image processor **125**. The image of this light is then

found in images from the camera **110**, and its displacement from image to image is calculated. This displacement is translated to a movement action within the video game and transferred to the video game via the video game controller plug **130**. The orientation of the LED is fixed, so the image processor **125** can also determine the rotation of the camera **110** about the axis that runs through the camera **110** by examining the degree of tilt of the LED beacon within the images.

[**0033**] In another embodiment of the present invention the image processor **125** examines images from the camera **110** to look for the telltale signs of a television. Once the television is detected then is it tracked in subsequent images. The displacement of the television across images is calculated and translated to motion information that the video game console **140** can understand, and this motion information is sent to the video game console **140** to cause movement of an in game character. The rotation and orientation of the gun about its Z axis is also calculated based on the assumption that the top of the television is facing upward. The detection of the television is also used by the image processor **125** to disregard any motion that occurs with the television, since this motion will probably be contrary to the motion of the apparatus, and therefore would ruin the displacement calculations.

[**0034**] In another embodiment of the present invention a second camera is attached to the PCB, and is aimed toward the game player. The images from this second camera are analyzed to identify the game player. The image of the game player is analyzed to detect specific movements and gestures of the game player. These gestures are then mapped to codes for functions of the video game. These codes are then transferred to the video game to invoke specific actions within the video game based on the motions of the game player's body. One of the gestures a user can perform is to kneel down. In many video games, especially FPS games, there is a button on a gamepad controller (or key on the keyboard of a PC) that is used to cause the in game character to crouch. When the game player kneels down, then the image processor **125** will identify this action, and the processor **120** will map this action to an appropriate code for the video game, thereby causing the in game character on the screen to also kneel down.

[**0035**] In another embodiment of the present invention even greater precision of movement of the features being tracked can be determined by doing a "sub pixel" search. If an image is HEIGHT pixels high and WIDTH pixels wide, then the image contains resolution of HEIGHT×WIDTH pixels. But also, grayscale and color images contain additional resolution in their "color depth". Color depth is determined by the number of bits that are used to represent each pixel. In a monochrome bitmap only 1 bit is used per pixel. But in this embodiment **24** bits are used to represent each pixel. If a literal image compare is done between the feature to search for, and the image frame, then this 24 bits of color resolution is not being fully utilized. This is because when a camera moves only a tiny amount then this can cause the features in the image to simply bleed a bit to the next pixel without moving a whole pixel in any direction. With a direct feature compare from pixels in the feature to pixels in the image this small motion will not be detected. In order to harness this color depth resolution, and therefore detect this small movement of the video camera **110**, the feature being searched for has to be shifted a fraction of a pixel in a given direction. This is done by looking at each pixel of the feature bitmap, and then giving it a new color value that is based on its neighboring pixels in the direction the pixel is being shifted. For example, if the pixels are being shifted 0.5 of a pixel directly to the right, then the new pixel value will be 50% of the current pixel color value plus 50% of the color value of the pixel directly to the right. If the pixels are being shifted in a diagonal direction then the new value of the pixel is based on the sum of the fractional values of pixels that the shifted pixel overlaps when it is shifted (including the contribution from the old location of the shifted pixel).

[**0036**] Note that the invention described herein is not limited to the aforementioned embodiments, but rather these are examples meant to help crystallize the invention in the mind of the reader. For example, the device itself can be connected to the video game console **140** via many physical and wireless means, and the camera used could be of many different varieties of camera, including infrared, etc. And the video game could reside on any video game player, including many different video game console **140** devices and personal computers.

What is claimed is:

1. An apparatus for providing realistic gun input to a video game, comprising:

A housing that is shaped like a firearm;

A camera;

An image processing means that processes images from said camera and produces camera motion information;

A means for translating said camera motion information into motion information for a video game;

A means for transmitting said motion information for a video game to a video game;

A plurality of buttons for controlling various functions of a video game;

Whereby moving said housing shaped like a firearm causes corresponding motion displayed by said video game.

2. An apparatus as recited in claim 1 further comprising a means for adjusting the sensitivity of said motion information, wherein the magnitude of said motion information can be amplified and can be reduced.

3. An apparatus as recited in claim 1 further comprising a means for mapping the function of button within said plurality of buttons to any other button within said plurality of buttons.

4. An apparatus as recited in claim 1 further comprising:

a means for simulating the recoil action force of a firearm;

an expandable rifle stock.

