

## A Low Cost Design of Audio Player Using Raspberry PI

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### ABSTRACT:

This design overcomes disadvantages of traditional MP3 players which include few supported file formats, absence of intelligent interface and incapability of replacing storage devices. In this system, the latest Raspberry Pi-based BCM2835 chip is adopted to be the host controller to read out audio files stored in USB Pendrive and plays audio files. Meanwhile, the song information and lyrics are displayed on LCD monitor which integrates and volume adjusting and other control functions. The separation of decoding module and storage module makes it possible to expand capacity and share music. Experimental results show that the data transmission speed is enhanced for the adoption of pendrive. In addition, the number of audio file formats supported by this system is greater than the traditional MP3 players. This section of the report consists of all past, presently on-going and also upcoming researches or developments in area of raspberry pi driven Audio player. Raspberry pi is a great small computer, which can do a lot of things and have different applications in the field. In the following part some of the areas of application of the raspberry pi and the Audio player will be covered.

### Key words:

BCM2835, Audio player, LCD monitor, connecting switches, Rasbian operating system.

### I. INTRODUCTION:

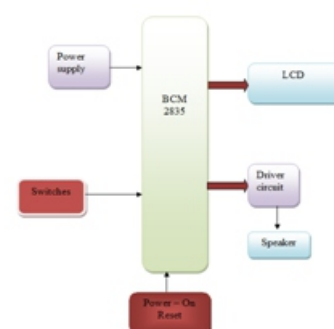
However, with the accelerating pace of life and growing pressure for surviving, people's desires for high quality music are increasing rapidly since it is a good way to release. Whenever being at home or going out, people want to enjoy more and better music. That presents a higher demand for electronic music. In this case, the development of MP3 is restricted by its low sound quality for it uses a form of loss data compression. Many other audio file formats are replacing MP3 stealthily such as WMA, WAV and MIDI, etc. Windows Media Audio (WMA) is an audio data compression technology developed by Microsoft.

It is claimed that audio encoded with WMA sounds better than MP3 at the same bit rate and sounds better at lower bit rates than MP3 at higher bit rates. The WAV file is an instance of a Resource Interchange File Format (RIFF) defined by IBM and Microsoft. It is the main format used on Windows systems for raw and typically uncompressed audio. The sound quality is up to CD-quality. Musical Instrument Digital Interface (MIDI) is a technical standard that describes a protocol, digital interface and connectors and allows a wide variety of electronic musical devices to communicate with each other. A MIDI file is a recording of MIDI information, which is an attractive way to share music. These audio file formats have greatly improved the quality of music experience for people. Audio file formats supported by this design include MP3, WMA, WAV and MIDI, which meet users' various demands for music.

### II. WORKING PRINCIPLE:

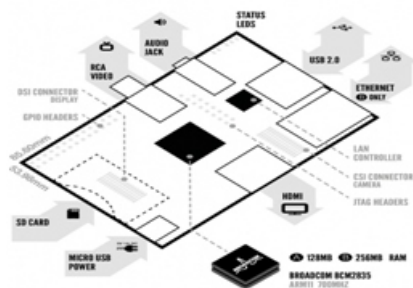
The development of mobile multimedia services has changed people's daily lifestyles. It is not difficult to find people who listen to music or watch TV via their mobile devices such as mobile phones. Micro SD card has become the memory card of almost every smartphone as a Common storage device. There is an SD card interface within the intelligent audio player proposed in this paper. The system supports reading and writing for a memory devices making it possible to share music with other devices or other people by exchanging SD card whenever and wherever. But the memory chip of a traditional MP3 player is embedded inside, which could not be replaced.

