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Portable DVD Writer Mounted Wireless Video/Audio System

Description

BACKGROUND OF THE INVENTION

In the current consumer electronics market, digital technologies become dominant. MP3 player, digital still/video camera, personal media player are just few examples. Digital technologies found their roots in the computer industry, and then made their way to every aspects of our life. For example, a DVD writer was first used as a computer peripheral for recording data. But in recent years, video cameras with built-in DVD writer for recording video data came to the market. Video recorded on the DVD discs can be directly played from a normal DVD player, saving a lot of effort on processing of video data. But like everything else, they have their own drawbacks. First, the disc used in the current DVD video cameras is 8cm/1.4GB type, instead of 12cm/4.7GB type. This is because consumer DVD video camera has to be compact, and if a 12cm disc is used, it will become very bulky and difficult to handle. An 8cm DVD disc has only 30 percent of data capacity of 12cm disc, but costs more than 10 times of 12 cm disc. This is an obvious drawback. Second, when recording, the DVD writer is susceptible to camera movement and vibration should be avoided. When shooting a video scene, for example a sport scene, a lot of camera movement is involved, and this can lead to potential damage to DVD writer. Third, even using 8cm disc, DVD video camera is still relatively large compared to those using hard disk or flash as their storage media, they still need some effort to handle.

SUMMARY OF THE INVENTION

The present invention addresses above issues of DVD video camera. It splits a DVD video camera into two parts: a video camera without local video storage unit but with a wireless transmitter/receiver, a base station including a DVD writer, a wireless transmitter/receiver, and a Digital Signal Processor/Microcontroller Unit (DSP/MCU). Video camera processes data collected from video sensor chip, encodes them to MPEG2 Program Stream format,

thus make them ready to be written to a DVD disc. Then camera packages the MPEG2 Program Stream to transfer to base station through its wireless module. Base station receives these streams through its wireless module, unpacks them, extracts original MPEG2 Program Stream, and writes them to a memory buffer. Next it sends a write command to DVD writer to get MPEG2 Program Stream written to a DVD disc. Wireless link between video camera and base station can be Wi-Fi (802.11), Bluetooth, or any other proprietary wireless technique. This invention uses Wi-Fi for its high transfer speed, longer range, and built-in security. Both video camera and base station are battery powered, so they are portable for outdoor use. The base station can also be externally powered by an AC adapter.

The advantages of this invention are listed as following:

1. Video camera does not have a local storage unit for video data, it can be made very compact (pocket size), very easy to handle, and highly portable.
2. Base station can be put in any stable and safe place, without worrying about vibration during recording.
3. DVD writer can use either 12cm or 8cm type. When 12cm disk is used, recording time can be 1 hour 40 minutes for standard resolution, much longer than 30 minutes recording time of 8cm disc.
4. Base station has build-in playback function, outputs NTSC/PAL video signals to a TV set for watching recorded/real time DVD contents.
5. When connecting to a wireless router, video camera can be used as a standalone Network/IP camera, which can be accessed through internet for site monitoring.
6. With proper software/driver installed on Desktop/Laptop PC having Wi-Fi, base station can be connected as a standalone DVD writer by PC through Wi-Fi.
7. With proper software/driver installed on Desktop/Laptop PC having Wi-Fi, video camera can store DVD data to a PC's hard disk through Wi-Fi.

BRIFE DESCRIPTION OF THE DRAWINGS

Fig.1 is a block diagram of wireless video camera. 1 is lens. 2 is CMOS video sensor.

Fig.2 is a block diagram of wireless base station.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig.1, wireless video camera has a lens 1 for receiving video images from outside world. Microphone 6 converts sounds to audio signals. CMOS sensor 2 converts lights it receives to video signals (YUV or RGB format). Both sensor 2 and microphone 6 are connected to DSP/MCU 3 by system buses. The DSP/MCU 3 is running a Linux Operating System (OS). DMA (Direct Memory Access) transfers video and audio signals to a location in SDRAM 9 for temporary storage. LCD viewfinder 7 receives video signals from this location to show a real time video image on LCD screen. DSP/MCU 3 unit accesses this location to retrieve both video and audio signals, encodes them to MPEG2 Program Streams. The encoding can be done by software or hardware. This invention uses DSP (Digital Signal Processor) to encode video and audio signals to MPEG2 format by software algorithms. The software used is FFMPEG, an open source MPEG encoder/decoder project. The encoded MPEG2 Program Streams are stored in a memory buffer in SDRAM 9. A Linux task is created to empty these buffers constantly. First the task creates a Linux network socket, passes it address of the stream buffer. The network socket transfers these streams through Wi-Fi module 4 to base station until the buffer is empty, i.e. there are no more data in the buffer. Next the Linux task sleeps and waits for more stream data arriving in the memory buffer, repeating above transfer process.

Besides serving as a view finder, LCD screen 7 is a major User Interface (UI), it shows Wi-Fi signal strength, battery lasting time, DVD disc remaining time, and recording on/off status. For information related to base station, a network socket is created as a communication means. The network socket is also used to send command from video camera to base station, like start recording, turning off power of base station.

Referring to Fig. 2, base station is put at a safe and stable place within a range from video camera. The range can be 100 – 300 meters in open space and 100 meters within home and office. Wi-Fi signal strength is shown on LCD screen 7 of video camera to tell user the connection status. DSP/MCU 3 runs Linux Operating System. Upon power on, base station is immediately entering a standby state, waiting commands from video camera. When a start recording command is received, DSP/MCU 3 starts a Linux task. This task creates a network socket to receive MPEG2 Program Streams through Wi-Fi module 2. An address of a memory buffer in SDRAM 7 is passed to network socket, which stores MPEG2 data received to this memory buffer. After first frame of MPEG2 stream is received, DSP/MCU 3 creates another Linux task to constantly check the above memory buffer, copy data in this buffer to internal memory of DVD writer 5. Then it sends a write command to DVD writer 5 for writing MPEG2 data to a DVD disc. Two counters are maintained to count how much data is received from video camera and how much data is

copied to DVD writer 5 internal memories. If two counters become equal, the copying process stops. Otherwise, copying process continues.

When playback function is required, a Linux task is created to read MPEG2 Program Stream from internal memory of DVD writer 5 to a memory buffer in SDRAM 7. Next it decodes these streams by running FFMPEG decoder in DSP unit 3. The decoded video signals are in YVU or RGB format. These video signals are transferred to video output (DAC) unit 4 for outputting NTSC/PAL signals to a TV set, which is connected to base station by video/audio cables.