Minoru Webcams

Edwin Chan

Overview

- Consumer 3D webcam
- Two standard webcam mounted together
- Driver support for (pretty good) synchronous video capture
- Drivers and software at http://www.minoru3d.com/
 - \circ Current driver version v1.0.0.3
 - Current software version v3.0.1.4
 - \circ Linux drivers available



Specifications

- Baseline distance ~60mm
- Capture resolutions:
 - o 320 x 240
 - 640 x 480
 - **800 x 600**
 - o 352 x 288
 - \odot 640 x 240 (stereo side by side)
 - \odot 1280 x 480 (stereo side by side)
 - \odot 704 x 288 (stereo side by side)
- Frame rate is 15 or 30 fps for most resolutions.
 - Note 30 fps may not be achieved depending on factors such as USB transfer rates and exposure time. 15 fps is usually reliable.

Setup

 Setup the webcam drivers properly!

 Driver has setting for vertical and horizontal image shift.
 Set these to 0.

- Set the distance profile

 (left click sys tray icon) to 'close'.

 Note that this profile overrides
 those set in the setup wizard.
- Set both lens' focus correctly







How to capture images

With provided software from Minoru

 Captures images and videos to file
 Synchronization done by driver

With program using API interface

 DirectShow, Video for Windows, Video for Linux, etc
 Allows real-time image processing
 Need to check synchronization

Capture with Minoru Software

- Set the correct mode (right click sys tray)
 Side By Side
- Start video capture software
- Select the correct resolution

 Incorrect resolution will
 squash image





Capture with Minoru Software

Adjust video properties until good image quality is achieved

📧 Minoru 3D Webcam				23
1280x480 + 1:1 + Audio + (rec) (B) (A)	Properties	×		
	Video Proc Amp Camera Control			
		Auto		
	Brightness	1		
	Contrast	5		-
	Hue ()			
	Saturation	4		
	Sharpness	-06	the second se	
	Gamma	120	1 (1 ¹²) ¹	
	White Balance	4675		
masswQEvrorem at	Backlight Comp ()	0	N-PO Miccom	
and the second sec	Gain ()	32	A A A A A A A A A A A A A A A A A A A	
6070	ColorEnable Powe	Line Frequency 50 Hz (Anti Flicker)	STO WAY WAY	
	Defau	t	Cash Cash	
	0	Cancel Apply	1853 A	

Capture with Minoru Software

Video properties

- \circ Adjust exposure (camera control tab), this affects colour
 - Exposure will affect frame rate
- Do not use too much saturation and sharpness or artifacts will occur
- \circ Driver only have 3 white balance settings, and is not a continuum
- \circ Low gain will reduce noise
- If white balance or exposure control is unresponsive, check and uncheck "Auto" box
- Finally, capture a still image or a video

 Save using uncompressed format

Minoru Software Post Processing

Video captured using Side By Side mode needs to be split into separate images.

- 1. Download VirtualDub at http://www.virtualdub.org/
- 2. Open video with VirtualDub
- 3. Video > Filters
- 4. Add... > null transform
- 5. Cropping...
- 6. Set cropping boundaries to half the image (e.g. 640 x 480)
- 7. Either
 - File > Save as AVI...
 - o File > Export > Image sequence...
- 8. Set cropping boundaries to other half and save again

Minoru Images

Requires calibration and rectification to epipolar geometry



checkerboard



rectified checkerboard

Calibration Parameters

Calibrated using Zhang's method.

Relative rotation and translation:

R =	0.998	-0.0021	0.018	T =	-60.8488	values in mm confirms
	0.0022	1	-0.0054		-0.2774	baseline of approximately
	-0.0179	0.0054	0.998		3.6099	60 mm

Your calibration should achieve similar results.

Minoru Images

Rectified stereo pair



Image Problems

Distortion - lens is quite bad

- Radial
 - k1=-0.0878 k2=-0.1954 k3=1.2618 in normalized image coordinates
- Principle point misaligned (by about 10 px at 640 x 480)
- Limited tangential distortion
- Visible chromatic aberration
- Image is supersampled
 - Aliasing on images indicate sensor's true resolution is less than 640 x 480 (possibly 352 x 288)
- Different colour between left / right
- Occasionally frame is dropped from video due to unsync
 Possible to detect automatically by finding 2 identical images in sequence

About Chromatic Aberration

- 1. Materials such as glass have a property known as the *refractive index*. The refractive index indicates how strongly the material bends light.
- 2. The refractive index for a material varies for different wavelengths of light.
- 3. Thus different wavelengths of light (different colours) bend differently in the material. This is what causes a prism to split light into the colours of the rainbow.
- 4. Lens use such a material to bend and focus light, thus lens can suffer from chromatic aberration if not corrected.

More details see Wikipedia:

http://en.wikipedia.org/wiki/Chromatic_aberration