5. The apparatus of claim 1 further comprising a means of measuring the angle of rotation of said housing that is shaped like a firearm about an axis of rotation that is approximately parallel to the axis of rotation that runs longitudinally from the back to the front of said housing that is shaped like a firearm.

6. The apparatus of claim 1 further comprising:

a second camera that is aimed toward said housing that is shaped like a firearm;

a means for processing images from said second camera and detecting motions of a game player;

whereby motions of said game player can detected and then translated into actions within said video game.

7. The apparatus of claim 1 further comprising:

a pressure sensitive pad that a game player stands on and generates foot step information;

a means of reading said foot step information from said pressure sensitive pad;

a means of producing actions within said video game based on foot step information from said pressure sensitive pad.

8. The apparatus of claim 1 further comprising a pulse rate sensor whereby the pulse of the game player can be monitored and displayed.

9. The apparatus of claim 1 further comprising a thumbstick located on the upper portion of the pistol grip of said housing that is shaped like a firearm.

10. The apparatus of claim 1 further comprising a beacon that is used to give said image processor a point of reference in the environment.

11. The apparatus of claim 10 wherein said beacon is selected from the group consisting of: a reflector, and a light source, and a television.

12. An apparatus as recited in claim 1 further comprising a plurality of buttons on the side of the fore grip of said housing that is shaped like a firearm.

13. An apparatus as recited in claim 1 further comprising a button on the side of the trigger guard of said housing that is shaped like a firearm, and wherein said button is positioned such that said button is pressed with underside of the knuckle area of the trigger finger of a person's right hand.

14. An apparatus as recited in claim 1 further comprising a button positioned on the interior of the trigger guard of said housing that is shaped like a firearm such that said button is above the trigger finger of a person's right hand, whereby the game player can press the button with the side of their trigger finger by moving their trigger finger in an upward direction.

15. An apparatus as recited in claim 1 further comprising a means to store and recall a set of button mappings in non-volatile memory, whereby a user is able to select a different set of button mappings depending upon which video game is being played.

16. The apparatus of claim 1 further comprising a button selected from the group consisting of:

a pump action button which is pressed by a pump action motion like on a shotgun,

and a clip reload button which is pressed by pushing on the bottom of the pistol grip of said gun shaped like a firearm,

and a button for selecting between fully automatic and semi automatic ammunition firing modes,

and a button which causes said apparatus to cease updating said video game with said motion information,

and a button which causes a change in the magnitude of said motion information reported to said video game,

and a DPAD button,

and a button located in the trigger location of said housing that is shaped like a firearm,

and a second button located in the trigger area of said housing that is shaped like a firearm,

and a third button located in the trigger area of said housing that is shaped like a firearm,

and a button on the side of the fore grip of said housing that is shaped like a firearm,

and a button positioned on the interior of the trigger guard of said housing that is shaped like a firearm such that said button is below the trigger finger of a person's right hand,

and a button positioned on the interior of the trigger guard of said housing that is shaped like a firearm such that said button is above the trigger finger of a person's right hand, and such that said button can be pressed with the side of a person's right hand index finger,

and a button on the side of the trigger guard of said housing that is shaped like a firearm and wherein said button is positioned such that said button is pressed with underside of the knuckle area of the trigger finger of a person's right hand,

and a button on the side of the fore grip of said housing that is shaped like a firearm that is pressed with the underside of the knuckle area of a finger of a person's left hand,

and a button used to map buttons within said plurality of buttons to other functions,

and a button used to create a macro command,

and a button used to alter the sensitivity of the gun motion that is reported to said video game,

and a button used to define and recall a collection of button mappings known as a profile,

and a button on the side of the trigger guard of said housing that is shaped like a firearm wherein said button is positioned such that it is easily pressed with underside of the knuckle area of the trigger finger of a person's right hand,

and a button on the side of the fore grip of said housing that is shaped like a firearm wherein said button is positioned such that it can be easily pressed with underside of the knuckle area of the thumb of a person's left hand,

and a button on the side of the pistol grip of said housing that is shaped like a firearm wherein said button is positioned such that it is pressed with underside of the knuckle area of a finger of a person's right hand,

and a button on the side of the pistol grip of said housing that is shaped like a firearm wherein said button is positioned such that it is pressed with underside of the knuckle area of the thumb of a person's right hand,

and a button mounted on the left hand side of the pistol grip for operation by the fingers of the users right hand,

and a button that is similar in location to the safety button of a firearm,

and a button that is pressed by a slide action actuator similar the slide action actuator of a semi-automatic pistol.

