Self Powered Digital Audio MP3 Speaker

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**Introduction:**

The first practical sound reproduction device was patented by Thomas Edison in 1878. Ever since then people have been inventing new ways to reproduce audio. Designers always have one major problem; eliminating sound quality loss that arises in the sound reproduction chain. In analog audio, sound quality loss is present from the many stages that are required to boost the signal to a high wattage and to the tone control circuitry used to boost bass and treble. Once the audio is in digital form, its quality does not degrade unless it is switched back into analog form.

My proposal is to create a self-powered speaker that plays mp3 encoded audio. The project takes a digital input source, decodes it and sends the information out through a digital amplifier to the speaker. Thus, eliminating loss that is associated with analog audio. The power supply, amplifier and controller units will all be housed inside of a normal speaker box. All that the end user will need to do is plug the speaker into the wall, plug in the source and push play.

**Description:**

The project will be a standalone unit that consists of an amplifier and a power supply contained inside a normal floor standing speaker cabinet. The speaker will be roughly 2 feet high. Controlling the data flow and system information will be the microcontroller (refer to Figure 1), which is also housed inside the speaker cabinet. The system that will be used to store the mp3 file information will be a USB thumb drive. On the top of the cabinet the USB port, keypad and LCD screen will be accessible to the user. Through the User Interface (UI) the user will be able to control; song selection, play, pause, mute and stop the song via a keypad and an LCD screen. The microcontroller will output the mp3 file stream serially to a decoder; provide thermal shutdown protection, and mute the output. From the decoder the information will be sent to a pulse-width modulator, which will control the digital amplifier. The amplifier will output 80 Watts into a standard 8 Ohm speaker. The digital amplifier requires a 50 Volt and a 12 Volt power supply.
Benefits:

This product will provide the user with an all in one solution to audio. Because it is all digital, there is no sound quality loss. It will use a “plug and play” design. This means the user will plug in the flash card, the input power, and then just push play. The product will be designed with ease of placement in mind. The only placement requirement is that it must be near a standard wall outlet.

Market Comparison:

There are no products currently available on the market of this type. The only products that are in the same realm would be a docking station and speaker combo for Apple’s iPod. The docking station and speaker combo range in price from CTA Digital’s IP-RS2 iPod Round Speaker priced at $30, to Bose SoundDock Digital Music System at $299.00.

The Self Powered MP3 Speaker will be more powerful than an iPod speaker dock as well as have the improved sound quality of a floor standing speaker. The only disadvantage of the Self Powered MP3 Speaker is that it doesn’t have the storage capacity of an iPod. The iPod currently has a storage capacity of 80 GB as opposed to a thumb drive, which has only 2 GB of storage. The iPod also is much cheaper in terms of price per gigabyte; the 80 GB iPod sells for around $350, while the 2 GB flash drive sells for around $80.
Development:

The project will be developed using available equipment in ETEC 340 laboratory located in Ross Engineering Technology building. The lab has several debugging solutions for both software and hardware. The project will be demonstrated in the ETEC 340 lab at the senior projects demonstration time, organized by Todd Morton. The demonstration will consist of the product being set up in the lab. Anyone could come by, adjust the volume, change the song and browse the available songs. The available songs will be already loaded onto the thumb drive, in a play list selected by me.