# The FUJI 3D Camera


## A Presentation by George Themelis

## NSA / July 2010

# The FUJI 3D Camera

- Is the first compact digital stereo camera and it is already having a big impact in amateur stereo photography.
- This is currently perhaps the easiest way to make the transition from film to digital.

1. **Basic description of the Fuji 3d camera**
2. **Advantages & disadvantages**
3. **Buy Now or Wait?**
4. **Tips for using the camera**
5. **Advanced 3D (hyper/hypo stereo)**
6. **Use of Flash, problems & solutions**
7. **Processing digital stereo images**
8. **Viewing digital stereo images**
9. **Fuji W1 Wish List**
10. **Examples of Fuji 3d stereo pairs in digital projection**

# FUJI 3D Camera—WHAT IS IT?

- **WORLD's first digital stereo camera** (from a major manufacturer). First camera designed as a digital stereo camera.
- First digital stereo camera that can fit in a pocket.
- Two Fujinon lenses separated by 77mm (fixed stereo base). 3x optical zoom (equivalent to 35-105mm in 35mm film)
- Resolution: 10MP per sensor. File Format: MPO (can be read by several programs)
- 3D/2D 2.8 inch LCD monitor allows you to compose the scene in 3d and play back the pictures (or movies) in 3d
- Automatic stereo window adjustment with manual override
- 3D Interval Shooting mode aids in taking two sequential shots
- Standard (conventional) 2D photography is possible. Dual Capture Mode allows you to take two 2d shots at different settings
- Other features: Built-in flash, stereo microphones, tripod socket



## What is it not?

It is not a "professional" caliber camera.

In September I borrowed Jay Horowitz's camera and used it for one hour. This resulted in review article published in the October OSPS newsletter. You can download it from www.ohio3d.com



## ONE HOUR with the new

# Fuji 3d Camera

A Review by **George Themelis** , *DrT-3d@att.net*

### Disclaimer

I have nearly zero experience with digital 3d photography and very little knowledge/experience with 2d digital photography, but decided to write this informal review with my impressions (and some personal thoughts) after using the Fuji 3d camera for only about an hour.

Right now there is one complete review of the camera by **David Starkman**, published in many stereo publications (Stereo World, Stereoscopy, etc) and also a plethora of impressions from users posted daily in the fuji3d email discussion list, plus reviews and specifications of the camera in the internet. If you would like to read more facts or opinions and see more pictures from this camera, I recommend starting with an internet search for "fuji 3d camera".

### An offer I could not Refuse

I asked Jay to write a short hands-on review of his new Fuji 3d camera. In return, I received an email titled "An offer you cannot refuse" where Jay told me that he is busy and offered to let me borrow and use the camera so I can get my own impressions.

My first reaction was "thanks, but I can't do it". I was busy too, plus, digital stereo is an unknown area for me and I was not sure what I could do with the camera in such a short time. But curiosity got the best out of me and I accepted the offer.

I picked up the camera on Tuesday, last week. Instead of using it right away, I let it sit in its box all day Tuesday and Wednesday. I was procrastinating because I did not know what is involved in using the camera and did not want to read the 128 page instructions first. On Thursday, around noon, I only had a few hours before returning the camera and I felt embarrassed to return it without using it, so I decided to take it out of the box and turn it on.

### Turn On and Shoot!

To my surprise, I was able to take digital stereo pictures, by just turning the camera on and pressing the shutter button! The camera works right out of the box, without reading any instructions. That's a good first impression.

My first "victims" were my wife, preparing lunch in the kitchen, and our cat. I found myself thinking "This is fun!" I especially liked the way I could see 3d in the camera's display in the back. That's a great innovation by Fuji.

After taking pictures inside the house, I took the camera for a short walk, up and down our street. In the next half hour I took pictures of houses, leaves turning orange/yellow, or whatever caught my fancy around our neighborhood.

While outside, I realized one of the issues with the camera: You cannot see the display very well (under bright light, the display is like a mirror and you see yourself instead of the display.) But this is digital photography, not film. Composition is not very critical and it can be adjusted later. So, I kept taking pictures of anything I found interesting.

### What's Next?

I came back from my walk with 50 stereo pictures in the camera. So far, so good. Now what?

Without any instructions from Jay and without reading the manual, I decided to plug the camera to my computer with the included cable. The

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***Photo 1*** *– My favorite 3d subject: Our cat! This picture has been cropped from the original, using StereoPhoto Maker.*

***Photo 2*** *– An easy-to-use camera encourages experimentation. Here I took this picture of myself in the bathroom. I am shooting facing a mirror. There is a second mirror in the back, tilted to create a long row of reflections.*





(Continued from page 3)

computer "recognized" the camera and it appeared as an extra storage drive. I could see my 50 stereo pairs and copied them to my computer.

Each stereo pair is stored in a file with the .MPO extension. To see its contents, I decided to download StereoPhoto Maker (SPM). This is a free program, used and praised by the majority of stereo photographers. It has been described in previous Tutorials, but I have essentially no experience with it.

After a few painless minutes, SPM was in my computer. I started the program and opened the first file. Lo and behold, my first stereo pair was displayed in the computer screen! I can control the viewing method (parallel, cross viewing, or anaglyph). I turned on the anaglyph mode so I could check the stereo effect quickly, with a pair of anaglyph glasses that are always next to my computer.

I soon found out how to load the next picture by just clicking the mouse button. In a few minutes I had previewed all my stereo pictures.

How cool is that? Starting of a state of fear of the new camera and new software, in one hour I have downloaded and previewed my first 50 digital stereo pairs, without breaking a sweat and without reading any instructions. It could not be any simpler than that!

### Stereo the Easy Way

Having just witnessed how easy it is to take digital stereo pictures, I see our stereo hobby changing really soon. I can picture half of the participants in the 2010 NSA convention carrying these Fuji 3d cameras in their pockets, happily taking pictures of each other. This camera alone will increase the digital stereo output of stereo enthusiasts by many times.

The fact that it is so easy to carry and use means that everyone can have one at any time and any occasion. And since it costs nearly nothing to take a picture, I see people taking lots of pictures, experimenting with situations they would normally not bother with.

Notice, I have not said anything about the quality of the pictures from this camera. They looked OK in the screen. In my mind, this is a camera for 3d snapshots, so top quality is not important. Ease of use, combined with creativity, will result in many interesting pictures, I am sure. For more demanding jobs and variable stereo base, a twin rig will be required, just like serious film stereo photographer, use both a stereo camera and twin cameras.

I can see many situations where this compact digital 3d camera will become handy for me. Right now, to document favorite activities like running, or stereo club meetings, I take two cameras with me: A film stereo camera and a digital 2d camera. Both cameras could be replaced by an easy to carry 3d camera.

I also know people who got out of film and only carry on digital 2d camera and shoot 3d with cha-cha. No need to do that any more. Just carry the Fuji 3d digital camera. Actually, the Fuji 3d camera gives you a tool to shoot cha-cha (sequential) pictures, if variable stereo base is desired.

I can also see how this camera will bring a wave of new photographers back into stereo clubs and organizations like NSA. Adjustments will have to be made for this, especially in our club.

