International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 1 Issue 5, July - 2012

SMS Based Intelligent Real Time Audio/Video Playback System

Vinay Chowdary
Asst. professor, LIET, Hyderabad,

D Sreekanth
Asst. professor, LIET,

D Sunitha
Asst. professor, LIET,

ABSTRACT - In recent years, data service has been gaining popularity in embedded system. Most of the audio/video devices today are being controlled by legacy Infra Red (IR) based remote controllers which has limited range and also suffers from line of sight problem or internet based event management programs which always need connection to internet.

This paper proposes a method by implementing a simple Short Message Service (SMS) based audio/video controlling method using ARM 9 and GSM module without the need of internet connection or the need of line of sight communication and moreover the range is global.

A mobile number (registered/unregistered) with the GSM based audio/video control system upon boot up. Customer requested audio file or video file can be played based on the user's request, when that particular customer sends a SMS with his/her mobile phone.

Key Words: Global System for Mobile communication (GSM), Advanced RISC Machine (ARM) ,Short Message Service (SMS).

INTRODUCTION

Remotely controlling audio and video playback systems is now quite ubiquitous in the domestic environment. Most of the existing systems are operated using infra-red control based controls. These remote controllers rely on line-of-sight for transmission, audio/video parameter and volume settings for operating television sets and DVD players with several additional features for their operation. Moreover the range of infra-red control devices is limited only to few meters.

While these controllers are suitable in the home theatre environment, they cannot be easily extended to situations for example 1 when spectators in a live entertainment program would like to play and share a song sequence or a video with the audience on a giant TV screen provided at the venue. Further when these controllers are attached to a CPU and memory based devices in order to implement a store retrieve playback system then the overall hardware becomes very complex and costly. Another application that is envisaged is that of a film director sitting in the dubbing or editing studio and to who an assistant director wishes to convey his/her visualization of a proposed scene or setting by playing a similar one from a store of files that is available in a system in the studio.

The application requires a hardware that can receive SMS from a mobile phone in two different cases. First, it is in the general scenario where it can receive and process the SMS from any mobile number. This could prove to be a nuisance in the example 1 cited above will be able to playback a file of his choosing and that may not appeal to the audience. Second, is the scenario where it is programmed to receive SMS only from certain registered mobile numbers. For example 1, this could mean only those spectators who have been authorized by the event managers based on payment of a fee or recognized members can play the audio/video file on the audio system or the giant screen.

The system should therefore have a facility to decode the SMS and compare with entries in an existing table of audio/video files, retrieve that file and playback via the audio system or on the screen depending on the nature of the file. Considering the numerous computational tasks, it became imperative to design the system around a microprocessor or a microcontroller. This will provide not only a degree of flexibility required to cater to applications that could be diverse in nature and also keep the hardware compact and user-friendly.

The idea proposed is depicted in figure format which is shown below

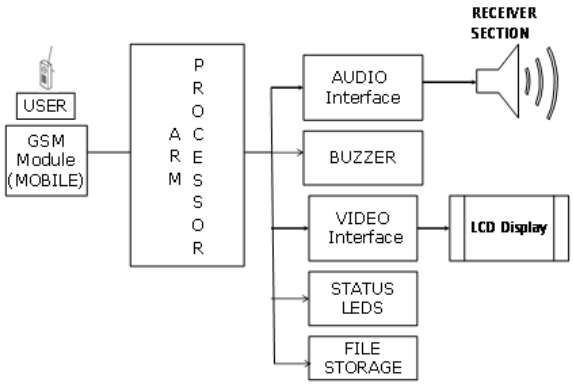

Figure 1.1 The proposed playback system

As can be seen from the block diagram in Figure 1.1 of the main modules of the audio/video playback system are the GSM module, ARM processor/controller, and the receiver section. The GSM module receives the message, processes it and sends appropriate signals to ARM9 where it will be decoded and the corresponding file requested will be retrieved. If the requested file is an audio file, it is played via the speaker and, if it is a video file it will be played and displayed on LCD.

GSM MODULE (MOBILE)

The GSM module which is a mobile in this audio video playback system has SIM300 modem which is a tri-band GSM/GPRS modem that works on frequencies EGSM 900MHz, DCS 1800MHz and PCS 1900MHZ. The band used in this audio video playback system is EGSM 900MHz. With a tiny size of 40mm× 33mm × 2.85mm it can fit into almost all the space requirements such as mobile, PDA, Smart phone. Digital channels are used because of which it is considered as a 2G technology.

