FC-1000/FC-1001 USB2.0 Camera Development Kit User Manual

Version 1.1

FClab Incorporation

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Installation

1. Package Contents

Your product package should include the items listed here. If anything is missing or damaged, please contact the support@fclab.com

- FC-1000 /FC-1001 USB 2.0 PC Camera module
- Bundled Software Disc
- This User's manual
- SDK manual

2. Host PC requirements

The computer you connect the camera to should meet the following minimum requirements:

- Pentium III 800MHz or greater for full performance
- 128MB system memory
- Hi-Speed USB 2.0 port
- Display card capable of true-color mode
- Microsoft Windows 2000 or XP

Since video processing is hardware intensive, a faster computer with a fast hard disk drive and extra memory will yield better results.
Some computers may only have USB 1.1 ports. You must upgrade your system by adding USB 2.0 ports via an expansion card. If you install such a card, confirm that it is properly installed or the FCLAB USB2 camera may not work properly.

Make sure your USB2.0 port is available by following steps

1. Go to "Control Panel" folder. Double click " system"
2. Select Hardware double click " Device Manager"
3. Double click " Universal Serial Bus Controllers "
4. You should find at least one " USB2.0 Root hub" as following

Fig 1.0

If cannot find "USB2.0 Root hub" on your Device Manager please refer your computer vendor or USB2.0 add on card Vendor installation documents for proper installation.

3. Software installation

Prepare

The installation of the Kit is a very quick and simple procedure. To avoid any unanticipated problems before installing this Kit it is important to ensure that all previous versions of the kit software have been removed using the Windows standard Uninstallation procedure below.

1) Click the Windows Start button; select Settings, then Control Panel.
2) Double click Add/Remove Programs.
3) Select the Install/Uninstall tab. Choose "FCLAB USB2.0 Camera Developer Kit" from the list of programs.
4) Click Add/Remove.
5) Click OK.
6) Click Close.

Do not connect the module to your computer yet!

Insert the Kit CD-ROM. Run SETUP.EXE

Follow the instructions on screen to complete the installation. When asked if you want to restart your computer, select **No** until all selected drivers and applications are installed.

After you clicked " finish" to complete the software installation you may go to the "Program Files" " FCLAB" folder to check all folders has been installed as following

Driver
Application
Documents
Example
Api

If you receive a message that the Microsoft digital signature was not found, click Yes.

The Kit software is pending assignment of a Microsoft digital signature. This will not affect the Performance of the Kit.

4. Hardware installation

Connect the module to your computer now!

You can connect USB devices to a computer while the computer is turned on. This "hot plug" capability is a convenient feature of USB products. To connect the camera to a computer do as follows:

- Plug the connector on the camera's attached USB cable into an open USB port on your computer. When you connect the module, the computer's Operating System should recognize it. Module's RED LED should on. You should see the FCLAB USB2.0 Camera on "Device Manager / Hardware" as following

Fig 1.1

Congratulations!
Your FCLAB USB2.0 Camera Development KIT has been installed properly

Getting start with the FC-1000/FC-1001 Module

- For FC-1000 module, make sure you have installed a proper C mount lens and put Focus and Aperture to certain position.
- Run " FCLAB USB2 Camera " application either from desktop or installed folder.
- Start preview function by click " Connect " button. A default 640x480 preview live image window will appear. The Green LED will blink along the frame rate. Fine turn focus, aperture and lighting condition you should see crystal clear live image.
- Following software menu you can play the camera with most of function Including
  - Live image preview
  - Pause live image
  - Change live image capture size
  - Change to scale mode
  - Change live image display size
  - Change live image window position
  - R, G, B Gain control
  - Exposure control
  - Sensitivity selection
  - Gamma table load/unload
  - Color/ monochrome display
  - Still image capture
  - Continues images capture
  - Change lighting condition with default setting
  - Auto Color Balance (AWB)
  - Auto Exposure (AE)
- To achieve a balanced color, you can do AWB as following steps

1. During preview in 640x480 Adjust lens focus to 0.5M and aperture to a normal value (F=4.0). Change lighting condition to normal if the image is too bright or too dark.
2. Point camera to a white paper with in 0.5M. Click the “AWB”
3. After a couple of seconds capturing and calculating the preview image will change to a nature white and show ” AWB successful”
4. Go to Adjustment menu , Save parameter menu save the parameters and name the result as you like, you can name the name to “my room”….etc.

