



# FM-VC FACE Module

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## Setup Instructions

## Legal Notice

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## Revision History

Revision	Author/Engineer	Revision Changes
0.9	Dmitry Lifshitz	Draft
1.0	Maxim Birger	Initial public release

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## 1 Introduction

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### 1.1 Description

FM-VC FACE Module provide the ability for Video and Audio real and non-real time capture from low cost analog video sensors. Features A/V sampling, video, image processing and motion detection algorithms. In addition to application specific capabilities FM-VC offers several general purpose connectivity options as dual USB2.0 downstream ports and serial port supporting either single ended RS232 or differential mode RS485/RS422 operation.

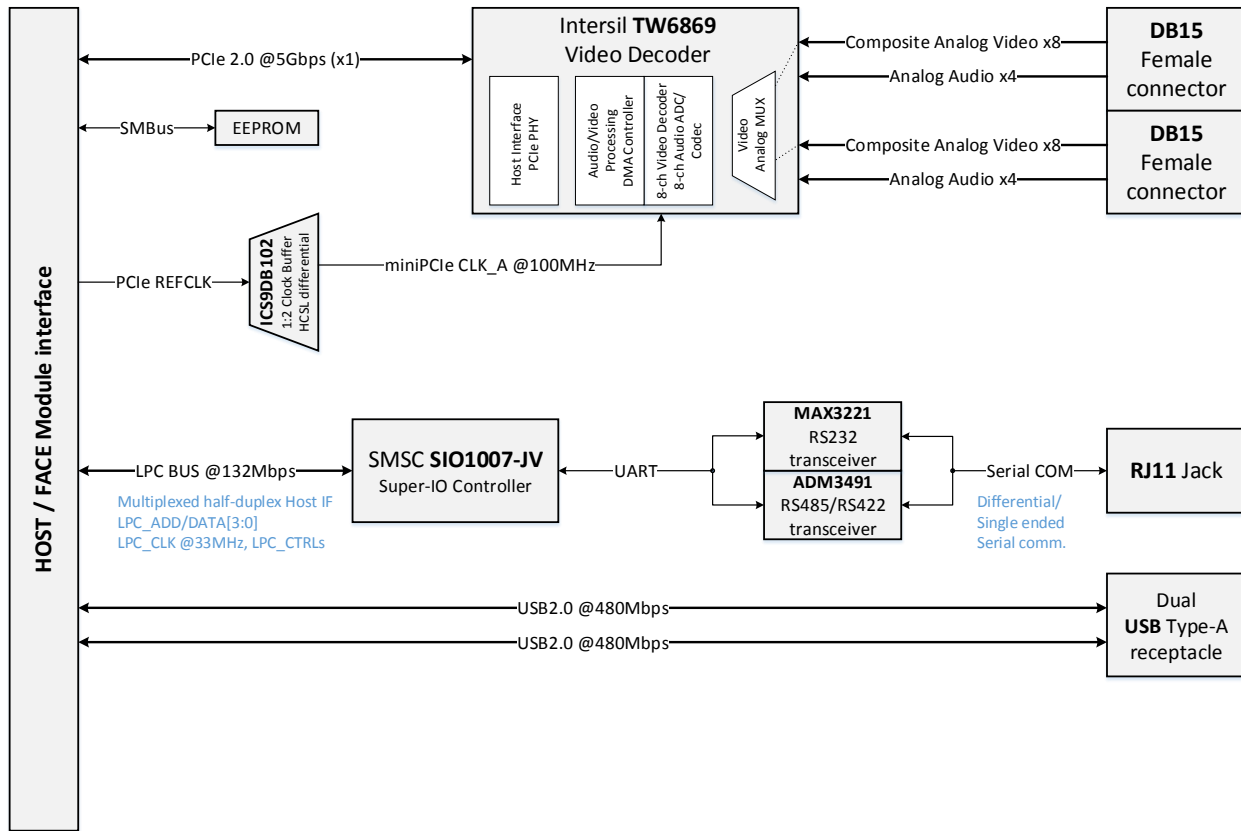
FM-VC FACE Module designed for surveillance, homeland security and any other video analytic system.

