A motorized mount for an electronic display includes a biaxially shiftable mount assembly including a positioning assembly being translatably shiftable in a plane and a rotator assembly operably coupled to the positioning assembly, the rotator assembly being rotatably shiftable about an axis, the axis being orthogonally disposed relative to the plane. A method of selectively positioning an electronic display is further included.
MOTORIZED MOUNT FOR ELECTRONIC DISPLAY

RELATED APPLICATION

[0001] The present application claims the benefit of U.S. Provisional Application 60/755811, filed Jan. 3, 2006, and incorporated herein in its entirety by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to mounting devices for electronic displays, and in particular, remotely selectively positionable mounting devices for flat panel electronic display devices.

BACKGROUND OF THE INVENTION

[0003] Flat panel electronic display devices such as flat panel televisions and display monitors are becoming increasingly popular due to superior image quality, space utilization, and increasing affordability as compared with conventional CRT displays. These flat panel display technologies have proven especially well suited to screen sizes over 36 inches, above which the size and weight of a CRT device become prohibitive.

[0004] In very large screen sizes, however, even flat panel electronic displays are heavy and difficult for an individual to manage. Further, it is often desirable to position a display in a better position for viewing. This typically involves moving the display away from a wall so the screen may be tilted from side-to-side over a wider range of motion. While this may be accomplished in some instances by mounting the display on a wheeled cart, this approach has drawbacks. One problem with such an approach is that the large mass of the flat panel display may make the combination heavy and prone to tipping. Another drawback is that the cart takes up floor space, thereby negating part of the space advantage of a flat panel display. Moreover, for full positioning capability, the cart must be remotely positionable as well as the display itself, making for a relatively complex position control system.

[0005] Another approach is to mount the flat panel display from a wall or other structural element. Prior wall mounting devices have been developed that enable wall mounting of a flat panel display with remote positioning capability. These prior devices, however, have certain drawbacks. One such device is disclosed in published PCT application WO 2005/052435 A1. In this device, threaded rods are joined together in a rectangular configuration whereby each threaded rod supports a movable carriage including a linear actuator thereon. The flat panel display device is coupled with each carriage through a rigid tube. As the linear actuators are moved along the threaded rods as directed with the remote control, the screen of the flat panel display is moved outwardly from the wall and tilted from side-to-side and up-and-down. A drawback of this device, however, is the display device causes relatively large structural loads to be placed on the threaded rods, tubes and linear actuators when the display is cantilevered a significant distance from the wall. The size of these elements must be made correspondingly large to accommodate this loading, adding to the space demands, weight, and cost of the mounting device. Further, the device requires a relatively large number of actuators or motors, adding to the cost of the device and complexity of the control systems.

SUMMARY OF THE INVENTION

[0006] Another prior remotely positionable mount is disclosed in US published patent application U.S. 2005/0179618 A1 entitled “VIEWING ANGLE ADJUSTMENT FOR A MONITOR.” In this device, a known swing arm type cantilever mount is modified with a rotary positioning motor at each arm connection. A drawback of this device, however, is that a relatively complex control system is needed to monitor and control the multiple positioning motors. Further, even with such a complex control system, the resulting positioning movement of the display is likely to be somewhat non-uniform and halting due to the need to assimilate position feedback signals in the control system.

[0007] What is still needed in the industry is a wall mount for an electronic flat panel display device that exhibits good structural strength characteristics in a relatively simple design that is as well relatively lightweight and compact that enables remotely controlled positioning of the display with a smooth motion.

BRIEF DESCRIPTION OF THE FIGURES

[0010] FIG. 1 is a perspective view of a remote controlled mount according to an embodiment of the invention with a flat panel electronic display device mounted thereon;

[0011] FIG. 2 is a fragmentary perspective view of a portion of the positioning assembly and swing arm assembly of the mount depicted in FIG. 1;
FIG. 3 is a fragmentary perspective view of another portion of the positioning assembly and scissor arm assembly of the mount depicted in FIG. 1;

FIG. 4 is a fragmentary perspective view of a portion of the rotator and slide assemblies of the mount depicted in FIG. 1;

FIG. 5 is a fragmentary perspective view of another portion of the rotator and slide assemblies of the mount depicted in FIG. 1;

FIG. 6 is a front perspective view of the mount and display depicted in FIG. 1;

FIG. 7 is a rear elevation view of the mount and display depicted in FIG. 1;

FIG. 8 is a top plan view of the mount and display depicted in FIG. 1;

FIG. 9 is a side elevation view of the mount and display depicted in FIG. 1;

FIG. 10 is a bottom plan view of the mount and display depicted in FIG. 1;

FIG. 11 is a perspective view of an embodiment of a remote controlled mount according to an embodiment of the invention; and

FIG. 12 is a fragmentary view of a portion of the mount of FIG. 11.

