

TRICK PHOTOGRAPHY AND SPECIAL EFFECTS

The Ultimate Guide of Tricks, Techniques, and
Ideas that Create Mind-Twisting Images

2nd
Edition



By Evan Sharboneau

Legal

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Front cover photograph by Dennis Calvert.

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To start things off...

Hello and congrats on obtaining **Trick Photography and Special Effects!** I have created this ebook to share some of the tricks I've learned over the years so that others can get a jump start on getting inspired to create artistic images with their camera and Photoshop. This ebook is structured so that at any point in time you can jump to just about any page and start getting inspired with new ideas and techniques. With that being said, however, it wouldn't be a bad idea to read the ebook in order because each technique generally gets more difficult and complex as the ebook progresses.

This ebook wouldn't have been made possible to create without the help from many photographers who have contributed their images to this project.

Remember that all images in this ebook are hyperlinked to their original location on the internet. This means you can click on any photo in this ebook and it will direct you to the original photo on the web. Feel free to comment the photographer's great work and ask them questions if you want to know more about their image. Images that are not clickable have been created by myself.

If you have any questions, comments, suggestions, testimonials, corrections, new ideas or photos that you would like to see in future editions of this ebook, feel free to e-mail me at trickphotographybook@gmail.com. I'm happy to answer questions and respond to feedback.

You can also find me on the following websites:

PhotoExtremist.com

[YouTube](#)

[Facebook](#)

[Flickr](#)

[DeviantART](#)

[Twitter](#)

Enjoy!

- Evan



Preliminaries

This section will briefly talk about cameras, lenses, and Adobe® Photoshop® software. If you are just starting out in photography, my advice would be not to worry too much about what type of equipment to get. Get a basic DSLR camera that is affordable and use it for a year or two. If your passion increases or you start to demand more features and higher image quality, only then should you get something that is more expensive.

I started out with an 'okay' camera and then got a more expensive one later. My 'okay' camera is now my secondary/back-up camera. You don't need an expensive camera to take good photos.

Camera Bodies

The techniques used in this ebook are geared towards people who own DSLR cameras. The reason why is that DSLR cameras are able to manually adjust the aperture, shutter speed, ISO, and white balance. Most DSLRs also have the option to take exposures that are 30 seconds in length. This will be a useful feature to have when doing the tricks covered in the long exposure effects module.



Some high-end point-and-shoot cameras will work okay, but chances are if you want to have better image quality and more control, a DSLR would be a much better option than a point-and-shoot.

The first DSLR camera I bought was a [Nikon D50](#) (now out of production), simply because that is what the guy at the store recommended after I told him "I want something that is good for long exposures". As simple as it sounds, that was my only criteria.

I didn't put a huge emphasis on gear and didn't stress about what camera I wanted because the essential elements needed to capture creative photos are in every DSLR: manual control over the shutter speed, aperture, white balance and ISO. I was leaning towards Nikon anyway because my father had an old Nikon film DSLR, and pretty much all lenses that are fitted for Nikon cameras, will be able to fit on *any* Nikon camera.

After learning how to use the camera for a year or two, I upgraded to the [Nikon D300s](#). Don't worry about which brand of camera to get in the beginning because they are all basically the exact same thing. Canon, Pentax, Nikon, Sony, whatever. It's the image that matters, not the what brand of camera it was taken with.

Getting a camera that allows wireless remotes, cable releases, an external flash sync (PC) port, and a mirror lock up mode is the next step up from an entry level DSLR. This wasn't something I needed when I was starting out, but as I progressed and got the hang of things, I demanded more image quality and extra features.

Just remember not to stress about what camera to get in the beginning; **it is not important.** Just go to the store and get whatever feels right. You will know when to upgrade to a better camera when the time comes.

Lenses

Here is another reason to get a DSLR over a point-and-shoot: DSLRs give you the option to swap different lenses on and off the camera body. Lenses are more valuable than the camera body itself because the technology doesn't get outdated as frequently, they are a bigger factor in determining image quality, and they can be used with other DSLRs of the same brand. That means that if you buy a good lens today, you will be able to use it on different camera bodies of the same brand tomorrow. You will most likely get rid of more cameras than lenses.



What Lens Should You First Get?