Hardware description

USB interface

USB or Universal Serial Bus, is a peripheral device connection technology that complements or replaces older peripheral device interfaces such as serial, parallel and PS/2 ports. There are two USB specifications, USB 1.1 and USB 2.0. The FCLAB Series Cameras are Hi-Speed USB 2.0 devices that require a USB 2.0 interface for operation. USB also supplies electrical power for connected devices up to 500mA directly through the USB cabling.

In FC-1000 design, USB interface not only for image transfer. It also design for a control link Between outside world and computer. During the camera working or idle the USB interface Can work as a USB to RS232, USB to I2C and USB to GPIO.

LED indicator

Red LED for power Indicate, once plug USB cable. This LED will permanent on for FC-1000.
Green LED for data transfer indication. During image transfer this LED will blink along the frame rate from 1F/S to 60F/S. For FC-1001 the Red LED will do same function as Green LED in FC-1000.

Extend Port (for FC-1000 only)

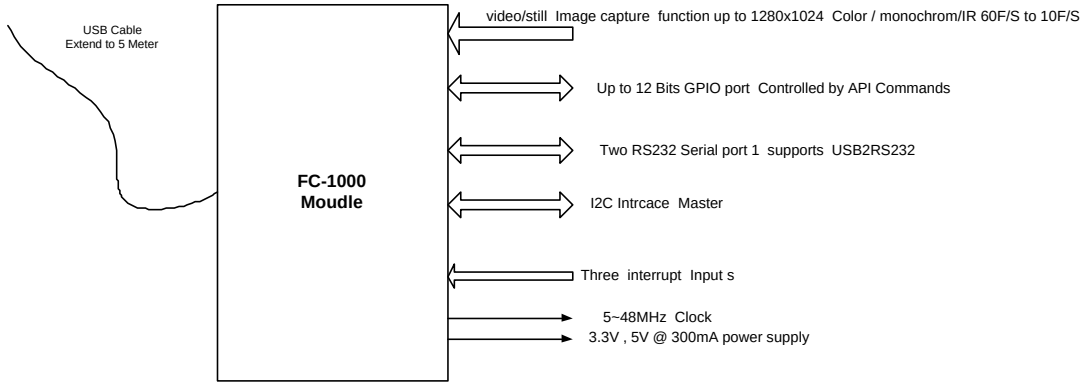
There is a 8 Pin 2.54mm pitch jump connect use for extend purpose.

J2 Pin 1 Strobe signal : 3.3V. Active. During exposure this signal will change to high to turn on a possible lighting device such as flash tube, LED bar. This signal can be use for capture a high speed moving object that ignore Rolling shutter weakness.

J2 Pin2 GPIO1 : Can be configure to input or output through FclBitOperation API command in software application level.

J2 Pin3 GPIO2 : Can be configure to input or output through FclBitOperation API command in software application level.
J2 Pin4 GPIO3 : Can be configure to input or output through FclBitOperation API command in software application level.
J2 Pin5 GPIO4 : Can be configure to input or output through FclBitOperation API command in software application level.
J2 Pin6 GPIO5 : Can be configure to external trigger event through customize Firmware.
J2 Pin7 +5V : Output a 5V 300mA to outside possible load.
J2 Pin8 GND : Ground.

Customizable Resource



FC-1000 USB2 Camera Moudle Hardware Resource Block Diagram

The core of FC-1000/FC-1001 is a 48Mhz micro processor with USB2 interface . There are a lot of useful hardware/ firmware resource for customize. These resource including
Extra up to 20 bits bit control GPIO interface.
I2C interface
RS232 interface
4 external interrupts.
User can use these ports for system Integratable design

Please contact support@FLAB.com for customize design.

Application user guide

Component

Software of FC1000 is composed of two type windows: window for video and window for image. Anytime only one video window for video, but maybe more windows for captured images, snap images, etc. The two windows have different menu and toolbar and functions. When you want to see the whole window in Software, please select the menu of "Windows" and it's submenu for window arrangement.