DETAILED DESCRIPTION OF THE INVENTION

A motorized mount according to an embodiment of the present invention is depicted generally at 20 in the figures. Motorized mount 20 generally has three major components: wall interface assembly 22, display device interface 24 and positioning assembly 26, as depicted in FIGS. 1 and 6.

The first component of motorized mount 20 is wall interface assembly 22, shown particularly in FIGS. 2, 3, 7, 11 and 12. Wall interface assembly 22 generally includes housing 28 having a pair of laterally projecting flanges 30. Housing 28 may have a width dimension W (see FIG. 2) defined between the flanges 30 and selected so as to correspond with the spacing between adjacent studs of standard stud spacing in frame wall construction such as stud spacing, for example, 16 inches or 24 inches on center. Each flange 30 may have one or more apertures 32 for receiving fasteners 34 (see FIG. 11) to attach wall interface assembly 22 to studs 36 in a wall 38. Mechanism cover 40 (see FIG. 12) may be provided to cover all or a portion of the interior of housing 28 when installed in the wall 38.

The second component of motorized mount 20 is display device interface 24, shown particularly in FIGS. 4, 5 and 9. Display device interface 24 generally includes interface plate 42 and fastening buttons 44. Interface plate 42 has a plurality of apertures 46 defined therein for receiving fastening buttons 44, which are attached to flat panel display device 48. Various arrangements of apertures and fastening buttons that may be used to attach flat panel display device 48 to interface plate 42 are described in U.S. patent application Ser. No. 10/821,395 entitled FLAT PANEL DISPLAY MOUNTING SYSTEM, commonly owned by the owners of the present invention and hereby incorporated herein in its entirety by reference. In other embodiments of the invention, display device interface 24 may include a perimeter frame structure 50 (see FIG. 11) having inside dimensions slightly greater than the outside dimensions of a certain flat panel display device 48 and into which the flat panel display device 48 may be received. In these embodiments, flat panel display device 48 may be attached to frame 50 using any attaching means known in the art.

The third component of motorized mount 20 is positioning assembly 26, shown particularly in FIGS. 2-5, 11 and 12. Positioning assembly 26 generally includes means for shiftingly translating the display device interface 24 in a plane that is substantially horizontal or parallel with a floor of a room in which the motorized mount 20 is mounted. Positioning assembly 26 generally includes screw drive assembly 52, scissor arm assembly 54, slide assembly 56 and rotator assembly 58. Screw drive assembly 52 generally includes screw 60, positioning block 62, motor 64, and thrust bearing assembly 66. Screw 60 has a spiral thread 68 formed thereon and extending over its full length. Motor 64 is attached to inside surface 70 of housing 28 and has an output shaft 72 attached to one end 74 of screw 60. Opposite end 76 of screw 60 is coupled to thrust bearing assembly 66 at thrust bearing 78. Thrust bearing 78 is rotatably received in thrust bearing housing 80, fixed to bottom wall 82 of housing 28. Positioning block 62 has body portion 84 with a pair of cylindrical stub shafts 86 extending laterally, coaxially from each opposite side 87 of the body portion 84. Bore 88 is transversely defined from top to bottom through positioning block 62. Bore 88 has an internal thread (not depicted) formed therein corresponding with thread 68 of screw 60, so that positioning block 62 is shiftably threaded onto screw 60.

Scissor arm assembly 54 of positioning assembly 26 is depicted in FIG. 11 and generally includes first arm pair 90 and second arm pair 92. As such, scissor arm assembly 54 is compounded with each arm pair 90, 92 comprising an arm of scissor arm assembly 54. This is in distinction to the conventional construction of a scissor arm that has single bars pivotally coupled to each other. First arm pair 90 generally includes parallelly disposed arms 94, 96, that in cooperation comprise a first arm of scissor arm assembly 54. Each of arms 94, 96 have inwardly angled portion 98, 100, respectively at an end thereof. Fastening tabs 102, 104 project from each angled portion 98, 100, and each of the respective fastening tabs 102, 104 has a bore 105 formed therein. The respective bores 105 are in registry for receiving pivot axle 106 on respective opposed ends of pivot axle 106. Opposite ends 108, 110, of arms 94, 96, have a bore 111 that receives bushings 112, 114. Pivot axle 116 extends through a bore defined in positioning block 62 and is rotatably received at respective opposed ends thereof in bushings 112, 114.

