AN APPARATUS AND METHOD OF PROJECTING AUDIO SIGNALS SPATIALLY

FIELD OF THE INVENTION

The present invention relates to an apparatus and method for projecting audio signals spatially. In particular, the present invention pertains to an apparatus and method for facilitating and simulating a surround sound acoustic environment.

BACKGROUND OF THE INVENTION

Advances in digital signal processing and software designs have allowed the multimedia industry to offer to personal computer consumers a large range of entertainment products and experiences. Examples of such offerings include digitally mastered audio compositions, movies, games and other internet related materials.

However, a gap remains between the sensory perception of the personal computer environment and that of the analog environment. By analog environment, the present invention refers to the effect produced by a traditional surround sound audio system where the audience is surrounded by at least four speakers, one in each corner of the room and at ear level.

Personal computer manufacturers have attempted to simulate the surround sound environment that the audience experience in the cinema by introducing satellite speakers layout akin to the surround sound audio system. However, the cabling and distribution of speakers is often messy

and unsightly. Worse, family members of the user of such systems may trip over the extended wiring.

OBJECT OF THE INVENTION

It is an object of the present invention to project audio signals spatially for simulating a surround sound environment.

It is also an object of the present invention to simulate a surround sound environment while minimising the exposure of extended wiring of speakers.

It is a further object of the present invention to simulate a surround sound environment in a confined space without comprising the fidelity of acoustic signals.

It is yet another object of the present invention to retract the apparatus for projecting audio signals for minimising the space requirement when the surround sound environment is not required.

SUMMARY OF THE INVENTION

The present invention is an apparatus and method for projecting audio signals spatially in simulating a surround sound environment. The apparatus features at least a pair of foldable arms extended from at least a pair of poles extended from a base. Satellite speakers are attached to the end of the foldable arms with ball socket plates. The foldable arms are

hollow, allowing wiring for speakers to be concealed therein. The foldable arms are also coupled to vertical poles via lockable stoppers that permit users to adjust the spatial placement of the satellite speakers. When the surround sound environment is not required, users can fold the arms and retract the present invention to minimise space requirement. It follows that the present invention simulates a surround sound environment while concealing effectively the wiring for the satellite speakers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A illustrates a partially exploded, perspective, right side, elevational view of a prior art apparatus.

FIG. 1B shows in detail the tension joint of the prior art apparatus as illustrated in FIG. 1A.

FIG. 1C is a cross sectional, plan, elevational view of the extension arm of the prior art apparatus shown in FIG 1B.

FIG. 1D is a rear, perspective, elevational view of the end plate for securing a satellite speaker of the prior art apparatus illustrated in 1A.

FIG. 2A illustrates a perspective, right side, elevational view of the present invention.

FIGS. 2B – 2D are top, plan, elevational views of three positions of the foldable arm of the present invention.

FIG. 3A is a front, partial cross section, plan, elevational view of the lockable stopper of the present invention.

FIG. 3B is a right side, plan, elevational view of the two possible positions that the foldable arm can assume with the lockable stopper in FIG. 3A.

FIG. 4A is a front, perspective, elevational view of the speaker base plate assembly of the present invention.

FIG. 4B is a bottom, cross section, elevational view of the speaker base plate assembly of the present invention showing the ball socket subassembly therein.

FIG. 5A is a bottom, plan, elevational view of the foldable arm assembly together with the lockable stopper and vertical pole of the present invention.

FIG. 5B is a exploded, elevational view of the arm joint of the foldable arm where openings allows wiring to be concealed therein.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1A illustrates a partially exploded, perspective, right side, elevational view of a prior art apparatus 1 for projecting audio signals in simulating a surround sound environment. The apparatus 1 was supplied by the applicant of the present invention as a display stand in distributing its personal computer products. The apparatus 1 comprises a base 2, at least two vertical poles 3 and 4 separated with horizontal plates 5, at least two extension arms 7 and 8 coupled to the vertical poles with tension joints 10, and end plates 16 for securing satellite speakers 18. FIG. 1B shows in detail the tension joint 10 for aligning and fixing the extension arms to the vertical pole 4. A locking arm 13 compresses tension members 11 and 12 and a gasket member 14 to secure the extension arm 8 in position. The extension arm 8 is hollow and a groove is cut length wise to permit wiring to be concealed within the tubing as illustrated in FIG. 1C. An end plate 16 for securing a satellite speaker 18 as shown in FIG. 1D is coupled to the end of the extension arm 8 opposite the tension joint.