### The Viewing Issue

Am I ready to sell my film stereo cameras and convert to digital? Not yet. I have 50 digital stereo pairs in my computer. What do I do with them? There are several viewing options. Fuji promotes two options:

1. **Fuji Photo Frame**. This is a rather expensive autostereoscopic display that allows you to view your pictures without using glasses. Reports from people who have seen the frame vary. Some like it, others don't.
2. **Lenticular prints**. Sample prints (one such print came with Jay's camera) from Fuji are disappointing. They appear to be almost totally flat.

Digital stereo photography enthusiasts add a long list of additional options:

3. View the **stereo pairs in the computer** screen either by freeviewing, or anaglyph, or using viewing devices, including complicated setups with two screens and large mirrors.
4. Make **prints** in various formats and then use the corresponding viewer.

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***Photo 3*** *(top) - Typical 3d snapshot from our neighborhood.*
***Photo 4*** *(bottom) - The scarecrow attracted my attention here. Trying not to trespass too deep into the neighbor's house, I zoomed into the scene. Some "cardboarding" is evident.*

**Even though I had only used the camera for one hour, my overall impression of the camera and its impact in stereo photography was remarkably accurate. 9 months and 9,000 Fuji stereo pictures later, I cannot find much to change in this review.**

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- The fact that it is so easy to carry and use means that everyone can have one at any time and any occasion. And since it costs nearly nothing to take a picture, I see people taking lots of pictures, experimenting with situations they would normally not bother with.

- My one hour with the new Fuji 3d camera was an eye-opener. Unlike my film stereo cameras, the Fuji 3d camera is extremely easy to use by just about anyone without any instructions (just be careful to keep your fingers out of the lenses). This camera certainly delivers and makes taking digital stereo pictures extremely easy and convenient. I am sure it will be a great hit among stereo photographers.

- Those who are already involved with digital stereo should welcome this easy-to-use camera. Those who are currently shooting film exclusively will need to make adjustments in the viewing department (plus invest in computer hardware and knowledge) in order to make the switch from film to digital as smooth as possible.

- The big unknown for me is the reaction of the general public, which will determine the commercial success (or failure) of the Fuji 3d experiment.

# FUJI 3D Advantages

- **Portability**: Fits in a pocket.
- **Ease of operation**: Slide the lens cover, aim and shoot. Only stereo camera I know of that can be used with only one hand (including turning on and off)
- **3D LCD display**: A good way to compose, view and show your stereo pictures (and videos) to others.
- **Advance 3d mode**: You see a shadow of the first image when aiming for the second. That enables you to align the two images and also estimate the stereoscopic deviation. A great feature for handheld hyper and hypo stereos.
- **MPO file format** is read by StereoPhoto Maker (and videos by StereoMovie Maker) so printing or making anaglyph pairs is not a problem.
- **Durability**: I have done my best (dropped it 3 times, plus covered it with sweat) and I cannot kill it!!

# FUJI 3D Issues

- **Image quality** has been criticized. Zooming at full resolution shows some loss of sharpness & chromatic effects. Noisy at low light. *This is typical for compact digital cameras with small sensors. Does this matter for viewing options?*
- **Haze** under certain conditions, affecting left lens.
- **Dust & humidity** can get inside (not dust/water proof)
- **LCD is hard to see** in bright sunshine, which makes accurate composition a problem. *A problem for users in California. Solution: Move to Ohio!!!*
- **Ergonomics** are not great *(but the same was said for the Stereo Realist, the most successful stereo camera of all times).* It is easy to put the fingers in front of the lenses or accidentally hit the buttons in the back of the camera.
- **Cost:** *$600 is not cheap, but you are getting a unique product without any the competition in the marketplace, as of this writing.*
- **Fixed spacing of lenses wider than expected**. Is 77mm too much?
- **Viewing Options**: People are not very enthusiastic by the official viewing methods, but this is unrelated to the camera and can change in the future. *(It is already changing with 3D TVs, etc)*

# Is the Fuji for you?

## Type A photographer:

- Take time to set a shot. Use a tripod. Value quality over quantity. Looking for perfection. Take just a few pictures, but good ones. Favorite mode: Manual.

## Type B photographer:

- Like spontaneous hand-held shots. Take a lot of pictures. Value convenience over quality. Favorite mode: Automatic.

# Buy Now or WAIT?

- **If you are ready to use it right now, then buy it NOW!** *- Unless if a W2 is on the way?*

  *In the USA you can buy the camera from Fuji, Nvidia or Cyclopital on line: (Fuji's link: http://www.shopfujifilm.com/ ) but not B&H, Amazon, etc - Strange US marketing strategy—camera is mostly hidden from the general public (example: Popular Photography July Editorial: "Fuji's system isn't sold in the US")*

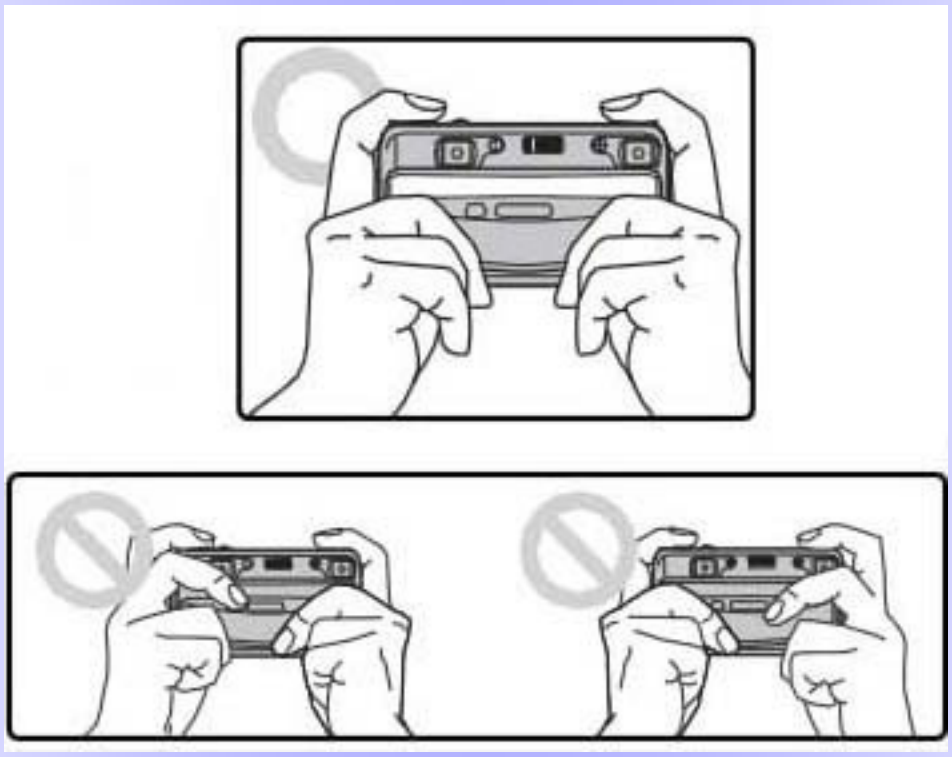
- **If you are not ready to use it right now, then it is better to wait.**