Second arm pair 92 generally includes arms 118, 120, that in cooperation comprise a second arm of scissor arm assembly 54. Arms 118, 120 include at a first end inwardly angled portions 122, 124, respectively. Each angled portion 122, 124, has a fastening tab 126, 128 for receiving pivot axle 130. Opposite ends 132, 134 of arms 118, 120 have apertures disposed in registry (not depicted) for receiving pivot axles 136, 138. Bracket pairs 140, 142,
extend downwardly from upper wall 144 of housing 28. Pivot axles 136, 138 extend through arms 118, 120 and each bracket pair 140, 142 to pivotably mount arms 118, 120 to housing 28. Each pivot axle 136, 138 has a respective head portion 146 and a respective opposing end 148. Each respective opposing end 148 has an aperture for receiving a cotter pin 150 to secure pivot axles 136, 138 in place.

Each arm pair 90, 92, has an aperture (not depicted) intermediate the head portion 146 and the opposed end 148 for receiving central pivot axle 152. Central pivot axle 152 extends through both arm pairs 90, 92, and enables arms 90, 92, to angularly pivot together in a compound scissors configuration, such pivoting acting to extend or retract the head portion 146 and the opposed end 148 relative to each other along an axis transverse to wall 38 and lying in a generally horizontal plane. Such extension and retraction acts to effectively lengthen and shorten the overall length of the scissors arm assembly 54, thereby positioning the display device interface 24 transversely relative to the wall 38 in the plane noted above.

Slide assembly 56 of positioning assembly 26 generally includes shaft 154 and slide 160. Shaft 154 is fixed to interface plate 42 at bosses 156, 158. Slide 160 is slidably received on shaft 154. Pivot axle 130 extends through fastening tabs 126, 128, and slide 160 to pivotally attach arms 118, 120, to slide 160.

Rotator assembly 58 of positioning assembly 26 (see FIGS. 8-11) generally includes means for shiftable rotating the display device interface 24 about an axis disposed orthogonally to the plane of actuation of the positioning assembly 26, noted above. Rotator assembly 58 generally includes housing portion 162, motor 164, drive gear 166, and positioning gear 168. Housing portion 162 and positioning gear 168 are rotatably mounted on shaft 154. Bearing portion 170 of positioning gear 168 bears against interface plate 42. Pivot axle 106 extends through fastening tabs 102, 104, and housing portion 162, to pivotally attach arms 94, 96, to housing portion 162. Motor 164 is fixed to housing portion 162 and has its output shaft coupled with drive gear 166, which is in turn, meshed with positioning gear 168.

Motor 64 and motor 164 may be electric motors with output shafts connected through reduction gear assemblies to provide a low speed bi-directional rotary output. Each motor is operable through a separate control so that each motor may be operated independent of the other.

In operation, power is applied to motor 64, causing it to rotate screw 60 in either a clockwise or counterclockwise direction. As screw 60 rotates, positioning block 62 moves vertically along the length of screw 60, the direction of movement depending on the direction of rotation of screw 60. The vertical movement of positioning block 62 causes scissors arm assembly 54 to move display device interface 24 either closer to, or further away from, wall interface assembly 22, thereby retracting or extending flat panel display device 48 from the wall in the plane noted above.

Power may also be separately applied to motor 164, thereby causing it to rotate positioning gear 168 through drive gear 166 in either a clockwise or counterclockwise direction through a known angle about an axis (the longitudinal axis of shaft 54) that is orthogonally disposed relative the plane of extension/retraction of scissors arm assembly 54. Such rotation imposes opposing biases on the interface plate 42. Bearing portion 170 selectively bears against interface plate 42 on one side or the other of the axis of rotation in the direction of gear rotation, thereby causing interface plate 42 to rotate on shaft 154 in a selected direction. Such rotation selectively positions the flat panel display 48 attached to interface plate 42 for better viewing as desired.

In an embodiment of the invention, motor 64 and 164 may be controlled remotely through a receiver associated motorized mount 20 and a remote transmitter. The receiver and transmitter may be communicatively connected via hardwire or various wireless modes including modulated infrared signals where line-of-sight control is desired, or through modulated radio-frequency signals for greater range. In embodiments of the invention, remote control of mount 20 may be incorporated in the same transmitter with remote control of one or more of the flat panel television, satellite receivers, digital media players, sound systems, or other electronic devices associated with the flat panel television as is known in the art.