### Block diagram:

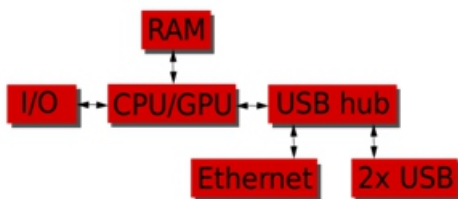


### III.SYSTEM HARDWARE DESIGN:

A. BCM2835's has a Graphical Processing Unit (GPU) which is Dual Core Video Core IV® Multimedia Co-Processor, Video Core is a low-power mobile multimedia processor architecture originally developed by Alpha mosaic Ltd and now owned by Broadcom. Its two-dimensional DSP architecture makes it flexible and efficient enough to decode as well as encode a number of multimedia codec's in software,



**Fig: Raspberry Pi components and sockets**



**while maintaining low power usage.**

B. RASPBERRY PI The Raspberry Pi is a single-board computer the size of a credit-card sized developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The Raspberry Pi is manufactured through licensed manufacturing deals with Element 14/Premier Farnell and RS Components. Both of these companies sell the Raspberry Pi online. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor (The firmware includes a number of “Turbo” modes so that the user can attempt overclocking, up-to 1 GHz, without affecting the warranty), VideoCore IV GPU, and originally shipped with 256 megabytes of RAM, later upgraded to 512MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage. The pi can be installed with Debian and Arch Linux ARM which can be downloaded from the raspberry pi website. Also planned are tools for supporting Python as the main programming language, with support for BBC BASIC, C, and Perl.

C. The traditional MP3 player encapsulates decoding module and memory module in one circuit board, which leads to limited capacity, unreplaceable storage devices and unshareable songs. In this paper the decoding module and the storage module are separated. Storage device could be replaced at any time, which makes it possible to expand capacity and easier to update songs. Users could listen to music as long as the intelligent audio player is plugged with an SD card, which also makes it possible to share music with other people or other devices. The song information and lyrics are shown on TFT LCD which integrates with touch panel to realize song switchover and volume adjusting and other control functions.

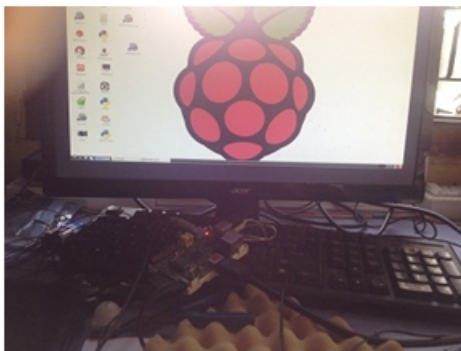
D. A Raspberry Pi owns rich functionalities. First of all, A Raspberry Pi supports three different kinds of video outputs: composite video, High-Definition Multimedia Interface (HDMI) video and Display Serial Interface (DSI) video. A Raspberry Pi provides an audio output via a 3.5mm jack or over HDMI (the HDMI port carries both the video signal and a digital audio signal). A Raspberry Pi (in Model B) has two Universal Serial Bus (USB) ports. Another significant feature of a Raspberry Pi is that it can connect to the network through an onboard Ethernet network connector (RJ45) or by using a Wi-Fi USB dongle in wireless.



## E. LCD MONNITOR

### Features:

- Designed for Raspberry Pi Model B/B+, easy to use
- Compatible with Raspberry Pi A+,B,B+/2.
- Supports Raspbian system, enables your system to:
- Play videos (supports multi formats, MP4 and so on)
- Take photos by touching (up to 17 camera modes)
- Support software keyboard (system interaction without keyboard/mouse)

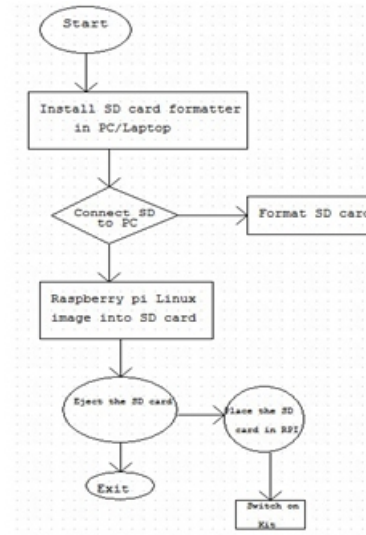


## F.Audio player:

Omxplayer GUI is a python program to manage playing all kinds of media with omxplayer in lots of different ways. Omxplayer GUI also supports extracting videos from websites containing HTML5 video or from all video websites supported by you tube-dl. It uses Python's Tkinter GUI elements and so does not require any other packages to be installed.