- **I am glad I did not wait!**

# Needed & Optional Equipment

- **Memory SD card** *(this is the only item needed)*
- **Replacement battery (& charger)**
- **Computer & Extra storage memory**
- **Carrying Case**
- **Holding Support**
- **Auxiliary flash**
- **Viewing equipment**

# Carrying / Protecting
# Holding/Supporting



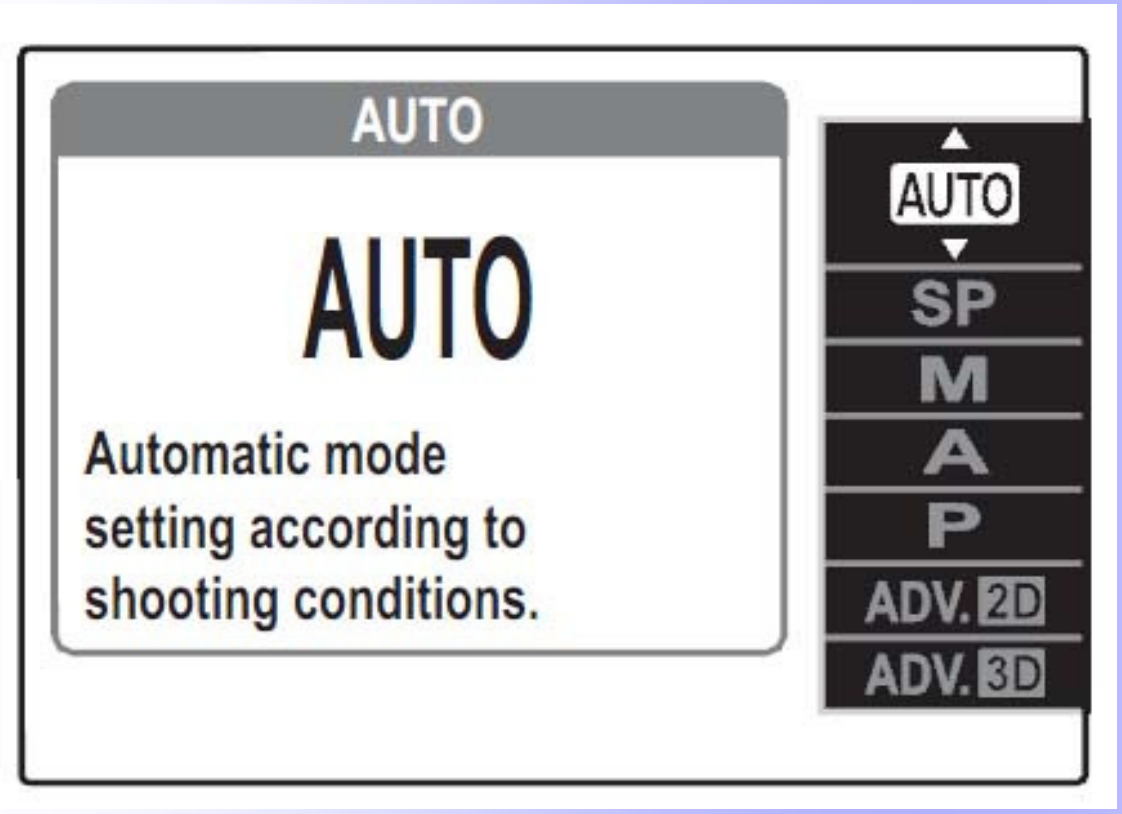
You **do not need anything** really to carry and use the camera, but many people feel more comfortable using some kind of carry case and support to hold the camera steady, while keeping the fingers out of the lenses.  There are many ideas discussed and documented in the fuji3d email discussion list.

## This is what I use and like:

# Hand Strap

**I use this strap for better support while running, or resting in the handlebar when biking**

# Shooting Modes




- **AUTO: Automatic**
- **SP: Scene Position**
- **M: Manual**
- **A: Aperture Priority**
- **P: Program**
- **Advanced 2D**
- **Advanced 3D**

Why are all these modes needed?

- I take 90% of my pictures in AUTO mode where I concentrate on the subject and let the camera make all the decisions regarding focus, exposure, and the use of flash or not. I have not been disappointed.
- Others like to use the M (Manual) model and “micromanage” the camera by instructing it to use a specific f-stop and shutter speed.
- Finally, there are in-between modes where the user decides on some aspects, and the camera sets the rest. It can be a bit confusing at first but one can find some beneficial settings.

# Recording Variables

**That either the user or the camera will set**

**Focus** (the user cannot set the focus manually, only indirectly by focusing at one area, half pressing the button, and then turning the camera to another area)

**Aperture (f-stop):** f3.7-f8

**Shutter Speed:** 3sec? —1/1000

**Sensitivity (film speed):** 100-1600

**Exposure Compensation**

**Use of Flash**

# SP Modes – Confused?

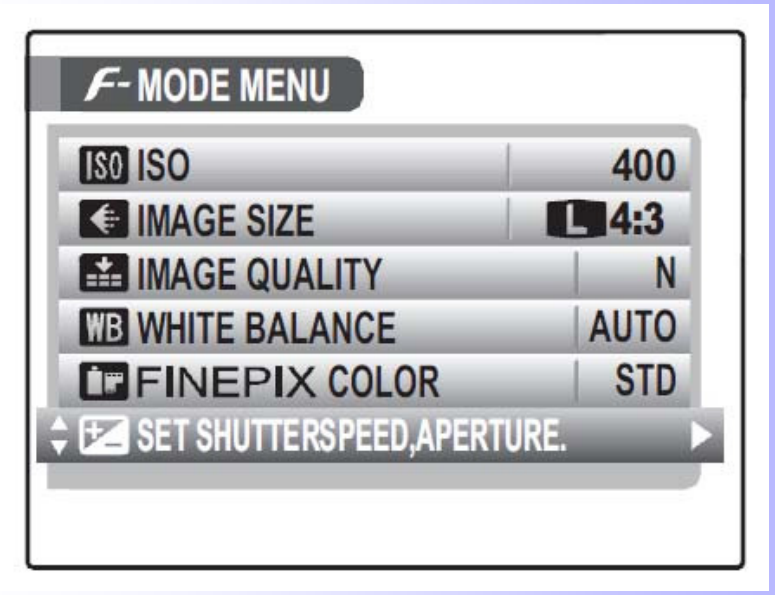
| Scene | Description |
|---|---|
| NATURAL & | Get good results with backlit subjects and other difficult lighting. The camera takes two shots: one without the flash and one with. |
| NATURAL LIGHT | Capture natural light indoors, under low light, or where the flash can not be used. The flash turns off and sensitivity is raised to reduce blur. |
| PORTRAIT | Choose for soft-toned portraits with natural skin tones. |
| LANDSCAPE | Choose for crisp, clear daylight shots of buildings and landscapes. |
| SPORT | Choose when photographing moving subjects. **QUICK AF** is automatically selected for **POWER MANAGEMENT** and priority is given to faster shutter speeds. |
| NIGHT | Choose this mode for poorly lit twilight or night scenes. Sensitivity is automatically raised to reduce blur caused by camera shake. |
| NIGHT (TRIPOD) | Choose this mode for slow shutter speeds when shooting at night. Use a tripod to prevent blur. |
| SUNSET | Record the vivid colors in sunrises and sunsets. |
| SNOW | Choose for crisp, clear shots that capture the brightness of scenes dominated by shining white snow. |
| BEACH | Choose for crisp, clear shots that capture the brightness of sunlit beaches. |
| UNDERWATER | Choose for vivid blues when taking photographs of subjects in an aquarium. |
| PARTY | Capture indoor background lighting under low-light conditions. |
| ANTI-BLUR | Choose **ANTI-BLUR** (picture stabilization) mode for fast shutter speeds that reduce blur caused by camera shake or subject movement. Recommended for photographs of children and pets. |

<u>Some modes make sense to me:</u>

- I use “Sport” mode when I run or want to use the camera quickly handheld while moving.
- I use “Night (tripod)” when shooting at night with a tripod.
- I am not sure what exactly some the rest of the settings do.

