A mount system utilizes one motor to extend/retract and tilt a monitor. The mount system may include a second motor to swivel the monitor.
MOUNT SYSTEM UTILIZING ONE MOTOR TO EXTEND/RETRACT AND TILT A MONITOR

BACKGROUND

[0001] 1. Related Applications

[0002] This application claims priority to a U.S. Provisional application Ser. No. 61/0152,277, filed Dec. 20, 2007, entitled “Mount System For Adjusting The Viewing Angle Of A Monitor,” which is hereby incorporated by reference.

[0003] 2. Field of the Invention

[0004] This invention is directed to a mount system that is adapted to couple to a back side of a monitor, and adjust the viewing angle of the monitor through one or more motorized actions.

[0005] 3. Background of the Invention

[0006] Flat panel monitors such as computer monitors, LCD, plasma, slim televisions, and the like (collectively referred to as “monitor(s)” are becoming popular because they can be mounted onto a wall to save floor space and for their aesthetically pleasing appearance. In many applications, a monitor is attached to a wall with a mount bracket between the monitor and the wall. In order to reposition the monitor, an articulating mount is used to attach the monitor to the wall. The articulating mounts that are available today, however, are difficult to use because they have a tendency to move laterally left and right rather than moving straight in and out of the wall as the monitor is pushed and pulled, respectively. In situations where the monitor is retracted into a wall or a cabinet, the lateral movement of the monitor adds to the difficulty of extending and retracting the monitor from its retracted position. Moreover, with manual mounts, in order to reposition the monitor, the viewer needs to walk over to the monitor and physically move the monitor to a new position.

[0007] Some mounts incorporate one or more motors to move the mount through motorized action. These motorized mounts incorporate a motor for every degree of movement such as: a first motor for extending and retracting the mount relative to a wall, a second motor for swiveling the mount side to side; and perhaps a third motor for a tilt movement. As such, for three degrees of movement, three motors are used. Every motor, however, adds to the cost of the mount. In addition, adding a motor increases the complexities of controlling the motors. Accordingly, there is a need to adjust the viewing angle of the monitor in a cost effective way and to simplify the control mechanism.

INVENTION SUMMARY

[0008] This invention is directed to a mount system adapted to extend and retract a monitor from the wall, and tilt the monitor with one motor. The mount system may also include a second motor to swivel the monitor. The mount system may have a scissor type actuator that extends and retracts the monitor in a substantially perpendicular manner.

[0009] Other systems, methods, features, and advantages of the invention will be, or will become, apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features, and advantages be included within this description, be within the scope of the invention, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention can be better understood with reference to the following drawings and description. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like referenced numerals designate corresponding parts throughout the different views.

[0011] FIG. 1 shows a side view of a mount system in an extended position along a YZ plane.

[0012] FIG. 2 shows the mount system of FIG. 1 in a retracted position along a YZ plane.

[0013] FIG. 3 shows a cutout front view of the mount system of FIG. 1 along a XY plane.

[0014] FIG. 4 shows another embodiment of the invention.

[0015] FIG. 5 shows a perspective view of yet another mount system in an extended position along X, Y, and Z coordinates.

[0016] FIG. 6 shows a perspective view of still another mount system in an extended position along X, Y, and Z coordinates.

DETAILED DESCRIPTION OF THE INVENTION

[0017] FIG. 1 shows a mount system 100 adapted to extend and retract a monitor, and as the monitor is being extended/retracted, the mount system 100 also tilts the monitor; and adapted to swivel the monitor along YZ coordinates. The mount system 100 includes a mounting plate 102 adapted to support a first actuator 104. The first actuator 104 may be a scissor type mechanism having a first link 106 and a second link 108. The first link 106 may have a proximal end 110 and a distal end 112; and the second link 108 may have a proximal end 114 and a distal end 116. The mounting plate 102 may have a first flange 118 with an elongated opening 120, and a second flange 124. The proximal end 110 of the first link 106 may be pivotably coupled to the opening 120 about a first pivot axis 122 to allow the first pivot axis 122 to slide along the elongated opening 120. The proximal end 114 may be pivotably coupled to the second flange 124 to pivot about a second pivot axis 126.