I used the 18-55mm kit lens that originally came with my first DSLR for years when I first started photography. The 18-55 is nothing fancy, it's just a basic lens. The reason why I use it is that it is a good general purpose lens and the image quality is sharp. It is not over-the-top expensive but it isn't a piece of junk either. Any lens in the 12-70 range is fine.

One additional item I would also recommend is a high quality protective [UV filter](#) for your lens (seen right beside the lens displayed above). This protects the lens from scratches and smudges. Remember that there is a difference between a lens and a filter; so many people go around calling a filter a lens.

Tripods

A tripod is essential to have when you are working with trick photography because many of the tricks require that the camera remain in the exact same location in 3D space when taking a series of photos.

I would highly recommend getting a tripod. I used an old aluminum tripod for years before I bought a new one. You could probably find one similar to the one I used at a thrift store somewhere for \$5-\$20. An old, heavy, bulky, clunky aluminum tripod purchased at a thrift store is better than a cheap plastic one purchased brand new at a camera store.

If you want a *new, high quality* tripod, I recommend the [Manfrotto 055XPROB](#) with a [Manfrotto 496RC2 Ball Head](#). This is what I currently use.



Photoshop

During this ebook I will sometimes mention using Adobe® Photoshop® software. Although Photoshop isn't required for all the tricks in this ebook, I highly recommend that if you do not have Photoshop right now, that you pick it up. Photoshop is the industry standard for image editing. A lot of magical changes happen to photos inside Photoshop and it is particularly useful for trick photography.



Basically, there are three versions of Photoshop:
[Photoshop Elements 11](#)
[Adobe Photoshop CS6](#)
[Adobe Photoshop CS6 Extended](#)

Which one should I choose?

If you have had your camera for a while and photography, photo-manipulation, and art is a significant part of your life, get CS6. It has a vast number of features and gives a lot of control to the user. Most of the tutorials you see online and in this ebook will be geared toward CS users. You can use older versions of Photoshop, however I would not recommend using any version below CS3, as the technology is getting more and more outdated.

If you cannot afford CS6, The next alternative would be to get anything at or above version 10 of *Adobe Photoshop Elements*. PSE11 may not be able to do *everything* taught inside this course when you compare to CS6, but it can still do many tricks.

What if I don't want to buy an image editing program?

If you flat out don't want to pay for Photoshop at all, you can download the free 30 day trial of Adobe Photoshop from Adobe.com or download a free alternative program called [GIMP](#). GIMP has a different graphical user interface than Photoshop, so some of the tutorials in this ebook will need to be done slightly differently in the GIMP.

Now that we are done discussing the preliminaries, let us jump right into the first chapter: ***Long Exposure Effects and Light Painting***

On we go.

Module 1

Light Painting and Long Exposure Effects



Long Exposure Effects and Light Painting

First of all, what exactly is a “light painting”? To quote Wikipedia: *“Light painting, also known as light drawing or light graffiti, is a photographic technique in which exposures are made usually at night or in a darkened room by moving a hand-held light source or by moving the camera...”* Most of the tricks and techniques can be done **right in-camera**, without the need for Photoshop software or any image editing program (although these do a great job on enhancing the photos).

Before we start diving into the chapter to learn how to use different light-toys to create beautiful illuminated photographs, let us first discuss how to use the settings on our camera. I recommend watching [my video on shutter-speed, aperture, and ISO](#) in addition to reading the content below. If you are an experienced photographer and already know those terms by heart, feel free to skip this section entirely.



Setting the Shutter Speed

The [shutter speed](#) will be determined by you and how long you think it will take to make your light painting. In all DSLR cameras, there is a piece of cloth or plastic that is between the lens and the camera's sensor. This cloth is called the “shutter”. When you push the button on your camera to take a picture, it opens the shutter for a duration of time, and then shuts it back up again to stop the exposure from taking place. Hence the term “shutter speed”.

You can set your camera to take different durations of shutter speed. Here are some examples:

B or BULB, 30", 25", 20", 10", 5", 1", ½, 1/5, 1/10, 1/100, 1/250, 1/500, 1/1000, 1/4000, 1/8000

Let's go over this chart from left to right. On the very left we see "B or BULB". BULB mode is basically a manual setting for shutter speed. It means that if you hold your finger down on the shutter button for 5 seconds, the exposure will be taking place during the 5 seconds you have your finger on the button. If you hold it down for 50 seconds, the exposure will be 50 seconds.