Although a specific arrangement is disclosed above, it will be evident to those of skill in the art that other embodiments are encompassed within the scope of the invention. For example, in an embodiment, the positioning assembly may be located in the display interface, with the slide assembly located in the wall interface.

What is claimed is:

1. A motorized mount for an electronic display, comprising:
   a wall interface assembly fixable to a wall, a display device interface couplable to the electronic display, and a positioning assembly operably coupled intermediate the wall interface assembly and the display device interface, the positioning assembly being selectively extendable relative to the wall interface assembly for translatably positioning the electronic display by means of a shiftable scissors arm assembly.

2. The motorized mount of claim 1, the positioning assembly including a screw and positioning block, the positioning block being threadedly engaged with the screw and being operably coupled to the scissors arm assembly, rotation of the screw in either a first direction about a longitudinal axis or in a second opposed direction about the longitudinal axis acting to axially translate the positioning block relative to the screw.

3. The motorized mount of claim 2 wherein axially translation of the positioning block relative to the screw in a first direction acts to extend the scissors arm assembly and axially translation of the positioning block relative to the screw in a second opposed direction acts to retract the scissors arm assembly.

4. The motorized mount of claim 2, an extending motor being operably coupled to the screw for selectively effecting rotation of the screw in either the first direction about the longitudinal axis or in the second opposed direction about the longitudinal axis.

5. The motorized mount of claim 4, the extending motor being actuable remotely.
6. The motorized mount of claim 1, the scissor arm assembly having a first and a second pair of parallelly disposed arms, the first pair of arms being operably coupled to the second pair of arms at a common pivot.

7. The motorized mount of claim 6, wherein actuation of the scissor arm assembly acts to simultaneously angularly shift the first pair of arms and the second pair of arms relative to each other about the common pivot.

8. The motorized mount of claim 1, further including a rotator assembly for selectively rotating the electronic display in a generally horizontal plane relative to the positioning assembly.

9. The motorized mount of claim 8, the rotator assembly including a rotator motor operably coupled to a gear train, the gear train being operably coupled to the display device interface for selectively imparting opposing biases to the display device interface for effecting bidirectional rotation of the display device interface.

10. The motorized mount of claim 9, the rotator motor being actutable remotely.

11. A motorized mount for an electronic display, comprising:

   a biaxially shiftable mount assembly including a positioning assembly being translatably shiftable in a plane and a rotator assembly operably coupled to the positioning assembly, the rotator assembly being rotatably shiftable about an axis, the axis being orthogonally disposed relative to the plane.

12. The motorized mount of claim 11, the positioning assembly including a shiftable scissor arm assembly, actuation of the scissor arm assembly acting to selectively translate a display device interface in two opposed directions in the plane.

13. The motorized mount of claim 12, the scissor arm assembly having a first and a second pair of parallelly disposed arms, the first pair of arms being operably coupled to the second pair of arms at a common pivot.

14. The motorized mount of claim 13, wherein actuation of the scissor arm assembly acts to simultaneously angularly shift the first pair of arms and the second pair of arms relative to each other about the common pivot.

15. The motorized mount of claim 11, the positioning assembly including a screw and positioning block, the positioning block being threadedly engaged with the screw and being operably coupled to the scissor arm assembly, rotation of the screw in either a first direction about a longitudinal axis or in a second opposed direction about the longitudinal axis acting to axially translate the positioning block relative to the screw.

16. The motorized mount of claim 11, the rotator assembly including a rotator motor operably coupled to a gear train, the gear train being operably coupled to the display device interface for selectively imparting opposing biases to the display device interface for effecting bidirectional rotation of the display device interface about the axis.

17. A method of selectively positioning an electronic display, comprising:

   biaxially shifting a mount assembly by means of:
   translatably shifting a positioning assembly in a plane;
   operably coupling a rotator assembly to the positioning assembly; and
   rotatably shifting the rotator assembly about an axis, the axis being orthogonally disposed relative to the plane.

18. The method of claim 17, including actuating a shiftable scissor arm assembly of the positioning assembly to selectively translate a display device interface in two opposed directions in the plane.

19. The motorized mount of claim 17, including selectively imparting opposing biases to a display device interface for effecting bidirectional rotation of the display device interface about the axis.

20. The method of claim 17, including remotely controlling translatably shifting the positioning assembly in the plane and rotatably shifting the rotator assembly about the axis.