[0601] An instrument or portion(eg a drumstick, a bow) to a musician

[0602] A axe to a lumberjack

[0603] A drill, hammer, or saw to a carpenter

[0604] A pistol to a policeman or soldier

[0605] A scalpel to a surgeon

[0606] A drill to a dentist

[0607] And so on

[0608] Each person can use a real, or alias object (eg a broomstick piece for a hammer) targeted as he chooses, in order to use the audio and visual capabilites of computer generated activity of the invention. All are more natural to him or her, than a mouse! In each case too, the object to be worked on can also be sensed with the invention

[0609] The cloth of the dress

[0610] The paper(or easel/table) of the artist or draftsman

[0611] The violin of the musician (along with the bow)

[0612] The log of the lumberjack

[0613] The teeth or head of the dental patient,

[0614] And so on . . .

[0615] The computer program, using the sensor input, can faithfully utilize the input, or it can extrapolate from it. For example rather than play middle C, it can play a whole chord, or knowing the intended piece, play several of the notes in that piece that follow. Similarly, one can start a simulated incision with a scalpel, and actually continue it a distance along the same path the student doctor started.

[0616] Sounds, Noise and Visual Cues

[0617] The cocking of a hammer on a toy pistol can act as a cue in many cases. A microphone connected to the computer can pick this up and analyze the signature and determine that a gun may be fired. This can cause the vision analysis program looking at the tv image to look for the pistol, and to anticipate the shot. The sound of the gun, rather than a visual indicator, can alternatively be used to cue the displayed image data as well. Two microphones if used, can be used to triangulate on the sound source, and even tell the tv camera where to look. In many cases sound and physical action are related. Sounds for example can be used to pick up a filing noise, to indicate that a alias object was actually being worked by a tool. The TV camera(s) can monitor the position and orientation of each, but the actual contact registered by sound. Or contact could be just the physical proximity of one image to another—however the sound is created by the actual physical contact which is more accurate, and more real to the user.

[0618] Signature Recognition

[0619] The invention can look for many signatures of object position and movement—including complex sequences. This has been described in another context relative to **FIG. 7** for recognizing human gestures. The recognition algorithim can be taught before hand using the position or movement in question as an input, or it may be preprogrammed, to recognize data presented to it from a library, often specific to game/activity of interest.

[0620] Such recognition can also be used to Anticipate an action, For example, if a bow string or hand is moved directly back from a bow, recognition is that one is Drawing a bow, and that an arrow may be ready to be shot. The computer can then command the screen display or sound generation speakers to react (eyes, head move, person on screen runs away, etc) Similarly, the actual action of releasing the bow can be sensed, and the program react to the move

[0621] It is of use to consider some of what even the simplest version of the invention, illustrated in **FIG. 1***a*, could accomplish? In the lowest cost case, This uses retroreflective glass bead tape, or jewelry on an object to allow determination in x and y (plane perpendicular to camera axis) of for example

[0622] 1. position of one or more points on or portions of, or things to do with, babies, game players, old persons, disabled, workers, homemakers, etc.

[0623] 2. Determine position of object such as something representing position or value of something else

[0624] 3. Determine location of a plurality of parts of the body, a body and an object, two objects simultaneously, etc

[0625] 4. With additional software and datums, expand to **FIG. 1***b* version, and Determine up to six dimensional degrees of freedom of object or of one object or more with respect to each other). Use Single camera but with target set having known relationships. (Single camera photogrammetry).

[0626] Today, costs involved to do the foregoing would appear to be a USB camera and in the simplest case, no frame board; just right into the computer. This today could result in images being processed at maybe 10 hertz or less. Simple thresh holding, probably color detection would all that would be needed. More sophisticated shape, recognition and finding of complex things in the scene are not required in simple cases with limited background noise, and are aided by use of the retroreflector or LED sources.

[0627] The only other equipment that would be needed in this scenario is the lighting unit that would surround the camera. Clearly this would be somewhat camera specific in terms of its attachment and so on. Many cameras, as it would appear that have been designed for internet Cameras and lighting as needed could be built right into the TV display units.

[0628] In the simplest case, there would be simply one target and one only. This would allow a simple TV camera to give 2D point position—essentially be a 2D mouse in space (except that absolute position of th point relative to the camera can be determined—the mouse of today is incremental from its starting point).

[0629] Some applications

[0630] 1. Direct mouse replacement. The mouse today is in 2D and so is this. Generally speaking, depending on where the camera is, this is either the