ARM PROCESSOR

The application requires a hardware that can receive SMS from a mobile phone in two different cases. First, it is in the general scenario where it can receive and process the SMS from any mobile number. This could prove to be a nuisance in some applications as when any spectator in the audience in the example 1 cited above will be able to playback a file of his choosing and that may not appeal to the audience. Second, is the scenario where it is programmed to receive SMS only from certain registered mobile numbers to provide and reject SMS from any other mobile number. For example 1, this could mean only those spectators who have been authorized by the event managers based on payment of a fee or recognized members can

play the audio/video file on the audio system or the giant screen.
The system should therefore have a facility to decode the SMS and compare with entries in an existing table of audio/video files, retrieve that file and playback via the audio system or on the screen depending on the nature of the file (audio or video).

Considering the numerous computational tasks that have to be performed, it became imperative to design the system around a microprocessor or a microcontroller. This will provide not only a degree of flexibility required to cater to applications that could be diverse in nature and also keep the hardware compact and user-friendly. User-friendliness is a key consideration in such applications because the users demand a high degree of robustness in duty and capable of accommodating a large number of files with facilities to organize these based on customer tastes. For example, music fans will prefer to quickly be able to locate audio files based on categories such as, classical, rock and blues and so on.

Therefore to implement all the above mentioned processes a processor of very high speed, low power consumption and which can decode the SMS in alphanumeric format is required. As the hardware required for this idea is quite complex using a CISC processor will result in high complexity and very high power consumption. Therefore the use of a RISC processor which consumes less power compared to CISC for the same audio video playback system is preferred. The RISC processor used here is ARM (Advanced RISC Machine). Several versions of ARM are available viz., ARM2, ARM3, ARM7, ARM9 and variations of it. The differences and the comparison between these is explained in this chapter.

The version of ARM processor used for this playback system is ARM9 and is the main module for the audio video playback system. A photograph showing the top view of ARM9 is shown in Fig 1.2.

The ARM9 has large memory space on the chip for specific application. A typical ARM9 chip can contain several peripheral controllers, a digital signal processor, and some amount of on-chip memory, along with an ARM9 core.

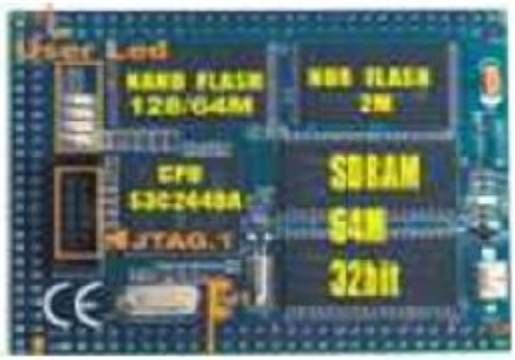

Fig 1.2 Photo of ARM9

LCD DISPLAY

The LCD used in this audio video playback system is a 4-wire resistive LCD a photograph of which is shown in Fig 2.5. **Resistive LCD screens** are sensitive computer displays composed of two flexible sheets coated with a resistive material and separated by an air gap or microdots. When contact is made to the surface of the touchscreen, the two sheets are pressed together. On these two sheets there are horizontal and vertical lines that, when pushed together, register the precise location of the touch. Because the touchscreen senses input from contact with nearly any object (finger, stylus/pen, palm) resistive touchscreens are a type of "passive" technology.

Fig 1.3 Photo of LCD

FEATURES OF ARM9

ARM9 is a 32 bit RISC processor (32 bit instructions). It has 32bit Data Bus and 32-bit address bus. The architecture of ARM9 is a Harvard type bus structure which is implemented in ARM9 to speed up the execution. Instructions of ARM9 can process 8/16/32 bit data types.
It has 7 modes of operations which are User, FIQ (Fast Interrupt Request), IRQ (Interrupt Request), Supervisor, Abort, Undefined and System. Supply required for ARM9 is around 1.2V internal, where as supply required for memory of ARM9 is 1.8V/2.5V/3.3V and for external I/O processor it is 3.3V.

It has a total 37 registers each of 32-bits out of which 31 are general purpose registers and 6 are status registers.

Memories available with ARM9 are 64M SDRAM (Synchronous Dynamic RAM), 64M or 128M Nand Flash, 2M Nor Flash and 1GB EEPROM. Separate cache memory each of 16KB for instruction and data is implemented.

ARM9 implements MMU (Memory Management Unit), AMBA (Advanced Memory Bus Architecture) bus.