It is compatible with Intense PC, fit-PC3/3i and  $\mu$ SVR systems.

### 1.2 Highlights

- 8x Real time capture Composite Analog Video NTSC/PAL/SECAM channels
- 16x Non-real time capture Composite Analog Video NTSC/PAL/SECAM channels
- 8x Real time capture Analog Audio channels
- 2x DB15 female connectors for AV capture
- 2x USB2.0 downstream ports, up to 480Mbps half-duplex
- 1x Serial port supporting RS232/RS422/RS488 communication via RJ11

### 1.3 Block Diagram

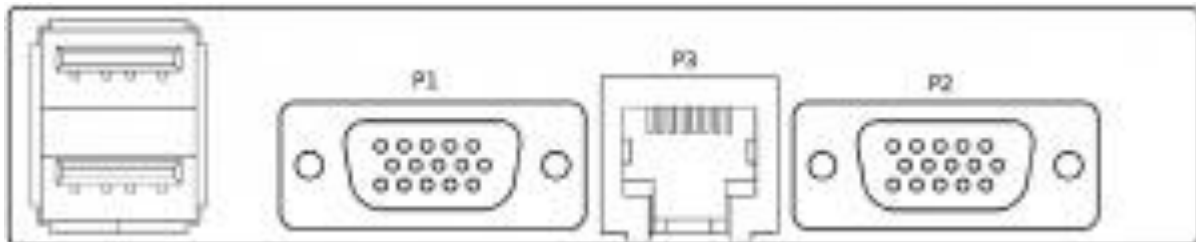


## 2 HW Setup

Eight analog video ports and four analog audio ports are located on each DB15 connector. FM-VC is supplied with two splitter cables, each from DB15-male to 8 BNC and 4 RCA connectors:

- Blue BNC connectors - analog video input
- Red RCA connectors - analog audio input
- Green BNC connectors - analog video input (see note below).

DB15 connector cables allow for an additional set of 8 non-real time video sources to be used (via green BNC connectors). Current version of FM-VC Linux driver does not support using these additional sources.



### 3 Kernel driver and Demo scripts

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Current driver supports real-time video capture with V4L2 framework, and PCM audio capture with 8 substreams using ALSA. Download the [http://fit-pc.com/download/face-modules/fm-vc/sw/linux-drivers/tw68v-dkms\\_1.0\\_all.zip](http://fit-pc.com/download/face-modules/fm-vc/sw/linux-drivers/tw68v-dkms_1.0_all.zip)

Install and load the driver:

```
sudo dpkg -i tw68v-dkms_1.0_all.deb
sudo modprobe tw68v
```

To use the demo scripts, install the GStreamer *ffmpeg* plugin:

```
sudo apt-get install gstreamer0.10-ffmpeg
```

#### 3.1 Basic video capture validation

List all video devices:

```
user@user-Brazos ~ $ ls -l /dev/video*
crw-rw----+ 1 root video 81, 0 Aug 2 03:26 /dev/video0
crw-rw----+ 1 root video 81, 1 Aug 2 03:26 /dev/video1
crw-rw----+ 1 root video 81, 2 Aug 2 03:26 /dev/video2
crw-rw----+ 1 root video 81, 3 Aug 2 03:26 /dev/video3
crw-rw----+ 1 root video 81, 4 Aug 2 03:26 /dev/video4
crw-rw----+ 1 root video 81, 5 Aug 2 03:26 /dev/video5
crw-rw----+ 1 root video 81, 6 Aug 2 03:26 /dev/video6
crw-rw----+ 1 root video 81, 7 Aug 2 03:26 /dev/video7
```

Stream from any of the video devices reported by the above command:

```
gst-launch-0.10 v4l2src device=/dev/video2 ! xvimagesink
```