After BULB mode, moving to the right of the scale, we see 30". This obviously means 30 seconds, and is the usually longest shutter speed available on most DSLR cameras. If you want longer exposure times you will need to use either a cable release, a wireless remote, or simply holding the shutter button down for a really long time in BULB mode. When it comes to going past the camera's maximum shutter speed, not all cameras are alike, so you will have to figure out which method works with your specific camera.

After 30" the shutter speed simply gets faster and faster. As you can see in the chart above, everything after 1" turns into fractions of a second. Most camera's just display a number like "125" to represent "1/125th of a second", so don't get confused and mistake "125" for "125 seconds". Look at it as a fraction.





Here is a popular long exposure trick that you have probably seen a dozen times:
Traffic.

The reason why the moving car lights look like long lines is because this photograph had an exposure time (shutter-speed) of 15 seconds. If the exposure time was $1/200^{\text{th}}$ of a second, the car lights would look like dots and not lines (just like they do in real life).

You might be asking “How come I can't see the actual cars?”. The reason why you can't see the actual bodies of the cars is because they are in constant motion and not enough light was shining on them to make a noticeable trail. The same thing happens when you are holding a light and doing a light-painting. The reason why you can't see the light-painter's body is because they don't have enough light shining on them when they are moving around. If they were wearing glowing clothing, however, then that would be a different story.

The opposite is also true. If you were holding a candle in front of you but you were completely *still*, then your body would appear in the photograph. This is why we can see the trees and snow in the photograph above, because the foreground was stationary and was being lit up by the sky (and also by the traffic).

More Resources on Shutter-speed:

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

<http://www.digital-photography-school.com/shutter-speed>

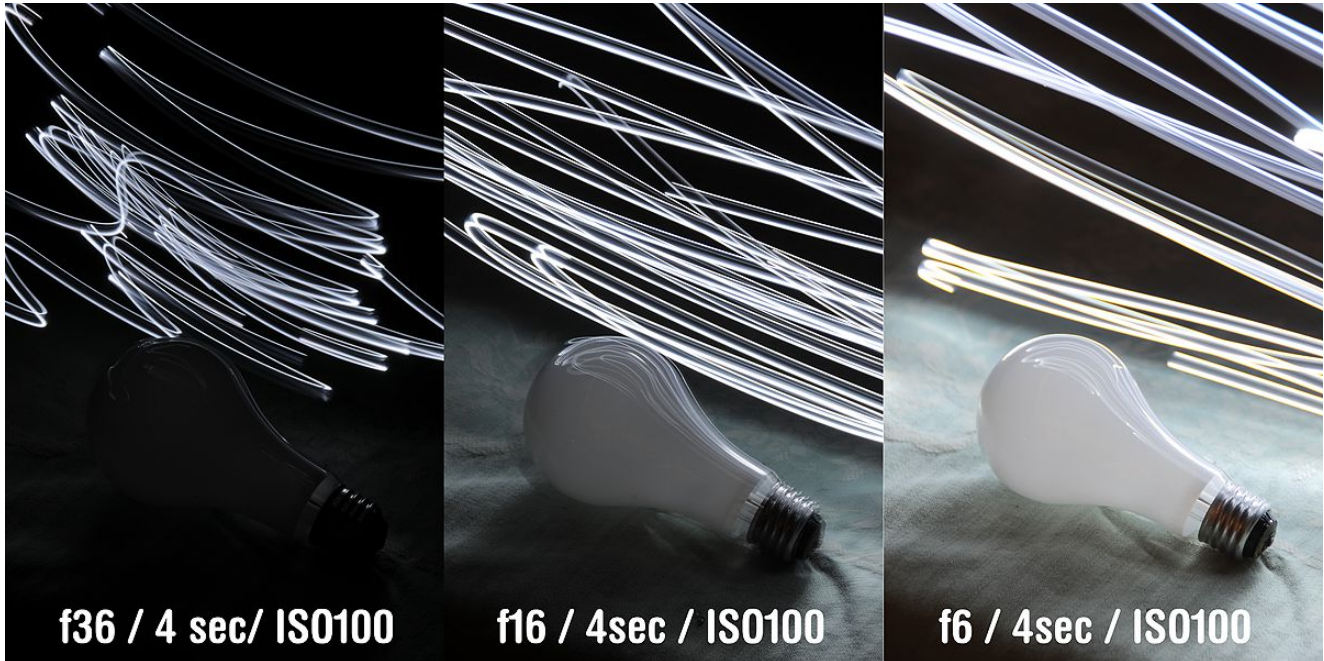
<http://www.smashingmagazine.com/2008/08/24/45-beautiful-motion-blur-photos/>