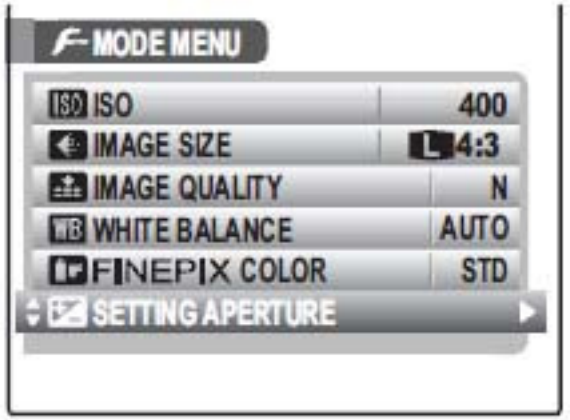
# M Mode

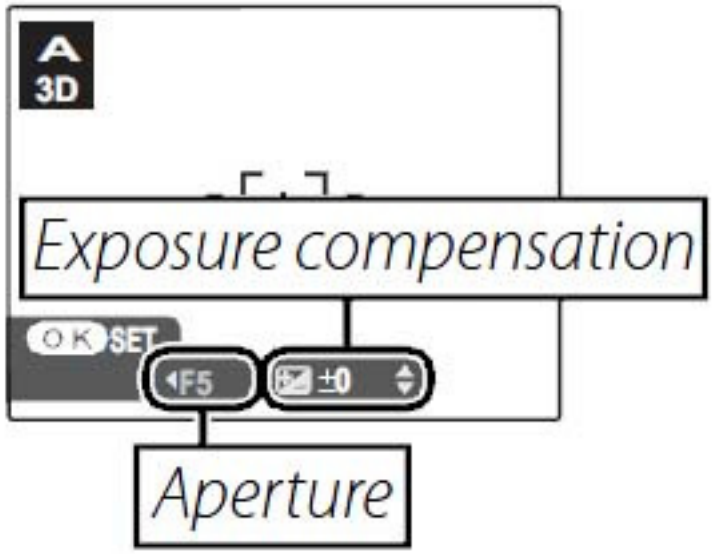
**Set ISO, Shutter Speed, Aperture**




# A Mode

**Set ISO, Aperture, Exposure Comp**



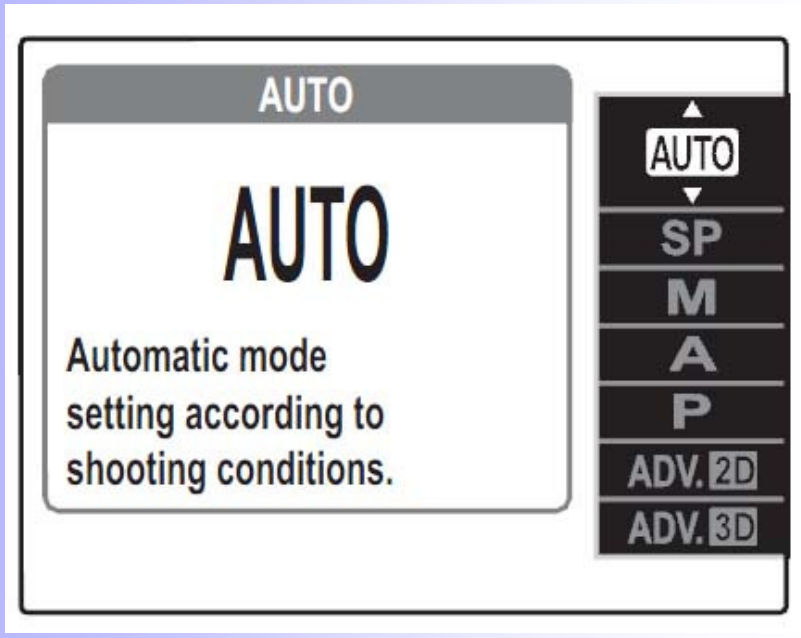




# P Mode

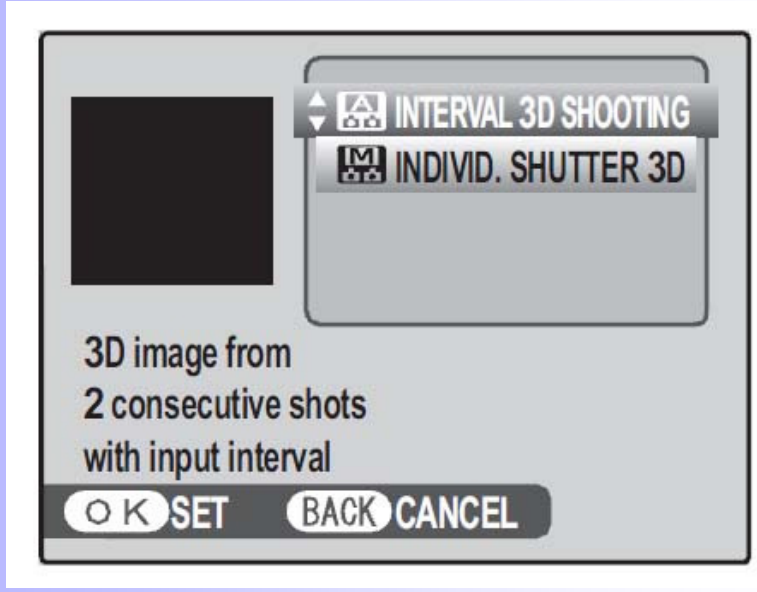
**Set ISO, Exposure Compensation**

# Advanced 3D

- **Individual 3D Shooting**

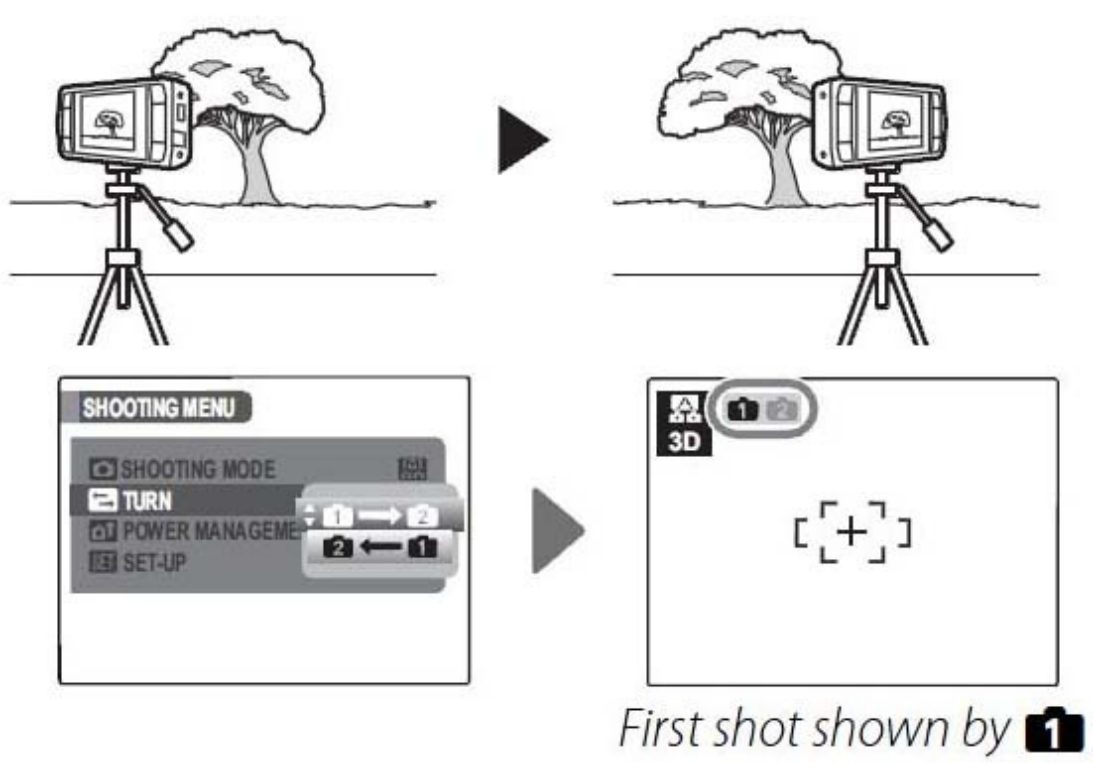



- **Interval 3D Shooting**




**One of the best features of the camera. You have to try these!!!**

# Individual 3D—Hyper/Hypo




Useful for hand-held Hyper or Hypo stereos

- Hyper = Stereo base (much) wider than 77mm for far away objects.
- Hypo = Stereo base smaller than 77mm for close-by objects.

Two advantages:

- Can align the 2nd picture with respect to the first
- Can see the 3d effect right after the hyper/stereo picture is taken.

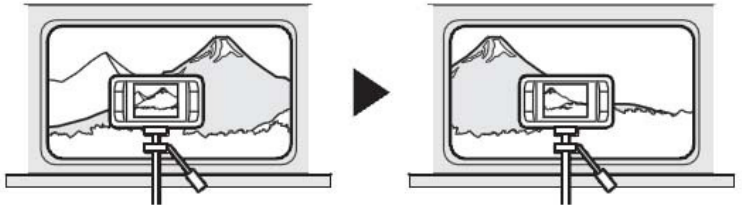
Ability to take the left picture first or the right picture first (can be handy)

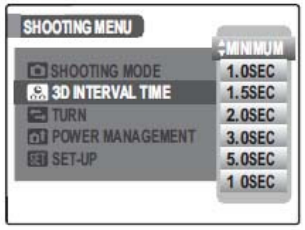