17. An apparatus as recited in claim 1 further comprising a means of temporarily diminishing the magnitude of said motion information transmitted to said video game, whereby a game player can reposition and adjust the aim of said apparatus to a new position without causing significant movement in said video game.

18. The apparatus of claim 17 further comprising a button selected from the group consisting of:

a pump action button which is pressed by a pump action motion like on a shotgun,

and a clip reload button which is pressed by pushing on the bottom of the pistol grip of said gun shaped like a firearm,

and a button for selecting between fully automatic and semi automatic ammunition firing modes,

and a button which causes said apparatus to cease updating said video game with said motion information,

and a button which causes a change in the magnitude of said motion information reported to said video game,

and a DPAD button,

and a button located in the trigger location of said housing that is shaped like a firearm,

and a second button located in the trigger area of said housing that is shaped like a firearm,

and a third button located in the trigger area of said housing that is shaped like a firearm,

and a button on the side of the fore grip of said housing that is shaped like a firearm,

and a button positioned on the interior of the trigger guard of said housing that is shaped like a firearm such that said button is below the trigger finger of a person's right hand,

and a button positioned on the interior of the trigger guard of said housing that is shaped like a firearm such that said button is above the trigger finger of a person's right hand, and such that said button can be pressed with the side of a person's right hand index finger,

and a button on the side of the trigger guard of said housing that is shaped like a firearm and wherein said button is positioned such that said button is pressed with underside of the knuckle area of the trigger finger of a person's right hand,

and a button on the side of the fore grip of said housing that is shaped like a firearm that is pressed with the underside of the knuckle area of a finger of a person's left hand,

and a button used to map buttons within said plurality of buttons to other functions,

and a button used to create a macro command,

and a button used to alter the sensitivity of the gun motion that is reported to said video game,

and a button used to define and recall a collection of button mappings known as a profile,

and a button on the side of the trigger guard of said housing that is shaped like a firearm wherein said button is positioned such that it is easily pressed with underside of the knuckle area of the trigger finger of a person's right hand,

and a button on the side of the fore grip of said housing that is shaped like a firearm wherein said button is positioned such that it can be easily pressed with underside of the knuckle area of the thumb of a person's left hand,

and a button on the side of the pistol grip of said housing that is shaped like a firearm wherein said button is positioned such that it is pressed with underside of the knuckle area of a finger of a person's right hand,

and a button on the side of the pistol grip of said housing that is shaped like a firearm wherein said button is positioned such that it is pressed with underside of the knuckle area of the thumb of a person's right hand,

and a button mounted on the left hand side of the pistol grip for operation by the fingers of the users right hand,

and a button that is similar in location to the safety button of a firearm,

and a button that is pressed by a slide action actuator similar the slide action actuator of a semi-automatic pistol.

19. A method for adapting realistic gun motion input to a video game, the method comprising the steps of:

generating a plurality of images from a camera;

comparing images from said plurality of images to each other and detecting motion by calculating displacement of a subset of pixels from one image from said plurality of images to a subsequent image in said plurality of images;

using said displacement of said subset of pixels to calculate motion data;

update said video game with said motion data;

whereby moving said camera causes corresponding motion displayed by said video game.

20. The method of claim 19 further comprising the steps of:

determining if a game player would like to recalibrate the location of said camera that will correspond to causing no motion within said video game;

reporting motion values to said video game that cause no motion within said video game if has been determined that said game player has selected to recalibrate the zero location of said camera;

whereby a game player can reposition and adjust said camera to a new position without causing significant movement in said video game.

21. The method of claim 19 further comprising the step of choosing a subset of pixels to track from within an image from said plurality of images that has a high degree of dissimilarity with neighboring subsets of pixels.

22. The method of claim 19 further comprising the step of searching for said subset of pixels in a lower resolution version of an image from said plurality of images;

whereby computation time is decreased.

23. The method of claim 19 further comprising the steps of:

altering said subset of pixels so that it resembles a subset of pixels that would be generated if said camera were shifted less than one pixel distance in a chosen direction, thereby producing a shifted subset of pixels;

compare said shifted subset of pixels to a second subset of pixels within an image from said plurality of images;

using the magnitude of degree of shift of said shifted subset of pixels to calculate the degree of movement of said camera;

whereby camera movements smaller than one pixel can be detected and used to provide higher resolution motion information to said video game.

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