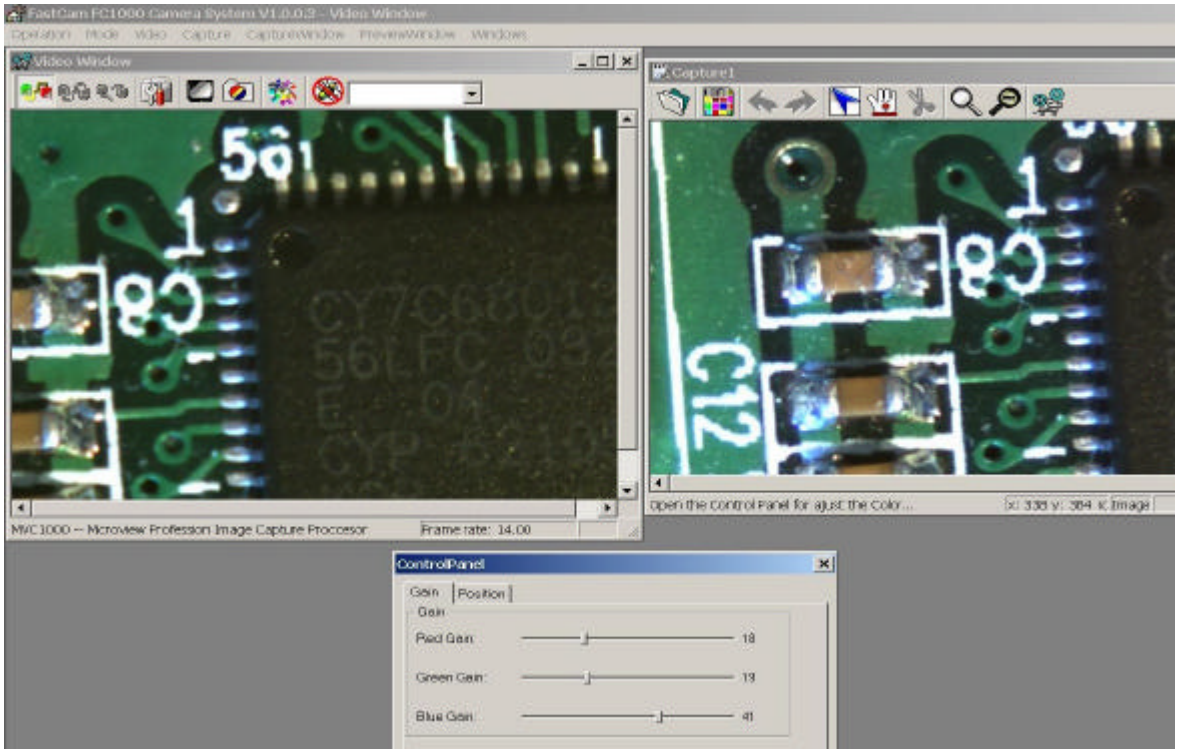


fig 1 Application User Interface

Operations for Video Window

Start ,Pause, Stop

When you connect the FC1000 device first, FC1000 software will open an video window and bring you to preview. You can select  on toolbar for closing the preview. if you want to preview once time, please click  on toolbar and if you want to pause the preview, please click  on toolbar.

Mode Selection

You can select mode according to your application. FC1000 apply three modes.the first one is High sensitive mode.which suitable for the high sensitive application such as darkness,fluorescence environment. Cooperate with exposure adjustment, you can

capture a high sensitive image. The second is De-noise mode, which is suitable for low noise application. The third one is normal mode. From the video window's menu "**Mode**", you can select one mode of these three.

Auto Exposure

With the light of environment and Len's aperture, preview will be darker or lighter. It has a relationship with the exposure time. you must balance the exposure time(related to frame rate) and aperture. You can choose "**video > Auto Exposure**" form video's menu and a center rectangle appears for auto exposure area.

Manual Exposure

Control Panel

You can adjust exposure time manually from 1ms to 500ms. Click  on video window's toolbar and a dialog for Control panel will pop up (fig 2). From the Gain property page you can scroll the exposure scrollbar and preview will change timely. also, You can save the parameters satisfying. The name of saved parameter will show on the toolbar's combo box so that it's convenient for you to select a group parameter from it's list.