## 3.2 Basic audio capture validation

List all audio capture devices:

```
user@user-Brazos ~ $ arecord -l
**** List of CAPTURE Hardware Devices ****
card 1: SB [HDA ATI SB], device 0: ALC888 Analog [ALC888 Analog]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
card 1: SB [HDA ATI SB], device 2: ALC888 Analog [ALC888 Analog]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
card 2: TW68SoundCard [TW68 PCM], device 0: TW68 PCM [TW68 Analog Audio Capture]
  Subdevices: 8/8
  Subdevice #0: TW68 #0 Audio In
  Subdevice #1: TW68 #1 Audio In
  Subdevice #2: TW68 #2 Audio In
  Subdevice #3: TW68 #3 Audio In
  Subdevice #4: TW68 #4 Audio In
  Subdevice #5: TW68 #5 Audio In
  Subdevice #6: TW68 #6 Audio In
  Subdevice #7: TW68 #7 Audio In
```

Stream from any of the audio devices reported by the above command.

For example, to stream audio from TW68SoundCard, subdevice 2, run:

```
arecord -f S16_LE -r 48000 -D hw:TW68SoundCard,0,2 | aplay
```

### 3.3 Demo scripts

Download *fm-vc-demo* (<http://fit-pc.com/download/face-modules/fm-vc/sw/fm-vc-demo.zip>) archive and extract into current directory. The demo scripts demonstrate streaming and encoding with FM-VC audio/video capture devices. All scripts are based on GStreamer framework. Each script has a single parameter specifying video/audio device id 0...7.

```
unzip fm-vc-demo.zip
```

### 3.4 Examples

- Streaming */dev/video0* output to display:

```
./cam_show.sh 0
```

- Simple RTP server with output to display and encoding to external file:

```
./cam_rtp_server.sh 0
```

This script will encode both video and audio into *cam0.avi* file, and send video output to display and LAN on port 5000. The video will be taken from */dev/video0* and encoded using H.263 video codec. The audio will be taken from *hw: TW68SoundCard, 0, 0* and encoded using ACC audio codec.

- Simple RTP client with output to display:

```
./cam_rtp_client.sh 0
```

Run this script on any another Linux host connected to the same LAN in order to receive video stream from */dev/video0*.

## 4 ZoneMinder surveillance solution

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ZoneMinder is an integrated set of applications which provide a complete surveillance solution allowing capture, analysis, recording and monitoring of any CCTV or security cameras attached to a Linux based machine. ZoneMinder is highly componentized and comprises both the back-end daemons, which do the actual image capture and analysis, and a user friendly web GUI, enabling you to monitor the current situation and manage events that have taken place.

ZoneMinder require neither X, nor the web interface for day-to-day functions, and is therefore suitable for 'headless' systems. The web GUI allows you to check and control your ZoneMinder installation from other computers in your home or from anywhere in the world.

ZoneMinder is the most popular open source video surveillance server. There is a verity of freeware client applications for Windows/Linux/Android/MAC OS featuring access for configuring, viewing, and replaying video feeds.

### 4.1 Setting up ZoneMinder

#### 4.1.1 Configuring static IP

It is recommended that you configure your ZoneMinder server to have a static IP, so that you may easily connect when accessing its web interface. Edit the Ethernet connection properties as shown in the example figure. When finished, please check the network configuration by running `ifconfig` utility to ensure the settings are applied.

```
user@user-Brazos ~ $ ifconfig
eth0  Link encap:Ethernet HWaddr 00:01:c0:0d:5d:e4
      inet addr:192.168.19.121 Bcast:192.168.255.255 Mask:255.255.0.0
      inet6 addr: fe80::201:c0ff:fe0d:5de4/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
      RX packets:15356 errors:0 dropped:3 overruns:0 frame:0
      TX packets:3911 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:6285808 (6.2 MB) TX bytes:1285690 (1.2 MB)

lo    Link encap:Local Loopback
      inet addr:127.0.0.1 Mask:255.0.0.0
      inet6 addr: ::1/128 Scope:Host
      UP LOOPBACK RUNNING MTU:65536 Metric:1
      RX packets:288 errors:0 dropped:0 overruns:0 frame:0
```

TX packets:288 errors:0 dropped:0 overruns:0 carrier:0  
collisions:0 txqueuelen:0  
RX bytes:40462 (40.4 KB) TX bytes:40462 (40.4 KB)



## 4.1.2 ZoneMinder installation

- Give user access previliges to the video devices

```
sudo adduser www-data video
```

- Install ZoneMinder application

```
sudo apt-get install zoneminder
```

- Stop the service in order to proceed with reconfiguration

```
sudo service zoneminder stop
```

- Edit `/etc/init.d/zoneminder` and add `"sleep 15"` above the `"zmfix -a"` entry.