The internal structure of ARM9 is shown in the figure below:

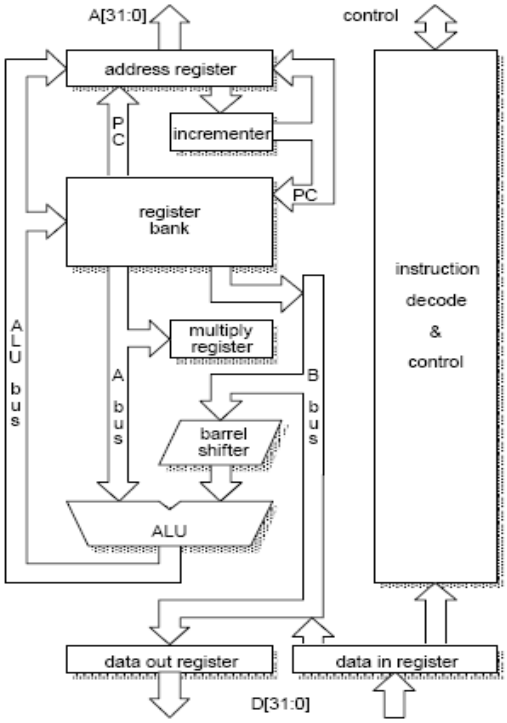

Figure 1.4 Internal architecture of ARM9

As shown the in the above figure, the ARM9 consists of register bank and the length of each register is 32-bit.

SAMSUNG S3C2440

Samsung S3C2440 (mini2440) kit comes with all the built-in components required for the implementation of playback system. The photo of Samsung mini2440 is shown below.

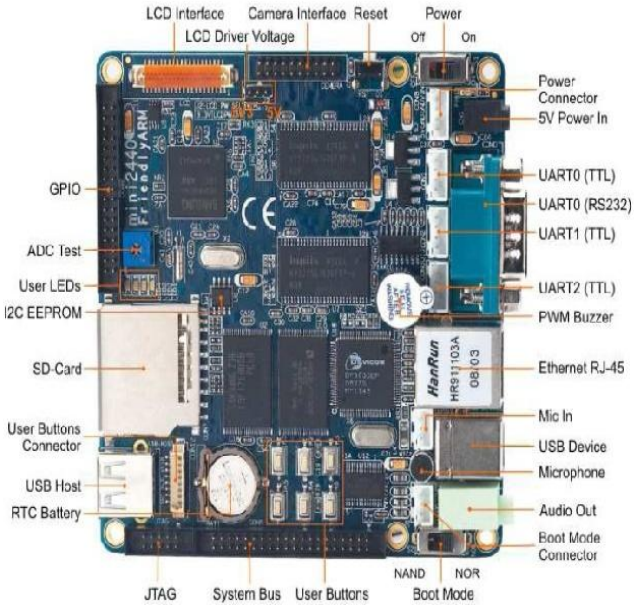

Figure 1.5 Samsung mini2440 kit and its hardware components

Memory associated with ARM9 in Samsung mini2440 kit is 1GB and is divided into eight banks. The size of each bank is 128MB. Here two types of Flash memories are used to load the OS i.e., operating system while boot up. The two types of Flash memories are Nand Flash and Nor Flash. For Nand Flash Boot, 4k Bytes Boot SRAM mapped to nGCS0 space is used. For Nor Flash Boot, Nor Flash mapped to nGCS0 space is used.

RESULT

As stated earlier the idea behind the audio video playback system is to operate the whole system remotely and wirelessly by using SMS and the result is shown in the figure 1.6 where a video file is played after sending a SMS from the user mobile.

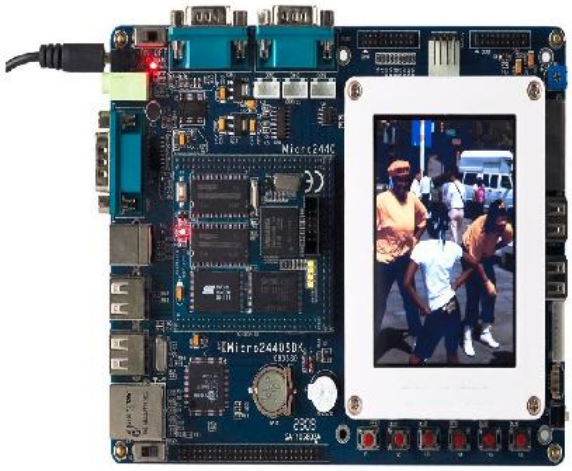

Figure 1.6 Playing of video file

FUTURE SCOPE

The S3C2440 board can be used as a mother board for the personal computer. It can also be a replacement for the set top boxes which are used for direct to home DTH technology. This audio video playback system can be used for home automation and also for time based event management and for internet based audio video playback system.

REFERENCES

[1] Fei Xie, Guowu Yang , Xiaoyu Song, Component-based hardware/software co-veri¿cation for building trustworthy embedded systems, The Journal of Systems and Software,2007, 80,pp: 643–654

[2] Estrin D,Govindan R,Heidemann J. Embedding the Internet Communications of the ACM May 2000;43(5):39–41.

[3] Weiser M.The computer for the 21st century.Scientific American, September 1991.p.66–75.

[4] Christof Paar,AndręWeimerskirch. Embedded security in a pervasive world. Information Security Technical Report,2007,12,155-161

[5] Jaewon Kang,Badri Nath, A study on switching voice traffic seamlessly between GSM and GPRS cellular networks, Computer Communications , 2006,29,1079–1093