## IV.SOFTWARE DETAILS:



### Flow chart:

### Introduction of python language:

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms. The Python interpreter and the extensive standard library are freely available in source or binary form for all major platforms from the Python Web site and may be freely distributed. The same site also contains distributions of and pointers to many free third party Python modules, programs and tools, and additional documentation. The Python interpreter is easily extended with new functions and data types implemented in C or C++ (or other languages callable from C). Python is also suitable as an extension language for customizable applications. This tutorial introduces the reader informally to the basic concepts and features of the Python language and system. It helps to have a Python interpreter handy for hands-on experience, but all examples are self-contained, so the tutorial can be read off-line as well.

## STEPS TO INSTALL RASPBIAN OS:

In order to install Raspbian OS, first next out of box software(NOOBS) has to be installed.



1. First step is to allocate the drive for installing OS
2. SD adaptor can also be used for this purpose
3. Download WINDISK 32 utility from source forge project which is a zip file
4. Extract and run the zip file
5. Select the file and click run as administrator
6. Select the image file which was extracted above
7. Select the drive letter of the SD card in the device box
8. Click write and wait for write process to complete
9. Exit the image and eject the SD card



Fig 4: Installed Raspbian OS

## V.Results and Output:

### Connection of hardware audio player:

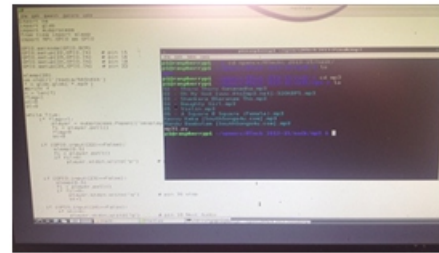
This figure shows the hardware connections of audio player on Raspberry Pi board consists of connecting switches, HDMI port and SD card installation of operating system, using pen drive for mp3 files or formats and speakers to play audio .



### Hardware of audio player :

### Software Execution of audio player:

This figure 6.1 shows the software execution of audio player on Raspberry Pi board by installing the Raspbian operating system to the Raspberry board. Installing the OMX audio player to detect and play the audio files.



### Software Execution of audio player OMX Player installation and execution

Omx player GUI is a python program to manage playing all kinds of media with omx player in lots of different ways..Omx player GUI also supports extracting It uses Python's Tinker GUI elements and so does not require any other packages to be installed.



Figure 6.6: Playing and pause the audio files of OMX Player.

File Format	Sampling Frequency	Bit Rate	Recorder Mode	Music Mode <sup>1,2</sup>	Podcast Mode <sup>1,2</sup>	Audio Book Mode <sup>1,4</sup>
WAV <sup>3</sup>	48 kHz, 44.1 kHz	16 bit	Yes	Yes	No	No
MP3 <sup>3</sup>	<b>MPEG1 Layer 3:</b> 48 kHz, 44.1 kHz, 32 kHz	8 kbps to 320 kbps	Yes	Yes	Yes	Yes
	<b>MPEG2 Layer 3:</b> 24 kHz, 22.05 kHz, 16 kHz					
WMA	48 kHz, 44.1 kHz, 32 kHz, 22 kHz, 16 kHz, 11 kHz, 8 kHz	5 kbps to 320 kbps	Yes	Yes	Yes	Yes

## VI.CONCLUSION:

The design of audio player using raspberry pi is designed. It can play high-quality audio files smoothly. The adoption of high-performance MCU is an efficient way. The performance of the intelligent audio player is enhanced. The system has a good prospect in areas of vehicle audio systems, home large audio system, industrial control systems, etc.Windows operating systems are not compatible because of the ARM processor. If the processor is improved or any workaround is found to run Windows directly on the Raspberry Pi, then it can be a great step for the Pi.

## VII. FUTURE SCOPE:

A low cost of audio player could be integrated in vehicle audio system. An SD card slot could be left outside, which makes it very convenient for updating music in vehicles. That is impossible for traditional MP3 players. The audio player could also be applied to other fields such as indoor large audio system and some industrial control systems with audio requirement.

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