- Link Apache webserver to ZoneMinder

```
sudo ln -s /etc/zm/apache.conf /etc/apache2/conf.d/zoneminder.conf
```

- Setup apache2 to show the ZoneMinder user interface

```
sudo vi /etc/apache2/sites-enabled/000-default
```

Change "*DocumentRoot /var/www*", to "*DocumentRoot /usr/share/zoneminder*"

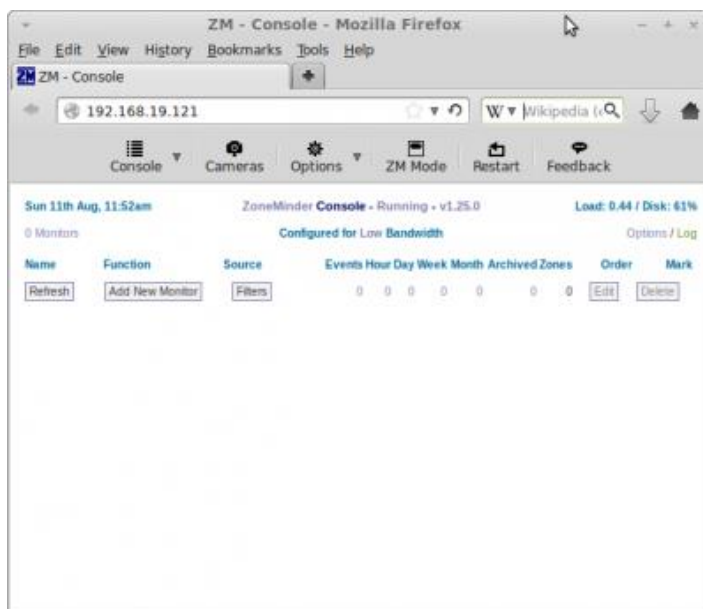
Change "*<Directory /var/www/>*", to "*<Directory /usr/share/zoneminder/>*"

- Edit */etc/sysctl.conf* and add

```
# Memory modifications for ZoneMinder (kernel.shmall = 16 MB, kernel.shmmax = 256 MB)
kernel.shmall = 16777216
kernel.shmmax = 268435456
```

- **Restart** the PC and ensure ZoneMinder service starts correctly on boot.
- Open a web browser and enter the address: <http://192.168.19.121>

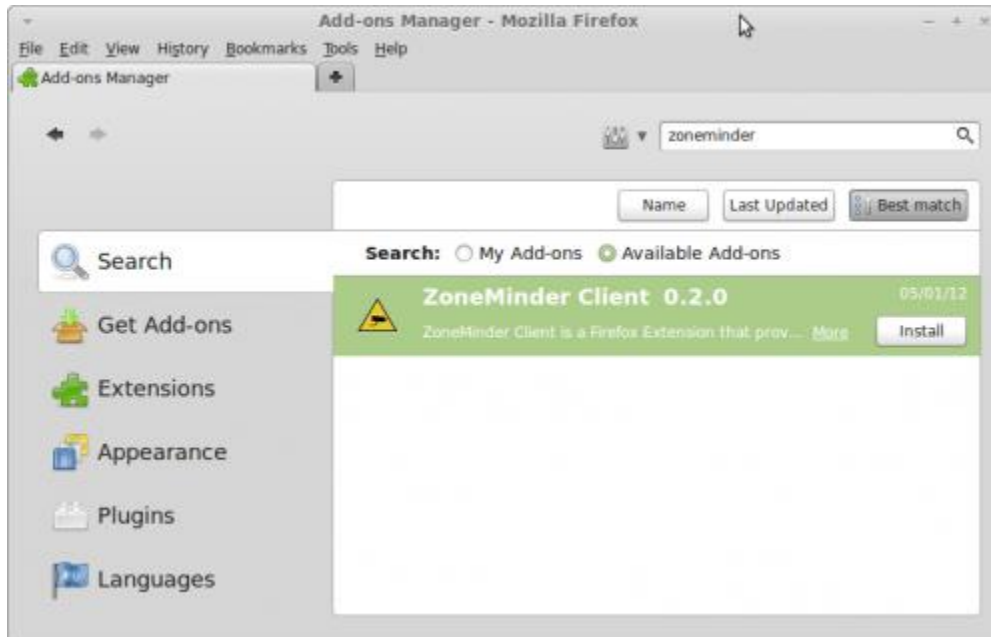
The following page should be loaded:



