



Vista Camera & WiFi Development Board Software

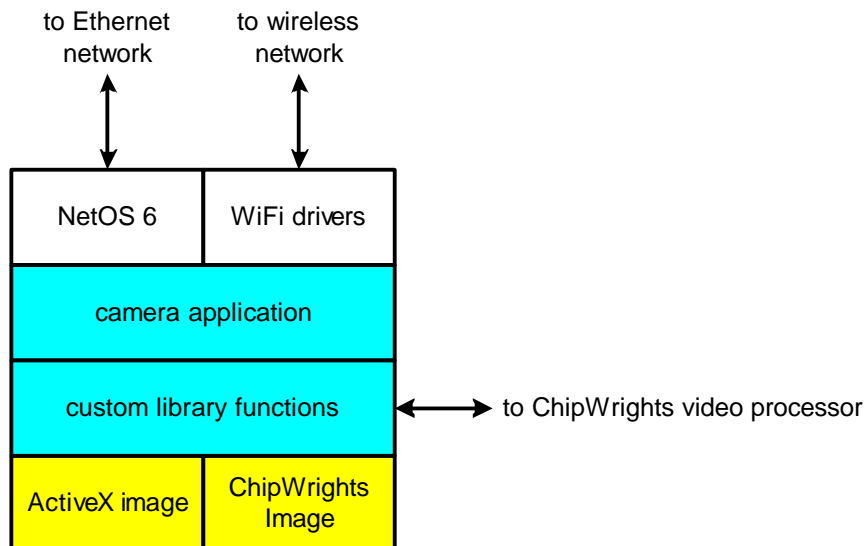
1. Overview

The Vista development board software allows for quick and easy entry into the remote camera and wireless networking markets. Software supporting the Internet camera includes an image that is loaded into the ChipWrights video processor and DMA routines that efficiently move video data to the NetARM and out the wired or wireless interface.

2. Firmware description

2.1 Block diagram

A simple representation of the software is shown below. NetOS and the WiFi drivers are available from NetSilicon. Custom libraries and a sample application that calls them were developed by Odic. An ActiveX binary image that runs on a PC browser and a binary image that runs on the ChipWrights video processor are also part of the software.



2.2 NetOS 6 and WiFi drivers

The camera software is built on NetSilicon's current operating system NetOS 6.

The WiFi drivers are part of the NetOS 6 operating system and is available from NetSilicon.

2.3 Camera application

The sample camera application is based on the \nahttp project that demonstrates the startup of the video server. The main differences in our application are the web page files and a call to `vservStart()` in `root.c`. This call starts the video UDP server which accepts a single connection. The drivers (wireless and ChipWrights) are loaded in the custom BSP platform that is supplied.

The web server portion of the camera application, developed using the basic web server tool, has a home page and an image page. The web server home page displays logos for NetSilicon, Odic and ChipWrights that provide links to respective company web sites. The home page also has a list box from which several camera images sizes can be selected (160x120, 320x240, and 640x480). When the user selects one of the size options and clicks the "Show Image" button, the web server sends the image page to the browser. The image page loads the ActiveX control that opens a TCP socket to the server for transmission of image frames to the browser window.

2.4 Custom library functions

Several functions were written by Odic to support the camera application. The functions listed below are included as a library and allow for custom hardware configurations through their API calls. These library functions are all used by the example camera application.

ChipWrights program loader

This driver handles the configuration of the ChipWrights processor and upload of its application image through the 4011's Host/Peripheral Interface (HPI). The ChipWrights' ELF image is converted using a utility into an object file during the build process and is linked in to the NetARM application. At runtime, the driver then parses the ChipWright's application's program (ELF file) sections and loads it to ChipWrights memory through its HPI port.

Video server

RTP provides end-to-end network transport functions suitable for applications transmitting real-time data, such as audio, video or simulation data, over multicast or unicast network services. Our video server achieves maximum transfer rates over IP by minimizing packet loss based on client reports. This method allows for faster data rates than TCP because of TCP's high connection

overhead. RTP-lite does not address resource reservation and does not guarantee quality-of-service for real-time services.

Video interface driver

Running on the NetARM, this driver uses 32-bit DMA transfers to move video data from the ChipWrights video processor, employing a zero-copy buffering scheme for efficient data transfer. A 30 fps VGA frame rate (40Kbyte JPEG image per frame) is easily reached when using Odic's ActiveX control over a 100 Mbit Ethernet connection to a 2 GHz PC on a local network.

2.5 ActiveX control

The ActiveX binary image is automatically downloaded to the PC (browser) when the web page that displays video images is accessed. When running on the PC, the ActiveX control is a UDP client that streams the JPEG image data from the NetARM server and displays the JPEG images. Using Odic's RTP-lite, the ActiveX control monitors the data and detects missing packets. As the server keeps trying to increase the data rate and packets begin to get dropped, the ActiveX control sends back a fractional packet loss report every few seconds which tells the server to reduce the frame rate by inserting packet delays.

Note that due to security settings, most browsers will either block the reception of the ActiveX control or at least warn the user that a control is trying to be downloaded. The user will usually need to change the security settings to allow for the reception of an ActiveX control, and we suggest that the user select the "prompt before loading" security option.

2.6 ChipWrights binary image

The image included in this software package is based on ChipWright's JPEG Pipeline Demo. We enhanced it to support the Omnivision OV9620 (1280 x 1024) or OV2610 (1600 x 1200) sensors and to interface properly with the NetARM processor. Note that the source code for the ChipWrights image is not included in this software package. ChipWrights development tools and reference libraries are available separately from ChipWrights.

3. What you get and what you need

3.1 Development kit components

The Vista Camera & WiFi development board software package comes with the following:

- a. Complete runtime image of wired camera application
- b. Complete runtime image of wireless camera application
- c. Source code for NetARM software in the wired/wireless camera applications
- d. Board support package (BSP) developed specifically for the Vista development board
- e. ActiveX image
- f. Source code for the ActiveX control
- g. ChipWrights video processor image
- h. Instructions on how to build wired and wireless applications; instructions on how to build the ActiveX control
- i. Four hours of telephone and email support from Odic

3.2 Prerequisites

This software package can be ported directly to your own target and modified as needed to suit your particular needs. However, if you want to run the software as-is and have a working wired or wireless camera “right out of the box”, you will also need the following:

- a. NetARM-50 board P/N 1951000 Rev A
- b. Vista Camera & WiFi development board P/N 6151003 Rev A
- c. Omnivision 2610AA (1600 x 1200) or 9620AA (1280 x 1024) camera sensor eval board
- d. NetOS 6 w/ WiFi drivers

3.3 Optional items

In addition to the items listed as a prerequisite, tools available from NetSilicon and ChipWrights can help you develop custom camera applications. These optional tools include are:

- e. NetOS 6 w/ WiFi drivers
- a. ChipWrights software development kit (SDK)
- b. ChipWrights evaluation board (EVK)
- c. ChipWrights software reference library

See www.netsilicon.com/products/netarm.html and www.chipwrights.com for more information about these tools.

4. Licensing and royalties

There are no fees or royalties due NetSilicon or Odic associated with the software included in this package as long as executable (binary) code is being generated and provided as part of a camera product. The source code is for a licensee's internal use only and may not be shared or sold to another entity. This software package entitles the licensee to evaluate, design, develop, test, compile and distribute binary applications.