Setting the Aperture

The [aperture](#) is how wide the hole in your lens is. It is very similar to your eyeball's pupil. The bigger the diameter, the more light hits your camera's sensor. So, the bigger the opening, the brighter the image! Sometimes you will hear people refer to the aperture as the "F-Stop" number. It's the same thing.



[Watch the video](#)

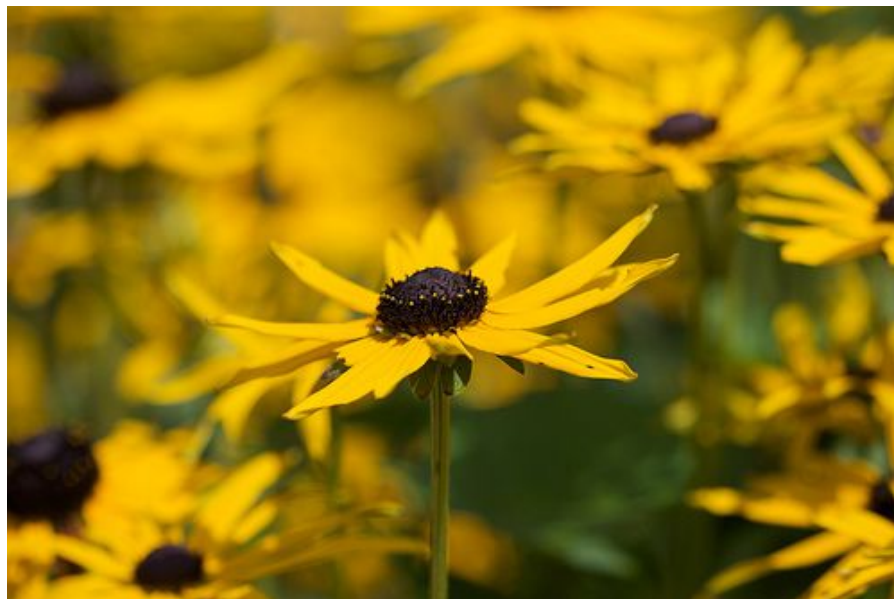


For light painting, adjusting the aperture is mostly used for adjusting how bright your light source will appear to be. As we can see in the example above, no other settings were changed in these three photographs except the aperture. The only thing visible at F36 is the streaks of light. When we move down the line to F6, we see that the light streaks are much brighter *plus* we can see more ambient light around the environment from the original light source.

There is also a side effect that comes with the aperture, and that is called **Depth of Field**. To give an example of what depth of field is, take a look at the two examples below. The one on the left has an aperture opening of F11, and the one on the right has an aperture of 2.8.



F11



F2.8

As you can see, the depth of field determines how deep or shallow the focus plane is. Using smaller F numbers will make the hole (aperture) in your lens wider, thus making your depth of field more shallow. Using larger F numbers will make the aperture smaller, creating a deeper depth of field.