# Interval 3D

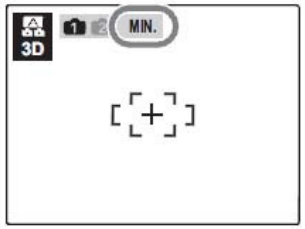
## Hyper from moving platforms

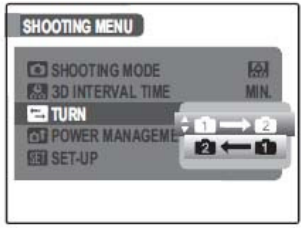
### INTERVAL 3D SHOOTING

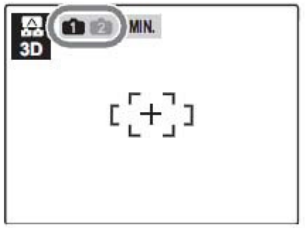
Use this option to take **3D** pictures of distant objects from a moving vehicle.





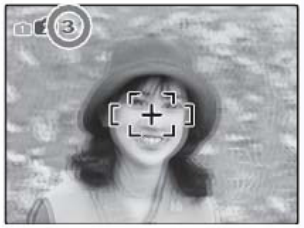



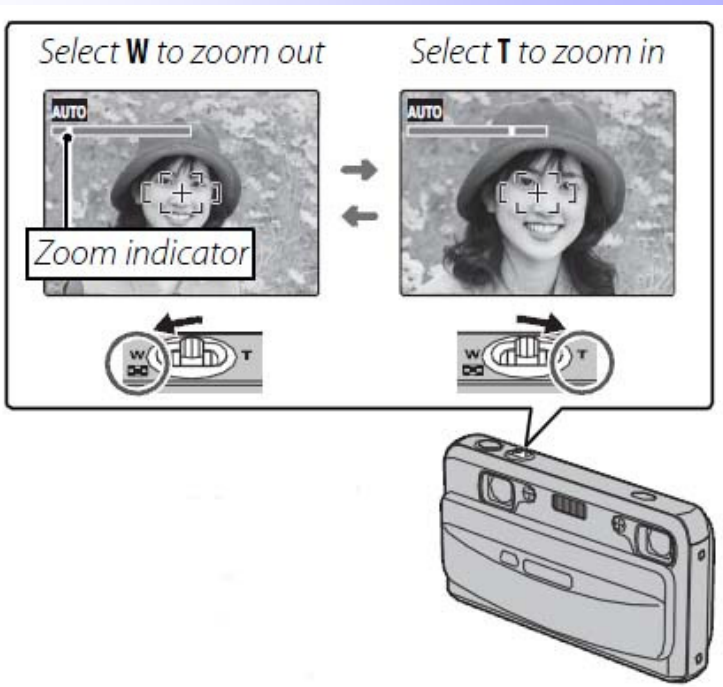

*First shot shown by* 1

Take the first shot. A timer is displayed after the first shot; the second shot is taken when the timer reaches zero.



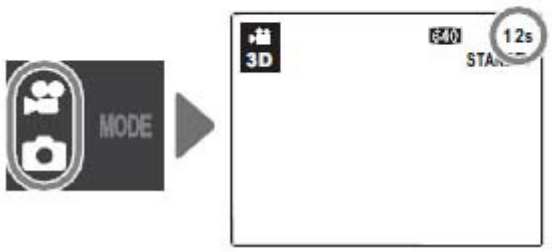

- Same as the previous mode, only the two pictures are taken automatically after a user-controlled delay.
- For hyperstereos of clouds from a plane I have found that a delay from 5 seconds (plane cruising, clouds away) to no delay (takeoff, landing, clouds close) works well.
- Ability to switch order helps for viewing correct stereo in the camera back. (On left side of the plane take the left picture first. On right side of the plane take right picture first).

