sion. Since today's CPUs with clock rates of 500 MHz to 1 GHz have at least an order of magnitude higher processing power than the real time DSP engines used in currently available MP3 player/decoders, these powerful CPU processors can often finish the decoding process in less than 10% of the available time. The CPU may then be set to idle by the present invention for more than 90% of the time, saving large amounts of power and thus greatly slowing the discharge of the battery and extending the useful time of the equipment under battery power on a single charge.

[0015] The present invention is unlike the real-time DSP engines known in the art, which require a constant data stream from the HDD, and which result in high power consumption, since the HDD is being accessed all the time. Using the technology of the present invention, the HDD may be accessed less than 0.5% of the time with a typical complement of memory, i.e., 128MB RAM. This results in a dramatic reduction in the rate at which power is dissipated from the equipment battery. Further, minimal PCB changes are required for the present invention, thus resulting in the quick adoption of new product features in PCs.

[0016] There are many possible music compression algorithms. Compression algorithms other than MP3 include WMA, AAC, and the proposed SDMI. The software decompression methodology of the present invention can be easily modified to decode any compression scheme, or with a software installation process, all the various compression schemes. This flexibility allows the adaptation to new and different algorithms, as they become popular, by permitting an after-market upgrade of computers equipped with the present invention. Also, since this portion of the present invention is a software system, new updates and/or algorithms may be downloaded (e.g., from the Internet) to upgrade machines in the field, eliminating the necessity for consumers to buy multiple players/decoders in order to listen to audio files having different compression formats.

[0017] Thus, the present invention provides a low-cost, low power-consumption, long-battery-life audio playing and decoding system, which may be used to play audio files of various formats.

[0018] In one aspect, a computer system adapted to play audio files comprises a system CPU, memory; at least one drive comprising compressed audio data residing in one or more audio files, a play list software program for selecting and storing a play list comprising one or more of the audio files, a first operating system adapted to control at least the system CPU and memory, and a second operating system stored in BIOS and adapted to retrieve the play list and cause the drive to read at least one audio file of the play list, to cause the system CPU to decompress the compressed audio data of the file and provide decompressed audio data, and to cause the decompressed audio data to be stored in memory.

[0019] In another aspect, a computer system adapted to play audio files comprises a drive comprising at least one audio file, an audio controller, and an operating system stored in BIOS, the operating system controlling the audio controller, so as to cause the audio controller to play at least one audio file.

[0020] In a further aspect, a computer system adapted to play audio files comprises: compressed audio data, a system CPU, an audio controller, a first operating system adapted to control at least the system CPU, a second operating system controlling the audio controller and system CPU, so as to cause the system CPU to decompress the compressed audio data, and a switch, the activation of the switch causing the second operating system to boot.

[0021] In yet another aspect, a computer system adapted to play audio files comprises a system CPU, memory, at least one drive comprising compressed audio data residing in one or more audio files, a play list software program for selecting a play list comprising one or more of the audio files, and an audio controller coupled to the system CPU, memory and drive. The audio controller is adapted to cause the drive to read at least one audio file of the play list, to cause the system CPU to decompress the compressed audio data of the file and thereby provide decompressed audio data, and to cause the decompressed audio data to be stored in memory.

[0022] In process form, a method of playing audio files on a computer system comprises: booting a first operating system; creating and storing a play list comprising a list of compressed audio files residing on one or more drives of a computer system having at least a drive, a CPU, and a memory; terminating the first operating system; booting a second operating system upon activation by a switch; reading the play list; reading the compressed audio files from the drive based on the play list; providing the compressed audio data to the CPU for decompressing the data of the compressed audio file into decompressed audio data; storing the decompressed audio data in memory; and retrieving the decompressed audio data from the memory for playing.

[0023] In another process form, a method of playing audio files on a computer system comprises: reading compressed audio data from the drive of a computer system having at least a drive, a CPU, and a memory; providing the compressed audio data to the CPU for decompressing the compressed audio data, thereby providing decompressed audio data; and storing the decompressed audio data in memory.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] **FIG. 1** is a block diagram representation an exemplary operational flow of one embodiment of the present invention;

[0025] **FIG. 2** is a flow diagram of an exemplary power up of the mini-OS and initiation of the player function, in one embodiment of the present invention;

[0026] **FIG. 3** is a block diagram of an exemplary audio player system consistent with one embodiment of the present invention;

[0027] **FIG. 4** is a block diagram of the internal portion of an exemplary special purpose circuit, in relation to the other components that interface with it, in one embodiment of the present invention; and

[0028] **FIG. 5** is another block diagram of an exemplary audio player system consistent with another embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0029] The present invention comprises mini-OS (operating system) software and a hardware interface between the