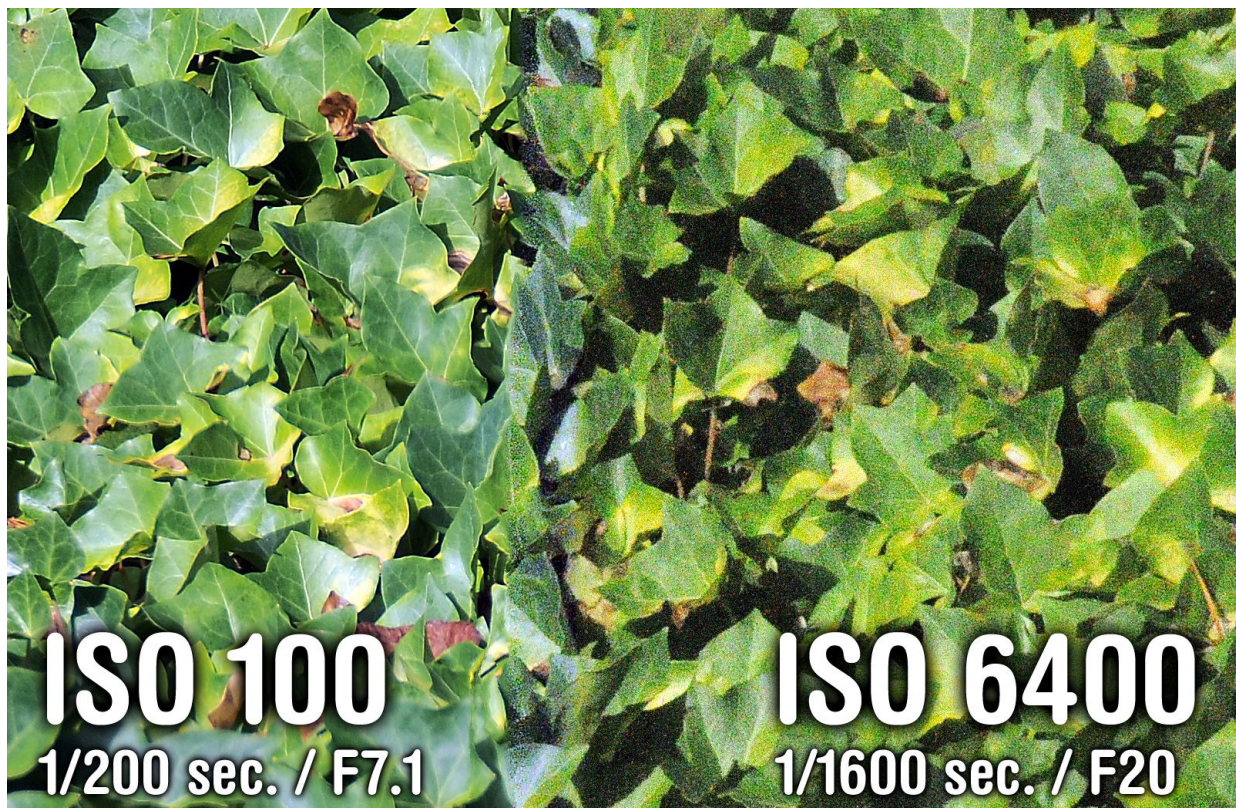
Setting the ISO

The ISO (also known as 'ASA' or simply '[film speed](#)') determines how sensitive your camera's sensor is to light. The higher the ISO number, the brighter your image will be. The lower the ISO number, the darker your image will be.

Now I know you are thinking "Great! I'll just use the highest ISO possible to make my image as bright as I can, then I'll just bring my F stop to make up for the difference!" Well, sadly but surely there is a negative side effect that comes along with ISO, and that is called [noise](#).

Noise is basically color grain that destroys the fine detail and color in your photographs. Always try to use the lowest ISO you can, especially when doing long exposure work. I usually try to keep my ISO in the 100-400 range.

The only situation where you will need to use higher ISO numbers is when you are in a dark environment with no tripod available. In this situation, your camera would try to open up the aperture all the way to let as much light in as it can, and then set the shutter speed for several seconds to let in even more light. Because we humans can't hold a camera perfectly in place for several seconds, our image would be very blurry. So, in order to get around that, we would *have* to use higher ISO numbers in order to compensate for the long shutter speed. If we had a tripod however, this would not be an issue. If you want professional quality long exposure photos taken in dark environments, just stick with using a tripod and a low ISO.



Setting the White Balance

The [white balance](#) is color correction right in your camera. If the light you are photographing has more cold/blue tones, you will want to raise the white balance to a warmer/redder color temperature to even out the tones.

Look in your camera's manual to figure out how to change the white balance preset and set your own custom white balance. The process for setting the white balance is different for every camera so I cannot explain how to do it in this ebook. Use Google or your camera's manual instead. Of course, if you don't want to mess around with it, just leave it on Automatic.

The photographs on the right were taken on a sunny day. The rocks were only *slightly* shaded by a tree.

These basic white balance presets should be on your DSLR and are probably ordered in the exact same way:

- Incandescent/Tungsten (2500-3000K)
- Fluorescent (~4000-5000K)
- Daylight (~5200)
- Flash (~5400K)
- Cloudy (~6500-8000K)
- Shade (~8000-10000K)
- Custom / Saved Preset / Set Color Temperature

So how does white balance pertain to light painting? Well, different types of lights produce different types of color temperatures. The light you see on the right side above the piano is a key chain LED, and the light on the left side of the piano is an incandescent Maglight flashlight bulb.