# Other Features



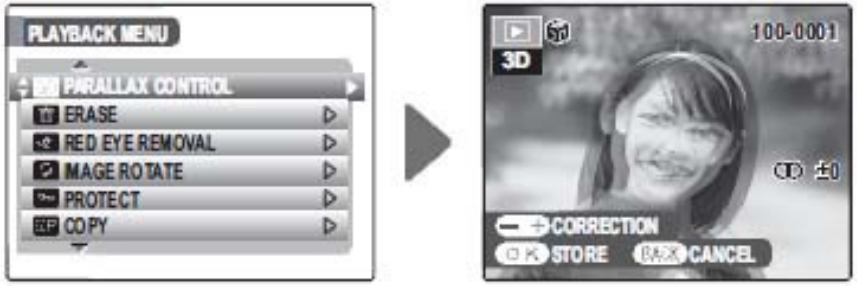

## Recording Movies

Press the / button.



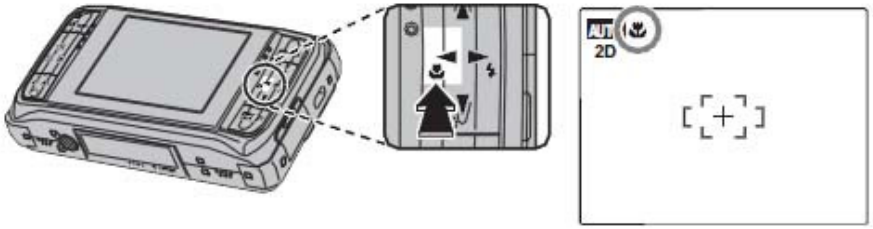

*Display shows time available*

## PARALLAX CONTROL (3D Only)

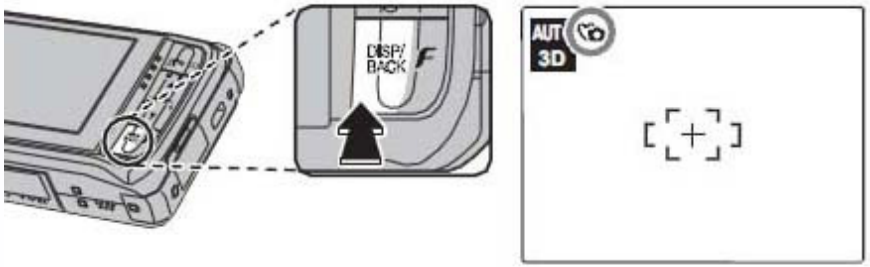



## Macro Mode (Close-ups)

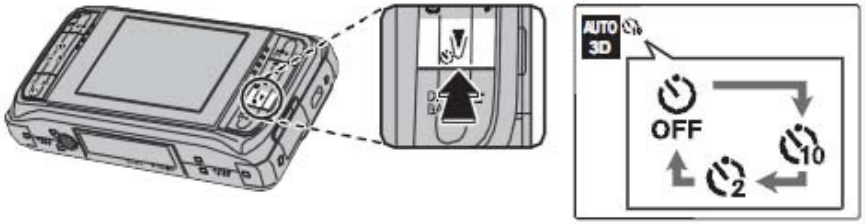
For close-ups, press the selector left ().




## Silent Mode




## Using the Self-Timer



# For more information

Fuji web page:

**http://www.fujifilm.com/**

Email Discussion list:

**http://tech.groups.yahoo.com/group/fuji3d/**

# Using Flash with the FUJI


| Mode |
| --- |
| AUTO (auto) |
| AUTO (auto with red-eye reduction) |
| (fill flash) |
| (off) |

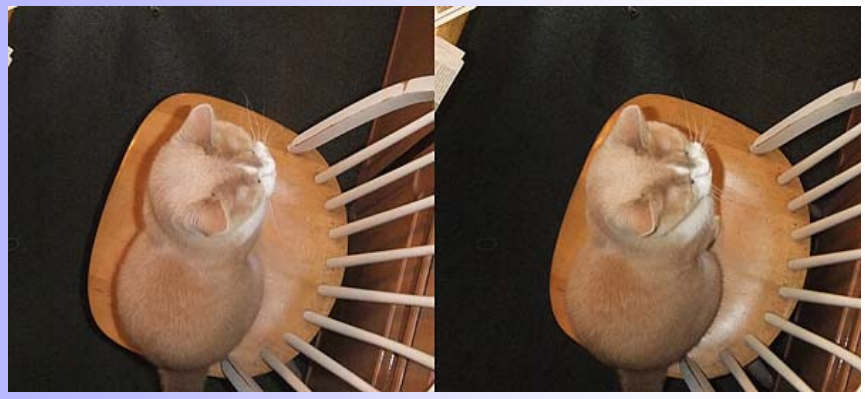
There are three basic flash settings, controlled by a switch in the back of the camera:

- Auto flash (camera decides when to use or not use the flash)
- Forced flash (always on)
- No flash

The Fuji flash is rather powerful of its size and it works OK in many situations, but it has a couple of problems.


# Fuji Flash Problems

**Distracting shadows:** Because the flash is centered between the lenses, it casts shadows where the left eye sees the left shadow, and the right eye sees right shadow. In real life light never comes between the eyes. It comes from above, forming shadows in the same side.



**Dust Halos & Red Eye:** Because the flash is very close to the line of sight of the lenses, small particles in the air will be recorded as out of focus distracting areas, known as “dust halos”. Also, red eye more of a problem.

**Direct Light is Unflattering:** Lack of shadows.

# Fuji Flash Solutions

**Use External Flash:** Without any provision for external connections, the only solution is **slave flash.**

Fuji flash uses "preflash", so instead of one flash burst, you get two. The first one is used to determine exposure and adjust "white balance". Only the second flash is used to illuminate the scene. There is no way to turn the preflash off. The first flash will trigger the slave flash. Solutions: **1) Use a digital slave with preflash/delay, 2) Use regular flash in "weak" auto mode**

Tip**:** To eliminate Fuji's flash completely, but still fire the slave, cover the flash with a piece of exposed film. This stops the visible light but lets IR go through, and this can still trigger slave flash.

Alternative: Use a constant bright light source instead of flash. This is useful for 3d movies but can also be used for still photography without the hassle of synchronizing the flash with the camera.