## 4.2 ZoneMinder setup

ZoneMinder services can be accessed and configured through the web GUI using the web browser from **any** host. This article describes the setup using Mozilla Firefox web browser. It should be properly configured according to [ZoneMinder- Wiki-FAQ](#).

We recommend using the Firefox add-on "**ZoneMinder Client**" which assists in configuring the browser, and enhances ZoneMinder GUI with the shortcuts toolbar:



Below is the series of screen-shots with "**ZoneMinder Client**" setup.

ZoneMinder Client Prefwindow

Server Info Cameras ZM Mode

ZoneMinder Scheme (required)  
http://

ZoneMinder Host (required)  
192.168.19.121

ZoneMinder Path (required)  
/zm/index.php

ZoneMinder Username (optional)  
username

ZoneMinder Password (optional)  
password

Show password.

Close

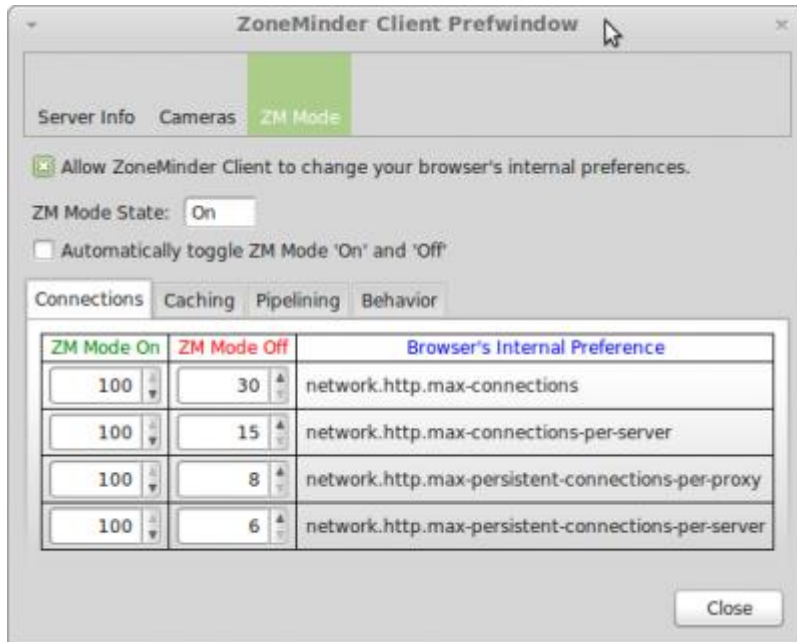
ZoneMinder Client Prefwindow

Server Info Cameras ZM Mode

Groups (optional, comma separated whole numbers  $\geq 0$ )  
0

Monitors (optional, comma separated whole numbers  $> 0$ )  
1,2,3,4,5,6,7,8

Close

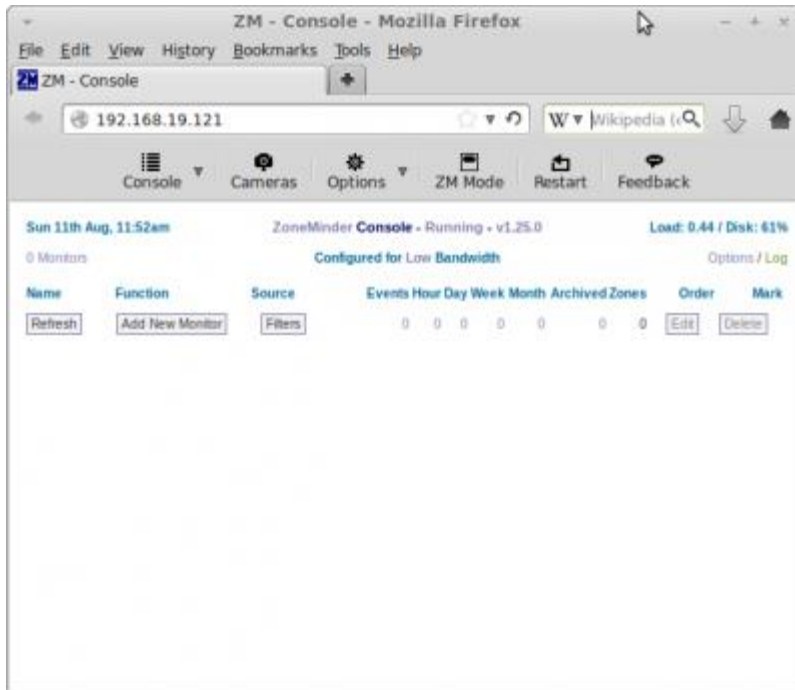




### 4.3 Setting up FM-VC video devices

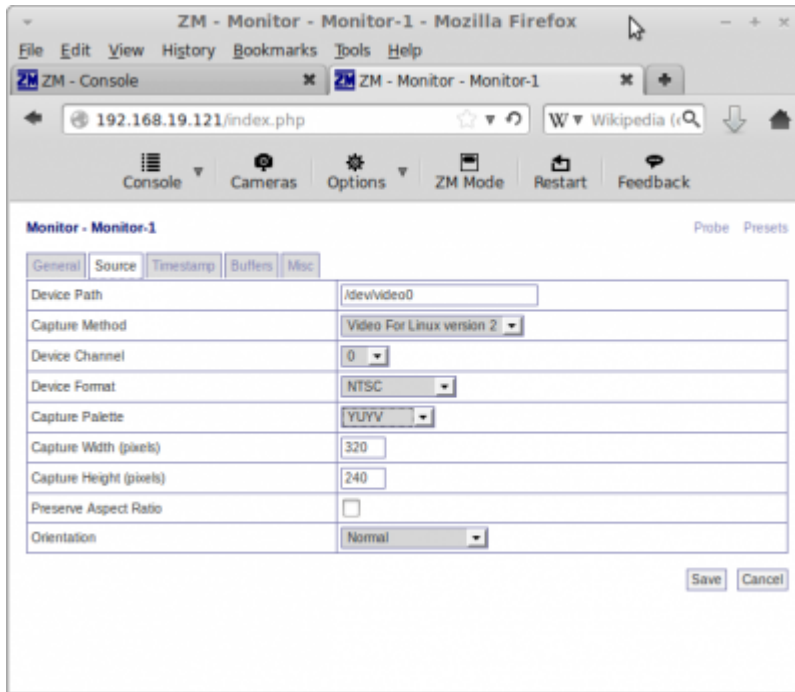
- Step 1

Click **Add New Monitor** to add a Monitor associated with one of eight FM-VC video devices.