The light on the right produces cooler tones than the one on the left. The white balance for this particular image was set right in the middle at 5000K. Can you guess what white balance would make the right light white? (wow, say that five times fast!) What about the one on the left? The answer: 2500K for the left, 10000K for the right.



Generic Common Settings for Light Paintings:

Although each setting on your camera will be dependent on the lighting situations, here is a generic combination of settings that you can use as a rule of thumb if you are confused:

Put your camera on a tripod and use Manual Mode and manual focus, lower the ISO number as low as it can go. Have your aperture at F8 and your shutter speed at 5 seconds. If you want to make the photo brighter, lower the F Number (something like F4, for example). If you want to make the photo darker, raise the F Number (something like F16, for example). Adjust your shutter speed as necessary.

That is the bare-bones-basic-generic-rule-of-thumb setting for long exposure work. Drawing with light is – for the most part – really easy and fun, even though it can be challenging to get things *just* right. For your first try, simply wait until it is night time, put your camera on a tripod, and put your camera on manual mode with the settings above applied. Then take anything that glows (like an LED or a cell phone, for example) and wave it around about 5 feet from the camera while it is taking an exposure.



Oh but wait! There is a helpful tip about **focusing** that I should mention before we move on.

In order to help set your focus point in the dark, simply place an LED or flashlight facing the camera on the spot where you want to focus. Focus on the light until it becomes sharp, then switch to manual focus so the camera won't try to keep auto-focusing. After that, you are set to go.



Fundamental Lights and Techniques

There are many different light toys that create different effects. Each one has specific uses and applications. In the end, it all boils down to something that illuminates. Things that have been used before include [sparklers](#), [glow sticks](#), flashlights, [maglights](#), fire/torches, [RGB strips](#), [Christmas lights](#), cell phones... anything...



I'll be going over flashlights and LEDs first, because these are the most fundamental light painting tools. We will cover the fancier light sources later.

Flashlights and LEDs

Great standard tools. For flashlights, I personally use Maglite® flashlights. Flashlight bulbs and LEDs each have advantages and disadvantages. Maglite flashlights give out nice yellow natural looking color because of the incandescent bulb. LEDs generally give out more of a colder tone in color. You can always change the white balance on your camera to make up for any temperature difference. I consider Maglights and LEDs to be the 'default' light painting tool.

Maglite M2A016 Review

The first tool is the [Maglite M2A016](#). This is a mini-flashlight. There are larger ones available that are better for lighting up larger objects.



The advantage that Maglights bring to the table is the natural looking bright bulb. The cap can be twisted to adjust the beam into a spotlight or a floodlight.

The cap can also be taken off entirely and reveal the full omnidirectional bulb. This 'candle mode' is what makes the Maglight so fantastic. The best color to get for the metal casing would be black, simply because black reflects the least amount of light.

There are also two accessories I'd recommend for this light: a [fiber optic adapter](#) that allows you to airbrush light very accurately onto objects, and the [IQ Switch](#) (but only if you want an on/off button on the end of the flashlight.)



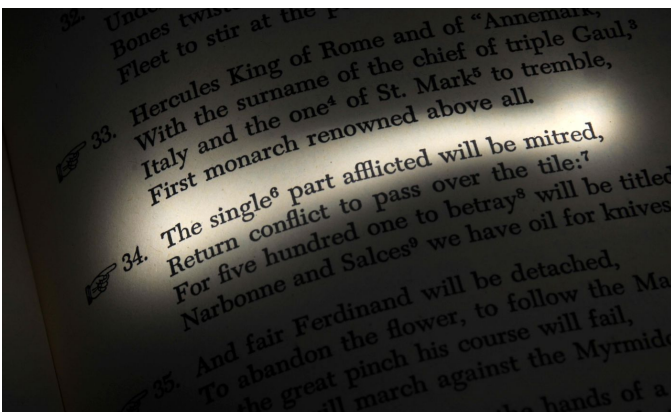
Using The Fiber Optic Adapter

If you are dealing with smaller hand sized objects, use a Maglight with a [fiber optic adapter](#). The fiber optic adapter is a cap that tightly goes over the front of the Maglight, with a fiber optic tube coming out the end.