# Processing Digital Stereo Images

StereoPhoto Maker (SPM)

**http://stereo.jpn.org/eng/stphmkr/**

**It is free and it is possibly the best tool available for editing digital stereo images.**

# Viewing Digital 3D—I

## “No Glasses” - The Fuji Way

1. **Back of camera** ($0)
2. **Fuji Photo Frame** ($500) or other Autostereoscopic displays ($300)
3. **Lenticular prints** ($7 ea)

# Viewing Digital 3D—II

## Unique Digital + "Glasses"

4. **View the stereo pairs in the computer screen** either by freeviewing, or anaglyph, or using viewing devices
5. **"3d ready" monitors (including TVs)**. Circular Polarization (Zalman $250, Acer 3D $700), Shutter Glasses (Asus 3D)


# Viewing Digital 3D—III

## Similar to Film

6. **Portable Viewers** ($0-$650)
7. **Digital stereo projection** (>$1000)
8. **Stereo Prints** (<$1 ea)
9. **Stereo slides** ($2-$5 ea)



# Summary for the Beginner

**Based on a posting by Georg Klein, email: usenet.gklein@reflex.at**
Vienna, Austria, January 2010

- **Buy the camera and a memory card (I recommend 8 or 16 GB)**
- **Download, save and read the manual. Keep it handy for reference**
- **Download StereoPhoto Maker**
- **There is no reason to install Fuji software (I have not)**
- **Make some basic adjustments in the camera menu (maximum quality, save only MPO files)**
- **Practice holding the camera without putting fingers in the lenses**
- **Start by using the camera in Auto mode and follow basic stereo advice (avoid objects close to the camera, etc)**
- **Develop a routine in transferring/storing/aligning digital images**
- **Learn to use SPM**
- **Experiment with settings other than AUTO**
- **Experiment with advance 3D modes for hyper/hypo stereos**
- **Invest in some useful accessories: Case, support, extra battery, viewing equipment**
- **Shoot, shoot, shoot!! It is FREE!!!**

# Wish List for the Fuji

- **Optical Viewfinder**
- **External Flash connection**
- **Variable Stereo Base**
- **“Raw” images**

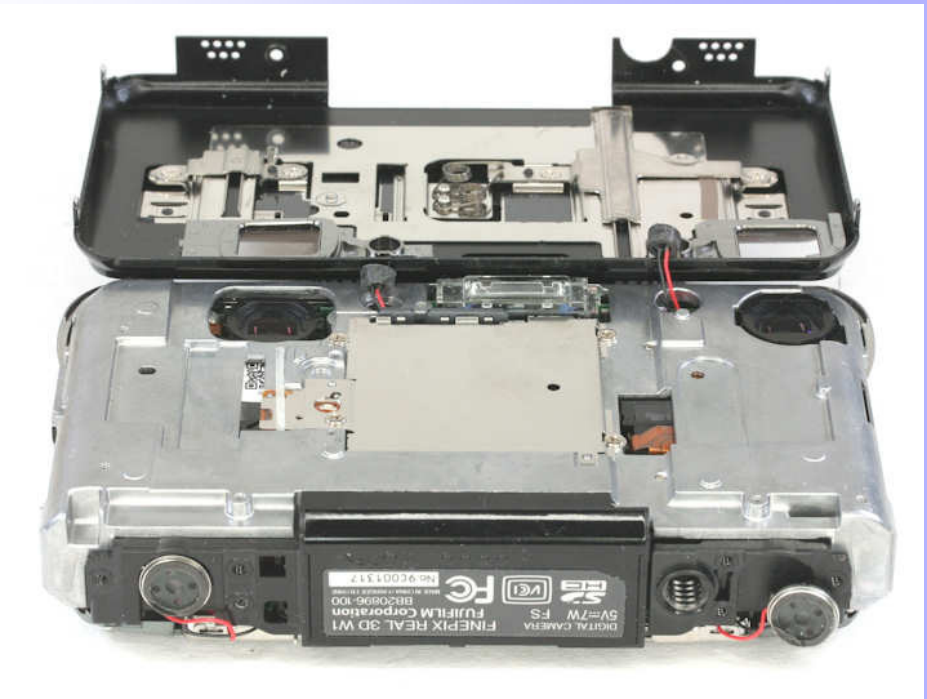
These options in my opinion are not practical and most current compact digital cameras do not offer them.

- **Wider angle of view (28mm instead of 35mm)**
- **Shorter lens spacing (60-65mm instead of 77mm)**
- **Lenses more recessed** especially the left one
- **Better dust-proofing**
- **Suppress preflash**
- **Time Exposures (up to 30 sec?)**

In my opinion, a wider angle of view and shorter lens spacing would make this camera easier to use for close ups, etc. At the end, it depends on the viewing conditions. Pictures that look OK in the back of the camera or small computer screens might have too much deviation when viewed in larger screens or projection. Portraits look unflattering.

# Taking Apart the Fuji

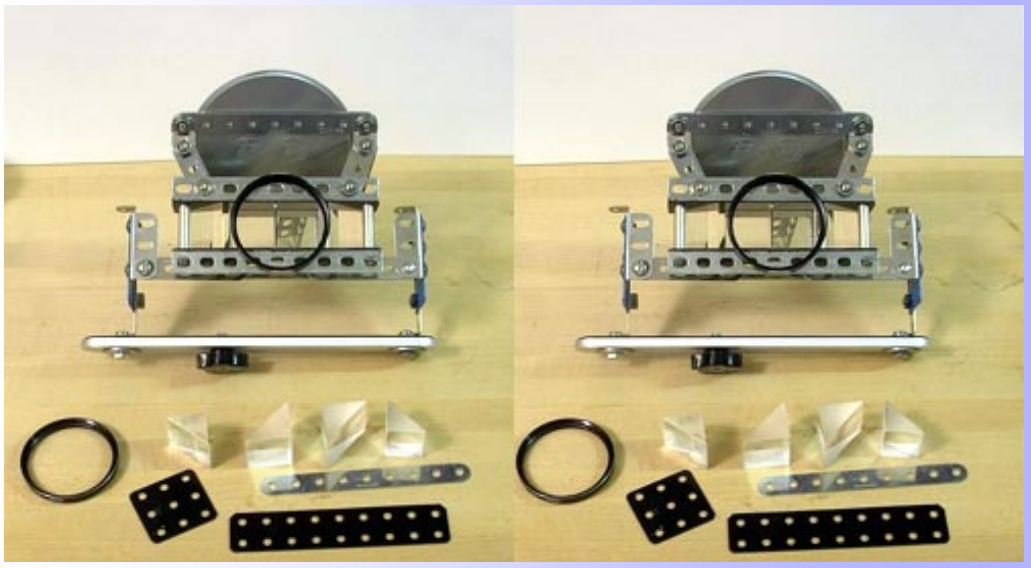
Courtesy of Co Van Ekeren





It might be necessary at some point to disassemble the camera at the stage shown above to clean any dust specs from the lenses.

Proceed at your own risk.



# Fuji + Prisms = Macro

Courtesy of Donald Simanek—http://www.lhup.edu/~dsimanek/3d/stereo/3dgallery17.htm

# Examples in Projection

- **People**—*My favorite!*
- **Scenic**—*Least impressive?*
- **Close-ups**—*Easy to do*
- **Hypers/Hypos**—*Experiment!*
- **Unusual**—*Go for it!*

# People

Relatives during a recent wedding. Wide angle & on-camera flash. Stretch is evident (77mm maybe too much)

Friend at a bar. Fuji with both on-camera flash and Metz hand-held.

Daughter Lea at the airport! Auto-everything and on-camera flash. Pizza through the window adds a touch to these precious family memories.

Wife Liz (51) and son Tony (18). Picture taken on Christmas day 2009. Both had their birthday on that day! Fuji with both on-camera flash and Metz hand-held.

*Extra Bonus*: I can use the 2d pictures for family and friends who always ask for copies of the pictures that I take. With film, I never bothered to scan the slides so very few people have seen the pictures. With digital I have become the "man of the hour" so to speak. 2d pictures are handy for blogs and facebook too.

# What's so special about these pictures?

I took it !