The tension joint and extension arm assembly of prior art apparatus 1 works adequately once it is assembled; however, over time the length of the extension arm 8 and the weight of the satellite speaker overcome the compression forces exerted by the tension joint 10. As a result the extension arm 8 and the satellite speaker 18 fall below the ear level and out of position. Furthermore, the prior art apparatus 1 is not retractable or maneuverable. As such, it takes up considerable space even when the requirement for surround sound environment ends.

FIG. 2A illustrates a perspective, right side, elevational view of the present invention 20. The apparatus 20 comprises a base 22, at least two vertical poles 23 and 24, at least one horizontal bar 25, and at least two foldable arms 28. The base 22 serves as a platform upon which either a personal computer system or a display device such as a monitor (not shown in figure but understood) rests. The vertical poles 23 and 24 extend upwards from the rear portion of the base 22 to terminate in lockable stoppers 30 (to be described in detail in FIGS. 3 below). The lockable stoppers 30 mates with the horizontal bar 25 for providing structural rigidity to the invention 20.

In the preferred embodiment of the present invention, the foldable arm and the vertical pole form one subassembly, while the base and the horizontal bar are separate components. This facilitates shipping and eases the user's task of assembling the present invention. It should be understood by one skilled in the art that other configurations are possible. For instance, the vertical poles and the horizontal bar can form a subassembly while the foldable arms are separate components.

The novel features of the present invention are incorporated in the foldable arm as illustrated in FIGS. 2 – 5. FIGS. 2B – 2D are top, plan, elevational views of three possible positions of the foldable arm of the present invention. While the description below relates to the foldable arm 28, it should be understood that the description applies equally to the foldable arm 27. Referring again to FIG. 2B, the foldable arm 28 is a hollow tube comprising of a lower arm 32 and an upper arm 34. At one end of the lower

arm 32 is the lockable stopper 30 while the other end terminates in an arm joint 36. The arm joint 36 receives the open end of the upper arm 34 and when fully extended as shown in FIG. 2B it extends the satellite speaker (not shown here but in FIG. 4A) farthest from the user. This allows the present invention to project audio signals in simulating a surround sound environment. When the surround sound environment is not required, the arm joint 36 permits the present invention to retract the upper arm 34 in manner illustrated in FIGS. 2C and 2D. This contrasts with prior art systems that are not retractable. It follows that the present invention provides users the flexibility to conserve space when the surround sound environment is not needed.

FIG. 3A is a front, partial cross section, plan, elevational view of the lockable stopper 30 of the present invention. The lockable stopper 30 comprises a stopper housing 41, a shaft 43 disposed concentrically within the housing 41 and loaded with a spring 47, a lock nut 45 at one end of the shaft 43 for biasing the spring, an angle preset plate 40 coupled to the other end of the shaft 43 for adjusting the foldable arm 32, and a stopper 44 disposed on the housing 41 for locking the position of the foldable arm. In the preferred embodiment of the present invention, the stopper 44 is a spring loaded and retractable pin 46 for mating with the plurality of holes 42 disposed radially on the angle preset plate 40. The lockable stopper 30 not only allows the foldable arm 32 to be adjusted to suit the individual characteristics of the user, but also prevents the foldable arm 32 from falling out of position. In FIG. 3B, the lockable stopper 30 allows users to raise the foldable arm from a position 32' to 32" such that the foldable arm does not occupy space when

the surround sound environment is not required. At the same time, the pin 46 of locks the position of the foldable arm 32. It can be appreciated that the lockable stopper obviates the disadvantages of the prior art systems.

FIG. 4A is a bottom, perspective, elevational view of the speaker base plate assembly 38 of the present invention. The speaker base plate assembly 38 is coupled to one end of the upper arm 34. The assembly 38 according to FIG. 4B comprises a housing 48, a ball joint 56 coupled to an angled arm 54 and further to a speaker base plate 52, a pin 58, and a cap 60. The housing 48 is substantially cylindrical with a tapered socket opening 49 for exposing partially the ball joint 56. The pin 58 is preferably grooved and terminates with an internal stopper plate 62 for exerting appropriate amount of pressure on the ball joint 56 when the pin is capped with the cap 60. The pin 58 is also adjustable with a knob 58 coupled to the external end of the pin.

