

QUICK DESCRIPTION

**- REF8116 USB CAMERA -
- GLOBAL ARCHITECTURE -**

AN/00064

Abstract

This document gives an overview of the hardware/software components of a camera based on the SAA8116.

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1 HARDWARE

A Camera based on the SAA8116 can accommodate several VGA sensors: CMOS or CCD.

The following sensors have been tested:

CCD: Sony ICX098, Sharp LZ24BP, Matsushita MN3777

CMOS: Hyundai HV7131B, Philips UPA1021, TASC, (Photobit PB320)

Reference designs are (or will be) available for Sony ICX098 (compatible with the Sharp sensor), Philips UPA1021. Schematics and a few demo boards are available for Hyundai HV7131B.

The camera supports Audio and has a LED and a snapshot button.

The snapshot button is also used for remote wake up when the PC is in suspend mode.

For more details about the camera hardware, please refer to the corresponding document.

2 SOFTWARE ARCHITECTURE

The software is divided in several modules described below:

2.1 *Embedded software*

This software runs on an 8051 inside the SAA8116. It performs the following tasks: SAA8116 registers initialization, Auto Exposure, Auto White Balance (2500 to 6500 degrees), High level USB protocol.

The embedded software uses a 512 bytes (or more) EEPROM for the following reasons:

- Flexibility. Most of the SAA8116 registers initialization values are stored in the EEPROM. It allows fine tuning of the camera performance. Also the same embedded software can be used with different sensors (Sharp, Sony, Hyundai...).
- Store settings which are unique to a specific sensor : black level, defect pixels, color adjustment (need to be updated for every camera) ...
- Store PID/VID and serial number

2.2 *PC Host Software*

The following blocks are provided for win 98, Win98SE, Win2000, Win Millenium:

1. USB Minidriver handles decompression, processing for still picture and camera control. The minidriver is based on WDM architecture.

2. Extension DLLs for Video For Windows and Direct Shows

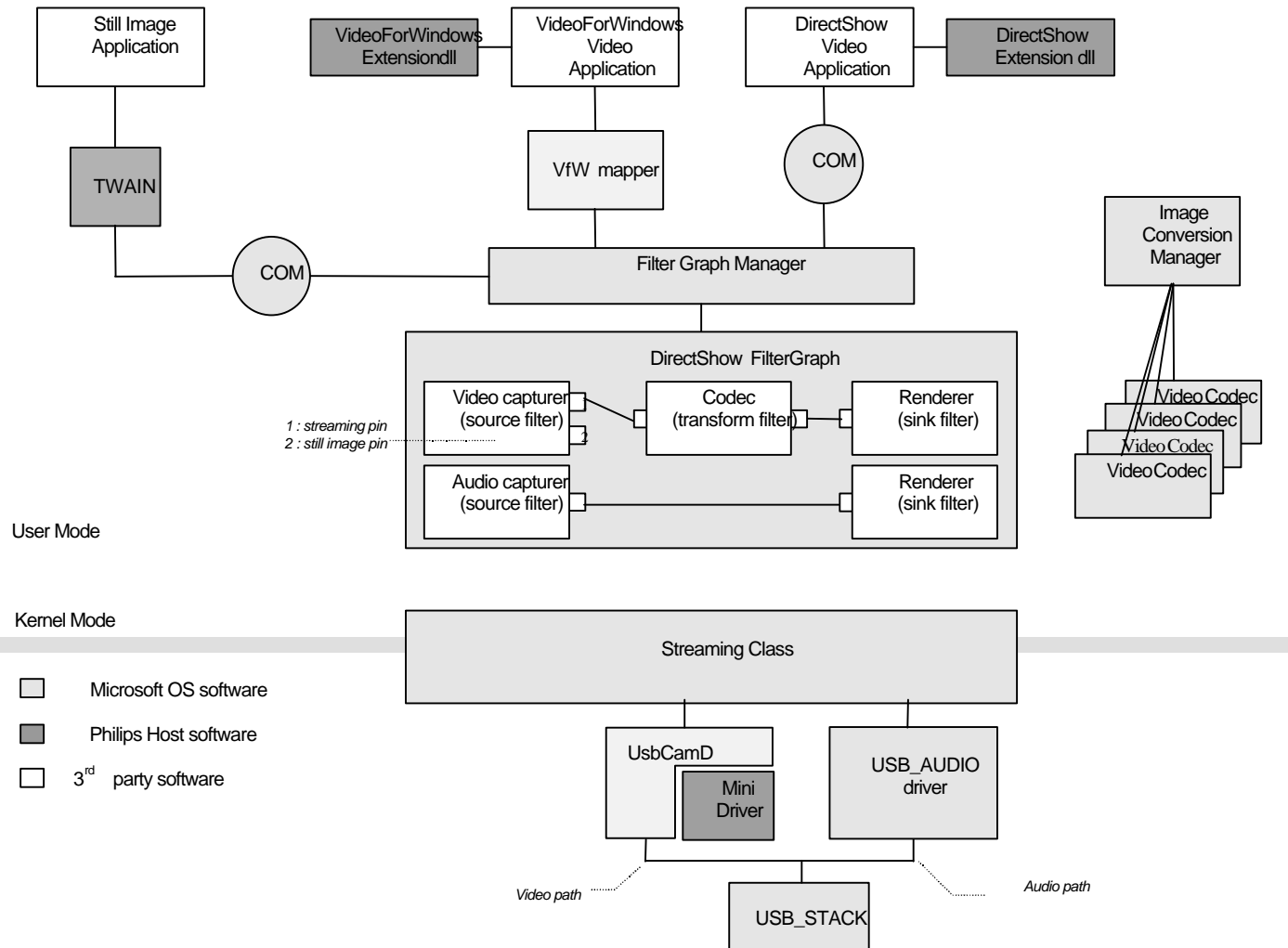
The extension DLLs are basically a GUI that can be integrated in any application using the camera. The GUI allows control of most of the camera properties: AE on/off, frame rate...