There is a and a 7" version and 20" version of the fiber optic adapter ready to be fitted over the small Maglite mentioned earlier.

Using the Maglight with a fiber optic adapter will give you the ability to light-paint small objects with extreme accuracy. This will allow you to airbrush light onto your object with very soft, yet very accurate light.

It also gives you the ability to get into small crevices. An example of this would be light painting between computer keyboard keys, or highlighting a sentence on a page.



Key chain LED Review

The next tool I recommend is this pack of [10 LED Mini Micro Black Keychain Lights](#) for **\$11.49** on Amazon.com. It's a steal. These lights have a button that can be pushed to quickly turn the light on and off, as well as a lock to keep the LED on constantly.

The advantage these key chain lights have is that the LED can take more damage than the delicate glass bulbs the Maglight has. Another advantage is that you get **ten** of them for only 12 bucks!

The disadvantage is that the light can't be seen as well when turned away from the camera. For example, the Maglight, when in candle mode, has the same amount of light intensity when viewed directly as it does when viewed at a 90 degree angle. The LEDs however, do not. The intensity is about 1/4th as much when viewed at a 90 degree angle.

There is a cool trick that can be done when you have multiple LEDs: tape a bunch on a long surface and turn them on all at once. You will then have a sweet light-toy that makes 10 perfectly parallel lines all at once!





If you want to illuminate things on a larger scale, just use a larger flashlight – any average, run-of-the-mill flashlight works.

Want *tons* of light output? There is a special flashlight called the [LED Lenser X21](#) that has just that. This thing is very expensive, but at 1000 lumens, it is apparently the brightest flashlight in existence. It produces a 3400K color temperature light and has a 500 meter range. Let's look an example to give you an idea of how bright it is:



F3.5 / ISO 200 / 30 Seconds

Here is a photograph showing me in front of the camera (for perspective) shining the light down a stretch of road. This is a 30 second long exposure where I had the flashlight with the beam narrowed to make the light output stronger. I focused the beam on the trees that were out in the distance for a longer period of time than the ones that were closer by, and then later widened the beam and illuminated the entire scene from left to right quickly.

This flashlight is useful for efficiently illuminating landscapes from a far away distance. The light output is smooth and even as well.



F 3.5 / ISO 400 / 20 Seconds / Near full moon

The Two Styles

If you boil it down, there are basically two ways to light paint. The first method is where you simply paint your scene with light but do not reveal the light source. I call this “Light Painting”. Using flashlights, car headlights, flashes, and portable fluorescent light bulbs are good for light painting because they produce a bright, directional, white light, which is practical for illuminating objects and scenes.

The second method, “Light Drawing”, is where you draw things into your scene and reveal your light source (shining the light into the camera lens). Normal lights like flashlights used in light painting work with light drawing in addition to things like sparklers, glow sticks, laser pens, and LED strips.

The photograph below combines the two styles using only one flashlight. *Light drawing* can be seen in the lines of text that reads “ONLY A FLASHLIGHT” and *light painting* is seen on the illuminated grass.





The extraordinary example above was photographed by Brent Pearson. You'll notice that the light on the foreground is very diffused (soft) and natural looking. Brent Pearson explains how to get this 'look' by setting up and using portable fluorescent bulbs in his ebook: [Night Photography and Light-Painting](#).



Lauchlan Swamp By Night

Normal flashlights such as Maglights do work, but the light may appear harsh or uneven. If you are annoyed with the 'un-even-ness' of the light, try putting some sort of diffusion material (cloth, etc.) over the front unit of your flashlight or upgrading the bulb inside of the Maglight to an LED.

Personally, I find that the yellow tone in addition to the unevenness that comes from the regular krypton or xenon bulbs is attractive, but others prefer the LEDs.

Here is a comparison between [LED Lenser flashlights and a Maglite](#). However you look at it, a flash light is a flashlight – just use what you already have and don't let the equipment hold you back from taking pictures (in the beginning, at least)!



Light Drawing

Light 'drawing' can get pretty crazy. You will see many psychedelic images with light drawings later on in this ebook, but let us first discuss what type of images can be achieved using Maglights and LEDs.