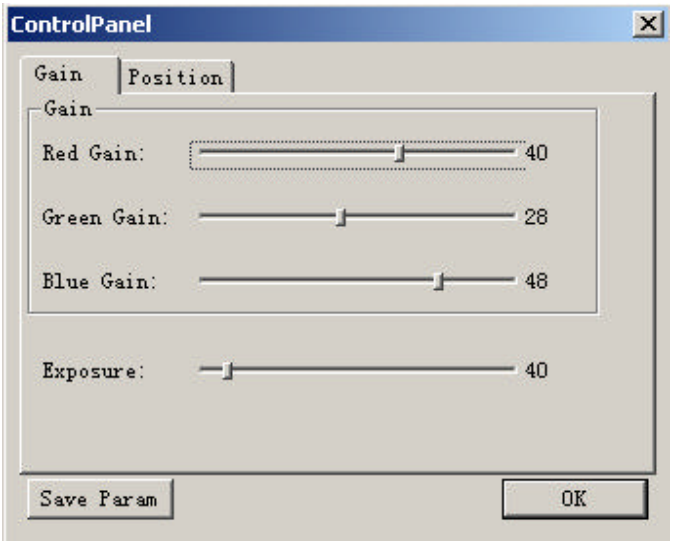


fig 2: Control Panel

Selectable Region AE

Same to Selectable Region AWB, see Selectable Region AWB.

Auto White Balance (AWB)

Before you do AWB, please adjust exposure at proper level. Then put an white paper before the lens and choose "**video > White Balance**" form video's menu. There 's a rectangle on the center image at this operation. Please ensure the white paper in the rectangle.

Manual White Balance

You can adjust white balance manually. click  on toolbar and appears control panel(picture 1), you can adjust red gain, green gain, blue gain in gain property page.

Load Gamma table

Please click  on toolbar to load gamma table which can correct color.

Adjust Gamma Value

You can also do color correction using gamma value by selecting" **Video > Adjust Gamma Value**".

Black&white/color

if you want to preview and capture an black/white image, please click  on toolbar.click again will back to color.

Capture Image

You can click  on video toolbar for capturing an image. The software will open an image window and show the capture image automatically.You can see the toolbar and menu changed for image process..If you want to back to video window, please click  on image window toolbar. There is an "windows" menu in both image window and video window so you can bring any window to top level.You also can select "**Capture**" menu's submenu to get **filter Image** and **continuous Frames**.

Viewpoint Adjustment

You can give an viewpoint when you not in full view(1280*1024). By opening control Panel and the position property page:

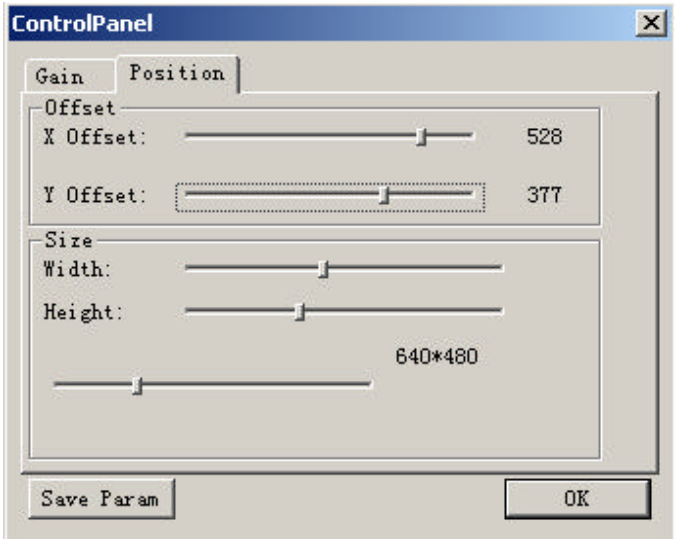


fig8 viewpoint

you can also save these parameters with gain together. The saved will appear on toolbar's combo box. See Control panel above please.

Operations for Image Window

Cut

When capture an image and in image window, we can click  on toolbar, then we can select the region we want and click  , we can get the regional image. If want to exit the cutting mode, we can click  to normal mode.

Image Process

In "**Process**" and "**Filter**" menu, we can select process of image.You can redo  and undo  to back and forward the process.

Zoom In / Zoom Out

In image window's toolbar, click  for zoom In and  for zoom out.

Open and Save

 and  in image window's toolbar to open and save an image.You can open and save files such as jpeg,bmp,tiff,png.

Back to Video Window

 , It's convenient for you to click this button from image window into video window.