Referring again to FIG 4A, the speaker base plate 56 is shown securing a satellite speaker 50. The ball and socket configuration of the assembly 38 allows the user to adjust the direction of speaker 50 with six degrees of freedom. Furthermore, the knob and pin subassembly also permits the user to fix the optimal spatial position of the speaker once it is determined. As such, the speaker base plate assembly 38 of the present invention enables the invention to achieve the ideal projection of audio signals to simulate a surround sound environment.

FIG. 5A is a bottom, plan, elevational view of the foldable arm assembly 28 together with the vertical pole 24 of the present invention. The foldable arm and the vertical poles are tubular with appropriate openings 21, 26, 33, 35, and 37 respectively disposed on the underside or rear portion thereof for concealing wiring 39 of the speakers. This contributes to the neatness and aesthetics of the present invention.

The present invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The presently disclosed embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims and all changes which come within the meaning and range of equivalency of the claims are, therefore, to be embraced therein. For instance, the present the term "foldable arm" to include extendable arm such as an telescoping arm that can be extended and retracted as and when the occasion calls for it. Similarly, the base of the present invention can be obviated if the computer or display device features sockets for accommodating the vertical poles. Finally, the vertical poles and the horizontal bar can be an unitary structure such as an arc.

CLAIMS

What is claim:

1. An apparatus for projecting audio signals spatially, said apparatus comprising:

at least one foldable arm coupled at one end with at least one satellite speaker in simulating a surround sound environment, said foldable arm being retractable when said surround sound environment is not required;

at least one lockable stopper coupled to the other end opposite said speaker for adjusting the spatial position of said foldable arm and locking said arm; and

a support structure positioned substantially in between two main speakers for engaging and positioning said lockable stopper spatially and substantially inline with the audience's ears.

2. The apparatus as in claim 1 wherein said foldable arm is tubular and has openings for concealing wiring of said satellite speaker.

3. The apparatus as in claim 1 wherein foldable arm further comprises of at least one upper arm and at least one lower arm and connected with a arm joint.

4. The apparatus as in claim 1 wherein said satellite speaker is coupled to said foldable arm with at least one base plate assembly, said assembly comprises at least one ball socket joint.

5. The apparatus as in claim 1 wherein said lockable stopper comprises at least one shaft for coupling with a lower arm, a preset plate having a plurality of radial holes for determining specific spatial position of said foldable arm, and a spring loaded pin attached to external housing of said lockable stopper for locking said foldable arm.

6. The apparatus as in claim 1 wherein said support structure comprises at least two vertical poles and at least one horizontal bar.

7. The apparatus as in claim 1 wherein said support structure comprises at least one arc.

8. The apparatus as in claim 1 wherein said support structure comprises at least two vertical poles, at least one horizontal bar and at least one base.

9. A method for projecting audio signals spatially, said method comprising the step of:

extending at least one foldable arm coupled at one end with at least one satellite speaker in simulating a surround sound environment;

retracting said foldable arm when said surround sound environment is not required;

adjusting and locking with at least one lockable stopper the spatial position of said foldable arm; and

aligning said lockable stopper spatially and substantially with the audience's ears with a support structure in the form of an adjustable frame.

10. The method for projecting audio signals spatially as claimed in claim 9, wherein said foldable arm is tubular and has openings for concealing wiring of said satellite speaker.

11. The method for projecting audio signals spatially as claimed in claim 9 or claim 10, wherein foldable arm further comprises of at least one upper arm and at least one lower arm and connected with a arm joint.

12. The method for projecting audio signals spatially as claimed in claim 9 to 11, wherein satellite speaker is coupled to said foldable arm with at least one base plate assembly, said assembly comprises at least one ball socket joint.

13. The method for projecting audio signals spatially as claimed in any one of claims 9 to 12, wherein said lockable stopper comprises at least one shaft for coupling with said lower arm, a preset plate having a plurality of radial holes for determining specific spatial position of said foldable arm, and a spring loaded pin attached to external housing of said lockable stopper for locking said foldable arm.

14. The method for projecting audio signals spatially as claimed in any one of claims 9 to 13, wherein said support structure comprises at least two vertical poles and at least one horizontal bar.

15. The method for projecting audio signals spatially as claimed in any one of claims 9 to 14, wherein said support structure comprises at least one base.