3. Twain interface

Is used as a bridge between the camera and any still picture oriented software like Photoshop. The twain interface has a preview mode for which it is possible to select all formats at all frame rates. An automatic snapshot mode is also available with programmable delay in between snapshots.

Note that the resource files of the extension DLLs are available on request. This allows customization of the look and feel and of the language supported by the GUI. Also an SDK will allow application to directly access the camera resource without going through the extension DLL. The SDK is also used for factory testing.

The following schematic give an overview of the PC software architecture:



2.3 Apple Driver

An Apple driver will be available. The basic functionality of the camera are implemented (video and audio streaming, frame rate, resolution).

3 FRAME RATE & RESOLUTION, AUDIO FORMAT

3.1 Video

Any combination of the following frame rate and resolution are supported for streaming video:

Frame rate: 5; 10; 15; 20; 25(24); 30

Resolutions:

QSIF: 160*120

QCIF: 176*144 (cropped from SIF, takes longer time to process)

SSIF 240*176 (cropped from SIF, takes longer time to process)

SIF: 320*240

CIF: 352*288 (cropped from VGA, takes longer time to process)

VGA: 640*480

3.2 Still Picture

Snapshot can be triggered by a button on the PC camera or from the PC.

From the Twain GUI the following still picture formats are available:

160*120

320*240

640*480

800*600

1024*768

1280*960

3.3 Audio

The following formats are selectable:

Frequencies: 8 kHz, 11.025 kHz, 22.05 kHz, 44.1 kHz

8 or 16bit

Stereo (although HW source is mono).

4 EXTENSION DLLS DESCRIPTION

From the extension DLLs the following controls are available:

- Frame rate selection (5,10,15,20,25,30)
- Selection of one of the following white balance mode:
 - Auto
 - Freeze to current color balance
 - Indoor
 - Outdoor
 - Fluorescent
- Auto exposure on/off
- If AE is off the following can be adjusted
 - Analog Gain
 - Shutter speed (exposure time)
- Saturation adjustment
- Brightness adjustment
- Contrast adjustment
- Gamma adjustment
- Black & White
- Mirror (rotation around Y axis, inversion of X coordinates)
- Back light compensation
- Flicker less on/off
- Full auto mode: This mode enable AE, AWB and select the optimum frame rate to get the best picture quality (enabled by default).
- Save/Restore user default
- Restore Factory default

The resource files of the extension DLLs are available to allow customization of the look and feel and of the languages.

5 Philips Semiconductors contacts

For more information about the camera, you can contact

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