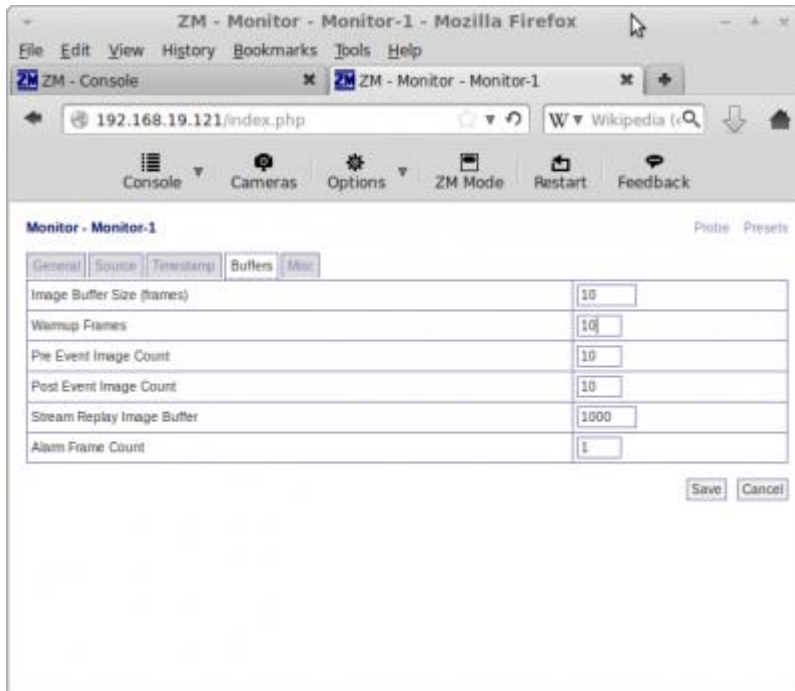
- Step 2

Select the **Source** tab and setup the parameters as shown in the screenshot below. Each monitor is associated with `/dev/videoX` video device, where *X* is 0...7.



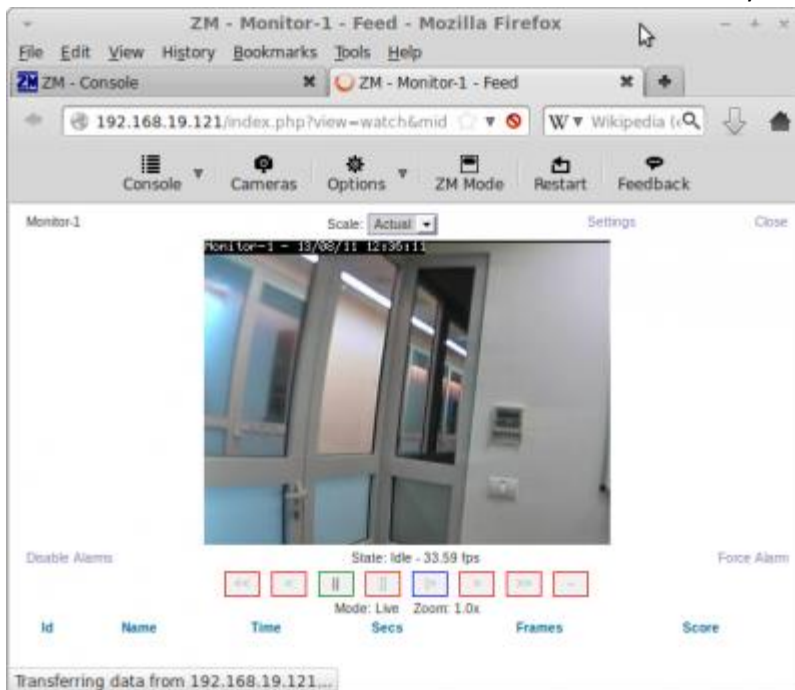
- Step 3

Select the **Buffers** tab and setup the parameters as show in the screenshot below.  
Press **Save**.



- Step 4

Press the **Monitor** link under the **Name** column to check the camera output. A yellow colored video device name indicates that the monitor was added successfully.



Repeat the above steps for each of the eight monitors.

#### 4.4 ZoneMinder client applications

ZoneMinder client applications:

- [ZM4MS](#) - MS Windows client
- [Zone Minder Client](#) - OS X / MS Windows client
- [eyeZm](#) - OS X client
- [Zoneminder client \(Unofficial\)](#) - Android client
- [Total Control Zoneminder](#) - Android / Blackberry client

## 5 Reference

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FACE Module HW specifications:

<http://fit-pc.com/download/face-modules/documents/face-modules-hw-specifications.pdf>

Block diagrams:

<http://fit-pc.com/download/face-modules/documents/face-modules-block-diagrams.pdf>

FACE Modules portfolio overview presentation:

<http://fit-pc.com/download/face-modules/documents/face-modules-portfolio-overview.pdf>

FM-VC schematics:

[http://fit-pc.com/download/face-modules/fm-c/hw/rev1.0/Schematics/fm\\_vc.pdf](http://fit-pc.com/download/face-modules/fm-c/hw/rev1.0/Schematics/fm_vc.pdf)