From the Athens Marathon, November 8, 2009. I ran with the Fuji camera on my hands so I was able to record 3d pictures and 3d video during the race! For this one I stopped and turned around but most pictures were taken while I was running.


My wife took it!

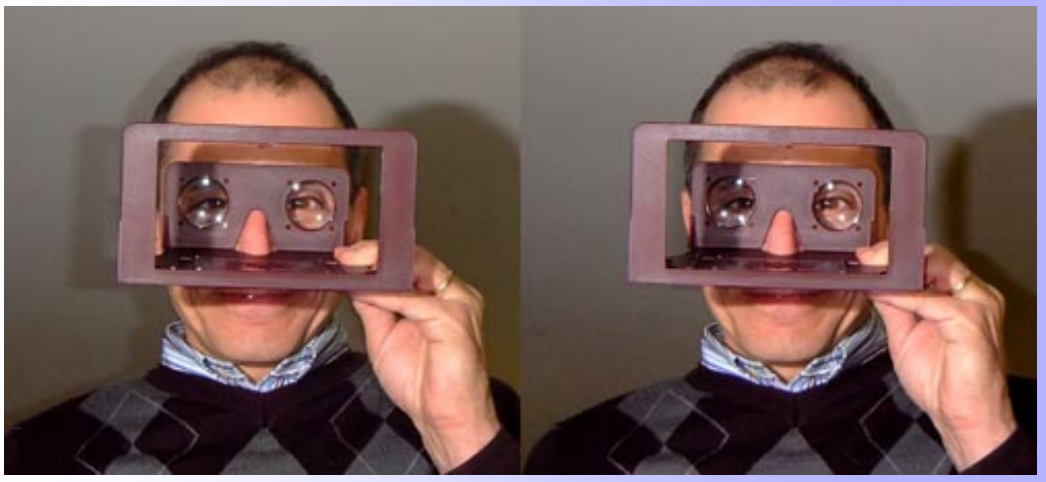
This was taken at the finish line of a local 1/2 Marathon race. See how both my feet are off the ground (perfect synchronization). This guy surprised me by coming from behind to beat me right before the finish. I normally have very good "kick" (ability to speed up at the final stretch), but I was surprised and did not have time to react. My wife captured the moment. **Now I can trust my wife to take decent 3d pictures of me!**

# Scenics

Not the camera's strongest point IMO, but perfectly acceptable.

Extra bonus: I can use some of these pictures as 2D in my running blog!

# Close Ups



Auto-everything.  My kids took this.  Side flash used.

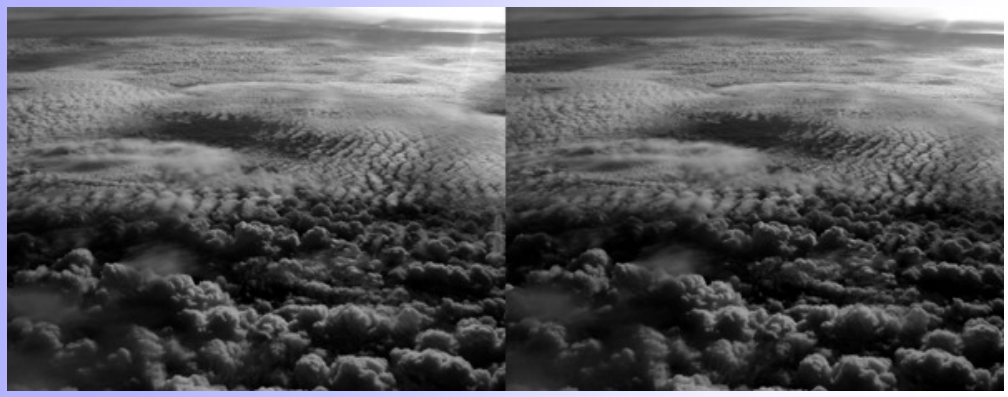

Auto-everything.


77mm spacing helps for “bass relief” type pictures

Hypostereo using “advanced 3D”.  Display in a store.
Your imagination is the limit really.

# Hyperstereos

Athens from top of Acropolis



Clouds from Airplane window

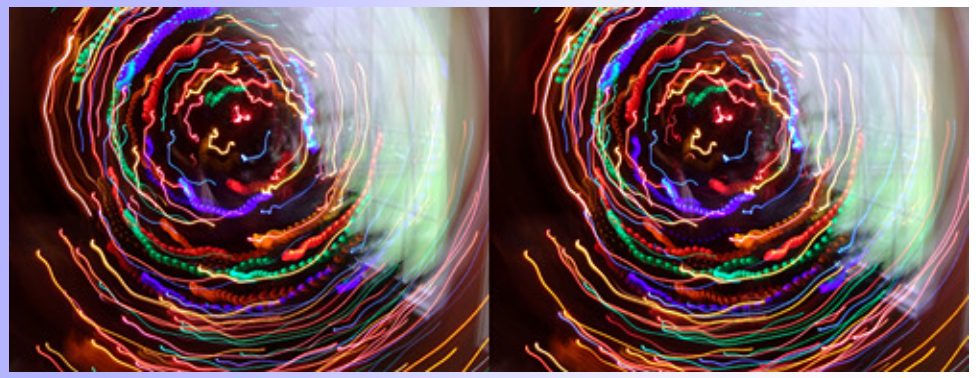
Building in Athens from Acropolis Museum

Electrical wires

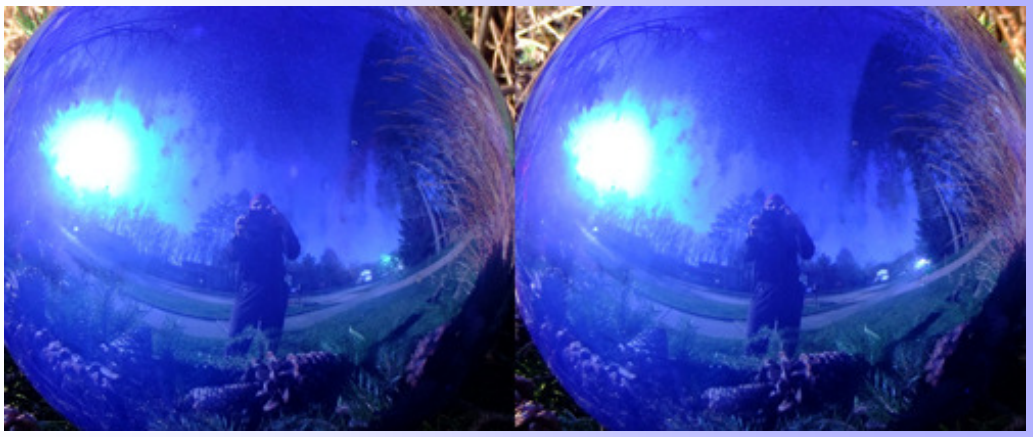
All pictures taken handheld using Fuji's advanced 3d modes.

# Unusual

Hyperstereo of clouds from a **moving car**!



Our Christmas tree.  I rotated the camera during the 1/2 second exposure.



Self-reflection on Holiday ball outside a house during running

One of our cats—Unusual perspective?  And how about this Green Eye?