[0018] The mount system 100 includes a second actuator system 130 having a housing 131 and a monitor mounting bracket 133. The monitor mounting bracket 133 may have two cross-pipes 130 and 182 adapted to couple to the rear side of a monitor. The housing 131 may have a motor 135 mechanically coupled to a gear 132 to rotate the gear 132. The housing 131 may include a shaft 137 with a first end 134 and a second end 136. The second end 136 may be adapted to couple to a sleeve 138 adapted to rotate about the longitudinal axis of the shaft 134. The sleeve 138 may be adapted to pivotably couple to the distal end 116 of the second link 108 to pivot about a third pivot axis 140. The sleeve 138 may be coupled to the second end 136 of the shaft 134 such that as the second end 136 moves along the longitudinal axis of the shaft 134, the third pivot axis 140 moves along Y-axis as well, which may be substantially parallel with the longitudinal axis of the shaft 134.

[0019] The shaft 134 may have gear teeth 142 along the longitudinal axis of the shaft 134 on one side. The gear 132 may be adapted to engage with the teeth 142 of the shaft 134 such that as the motor 135 rotates the gear 132, the shaft 134
may move along its longitudinal axis, thereby moving the distal end 116 along the Y-axis which is substantially parallel with the longitudinal axis of the shaft 134 while pivoting about the third pivot axis 140.

[0020] A moving block 144 may be coupled to the shaft 134 so that the moving block 144 moves along the longitudinal axis of the shaft 134 as well. In this example, the moving block 144 may be coupled to the side of the shaft 134. The moving block 144 may have one or more rollers 146 adapted to roll along a base plate 148 of the housing 131. The housing 131 may have side walls 150 adapted to pivotably engage with the side walls 152 of the monitor mounting bracket 133 so that the monitor mounting bracket 133 may pivot about a sixth pivot axis 154, which is located between the base 156 of the monitor mounting bracket 133 and the approximate location 158 of the center of gravity of a monitor. One of the side walls 150 or 152 may have a curvature opening 160 defined by a radius of curvature “R” with its focal point at the sixth pivot axis 154. Having the monitor mounting bracket 133 pivot about the sixth pivot axis 154, which is closer to the center of gravity 158, minimizes the torque needed from the motor to tilt the monitor. Note that it is within the scope of this invention to utilize a pivoting axis within the side walls 150 and 152 to pivot the monitor mounting bracket 133 relative to the housing 131.

[0021] The monitor mounting bracket may have a wheel 146 adapted to engage with the moving block 144 to pivot the monitor mounting bracket 133 about the sixth pivot axis 154. The moving block 144 may have a first surface 164 that may be sloped relative to the XY plane. The moving block 144 may also include a second surface 165 that is substantially parallel with the XY plane or the base 148. The moving block 144 may be positioned relative to the wheel 162 so that the first surface 164 of the moving block 144 engages with the wheel 162 at a predetermined distance from the fully extended position of the monitor mounting bracket 133. As such, as the first actuator 104 retracts the monitor from the extended position, the monitor mounting bracket 133 begins to tilt the monitor to the upright position as the base 148 of the housing 131 reaches a first predetermined position A and fully tilts the monitor to the upright position as the base 148 reaches a second predetermined position B, which is before the first actuator 104 is at a fully retracted position. In other words, the wheel 162 engages the first surface 164 of the moving block 144 as the base 148 of the moving block 144 between the predetermined positions A and B so that the monitor mounting bracket 133 tilts the monitor up and down relative to the base 148; and the wheel engages the second surface 165 of the moving block 144 between the predetermined position B and the fully retracted position. The length of the second surface 165 may be sufficiently long along the Y-axis to support the wheel 162 as the base 148 moves from the predetermined position B to the fully retracted position. This minimizes the torque required by the motor 135 because there may be an inrush of current necessary to extend the monitor from the fully retracted position and an inrush of current may be necessary to retract the monitor from the fully extended position. As such, by tilting the monitor between the predetermined locations A and B, less current or torque may be required for the motor 135 to extend or retract, and at the same time tilt the monitor.

[0022] The second actuator system 130 may include a second motor mechanism 166 having a second motor 168 adapted to rotate a second shaft 170 about its longitudinal axis. The distal end 172 of the second shaft 170 may be coupled to a bracket 174 adapted to pivotally couple to the distal end 112 of the first link 106 about a fourth pivot axis 176. The second motor mechanism 166 may be coupled to the base 148 of the housing 131 so that the longitudinal axis of the second shaft 170 may be aligned against the longitudinal axis of the first shaft 134. As the second motor 168 rotates the second motor mechanism 166 about the longitudinal axis of the second shaft 170, the second actuator system 130 may rotate about the longitudinal axis of the second shaft 170 to rotate the monitor as well.

