Portable MultiMedia Card (MMC) Photo Projector HH1a-05

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Introduction

Nowadays, Wide XGA (WXGA) projectors are very popular in many organizations, university lecture theatres and local families for widescreen presentation and photo sharing. Therefore, this project plans to build a pocket-sized micro-projector with high resolution display while MultiMedia Card (MMC) is the input source.

Aim and Objectives

The aim of this project is to build a photo projector based on silicon microdisplay. There are three main objectives from this project:
1) To optimize the image processing speed by using dual Digital Signal Processors (DSPs)
2) To improve the image resolution of compatible with 1024×768 pixels
3) To modify the Field Programmable Gate Array (FPGA) in order to deal with the increased data in Synchronous Dynamic Random Access Memory (SDRAMs)

The following figure illustrates the operation of the photo projector:

Figure 1 System block diagram of the photo projector with two DSPs
Implementation

In this project, two DSPs are used to increase the speed of the decoding process, the JPEG image file (1024×768 pixels) is divided into two image frames with 1024×384 pixels. The JPEG image from the MMC and FLASH combined together to form the standard display mode (1280×768 pixels).

The master DSP decodes the upper frame of image while the slave DSP decodes the lower frame of the image. The decoded image data is put in the designed allocated position of SDRAM memory for the FPGA access. The following figure shows the idea.

Figure 2 Dividing image into two parts

- Upper frame of image
- Whole image in MMC
- Lower frame of image

Figure 3 Two frame image decoded by master and slave DSPs

Image shown by the master DSP.

Image shown by the slave DSP.

Images stored in the FLASH are decoded separately by master and slave DSP.
Result

Figure 4
Firmware Preview Display

Figure 5
Firmware Standard Display

Figure 6 The Main Board of the photo projector