[0023] The first and second links 106 and 108 may be pivotably coupled together about a fifth pivot axis 178, which may be a midpoint between the pivot axes 122 and 176, and midpoint between the pivot axes 126 and 140. As illustrated in FIG. 2, with such pivot arrangements, as the first motor 135 moves the second end 136 of the first shaft 134 along its longitudinal axis, the fourth pivot axis 176 extend and retract substantially along the Z-axis or perpendicular to the mounting plate 102. Moreover, a first line defined by two pivot axes 176 and 140 may move substantially parallel with a second line defined by two pivot axes 126 and 122. In this example, the base 148 of the housing 131 may support or couple to the second motor mechanism 166 and the first shaft 134 such that base 148 moves along the Z-axis substantially parallel with the mounting plate 102 as the first motor moves the first shaft 134 along its longitudinal axis.

[0024] FIG. 3 shows the mount system 100 in reference to XY plane in a fully retracted position. As discussed above, the moving block 144 may be coupled to the first shaft 134 on side of the first shaft 134. The wheel 162 may be coupled to the monitor mounting bracket 133 so that the wheel 162 may engage with the moving block in a manner described above. The first shaft 134 and the second shaft 170 may be aligned along a longitudinal axis 184. As the second motor 148 rotates the second motor mechanism 166 about the second shaft 170, the sleeve 138 rotates about the second end 136 of the first shaft 138 so that the housing 131 and the monitor mounting bracket 133 rotates about the longitudinal axis 184. The monitor mounting bracket 133 may be pivotably coupled to the housing 131 through one or more rollers 186 to tilt the monitor up and down along the pivot axis 154. According to the mount system 100 may perform three functions with two motors: (1) extend and retract the monitor along the Z-axis; (2) swivel the monitor around the Y-axis; and (3) tilt the monitor along the YZ-plane.

[0025] FIG. 4 shows alternative mechanism for moving the sleeve 138 along the Y-axis. In this example, a threaded screw 188 may be rotatably coupled to a motor 190 to rotate the screw to move the threaded sleeve 138 along the Y-axis. The moving block 144 may be coupled to the sleeve 138 to tilt the monitor as described above. In this example, a pivot axis 194 may be formed within the two side walls 150 and 152 to pivot the monitor mounting bracket 133 relative to the housing 131.

[0026] FIG. 5 shows a mount system 200 in reference to X, Y, and Z coordinates having a piston type actuator 202 for extending and retracting a monitor. The actuator 202 has a motor 204 that extends and retracts a distal end 206 relative to a piston housing 208, which in turn retracts and extends, respectively, the monitor.

[0027] FIG. 6 shows a mount system 210 in reference to X, Y, and Z coordinates. In this example, by coupling the monitor mounting bracket 133 to a distal end 212 of an actuator 214, and coupling the bracket 131 to a second motor mecha-
nism 216 so that it slides along the longitudinal axis 218, the bracket 133 may extend and retract along the Z-axis and move up and down along the Y-axis as the actuator 21 extends and retracts the distal end 212. By coupling a moving block to the distal end 212 as described above, the mount system 210 may perform four functions with two motors: (1) extend and retract the monitor along the Z-axis; (2) swivel the monitor around the Y-axis; (3) tilt the monitor along the YZ-plane; and (4) lift and lower the monitor along the Y-axis.

What is claimed is:

1. A method of adjusting a viewing angle of a monitor, the method comprising:
   extending a monitor mounting bracket from a retracted position to an extended position and tilting the monitor mounting bracket from a retracted position to a tilted position using a first motor; and
   retracting the monitor mounting bracket from the extended position to a retracted position and tilting the monitor mounting bracket from the tilted position to a retracted position using the first motor.

2. The method according to claim 1, including:
   swiveling the monitor mounting bracket using a second motor.

3. The method according to claim 1, including:
   waiting a predetermined time to tilt the monitor mounting bracket from the retracted position to tilted position as the first motor extends the monitor mounting bracket from the retracted position to the extended position using the first motor.

4. The method according to claim 1, including:
   waiting a predetermined time to tilt the monitor mounting bracket from the tilted position to the retracted position as the first motor retracts the monitor mounting bracket from the extended position to the retracted position using the first motor.

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