You can take the cap off your Maglight and trace objects in candle mode. This can also be done with photon LED lights as well, but Maglights are long and easy to hold onto like a pen or pencil, plus they have the omnidirectional light bulb which is ideal for tracing things.

Try making your strokes quick if possible because if you hold the light in the same place for too long your hand, arm, and even body will start to faintly show up in the photograph. **Wearing all black clothing** will also help minimize 'ghosting'.

The example on the right was 26 seconds / F8 / ISO 100.





3 seconds / F16 / ISO 100

This is another wonderful photograph by Duchovny, the same photographer who did the chair on the previous page. The only thing he used to illuminate the subjects is a Maglight. He wedged plasticine clay between the back of the card and the table to enable the cards to stay upright. It's a very clever trick and one that would be hard to do without the length that the Maglight offers... Something Photon lights just don't have.

Maglights have a very convenient hole on the end of casing as well. You can put a string through the hole and swing the Maglight between objects if you need to get around tight spaces or if you just want natural looking smooth strokes. Of course, this can be done with keychain LEDs as well.



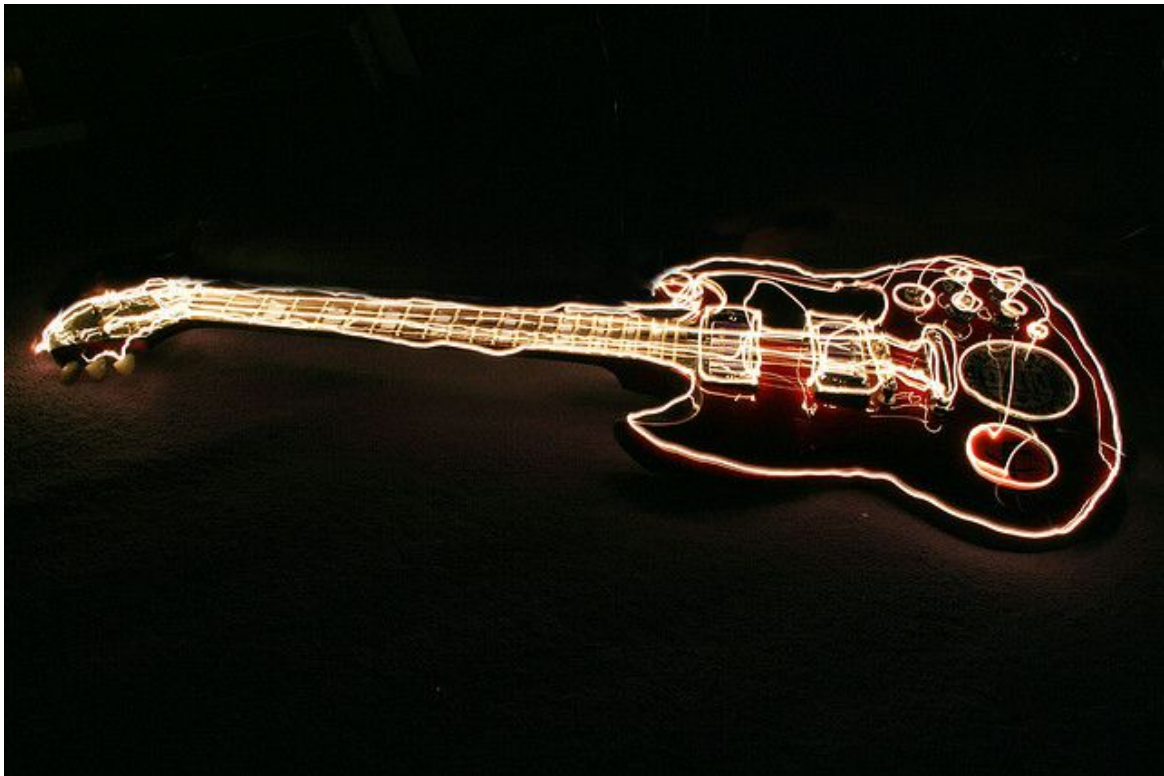
Multi-Colored LEDs

These lights are little [LED Finger Flashlights](#) that wrap around your fingers. My body remained invisible because it was not illuminated and was in constant motion. Remember that you can draw faces or shapes like hearts or words. Get creative! These images are 30 second exposures.



If you want regular colored keychain LEDs, [go here](#) and get the Beamer Micro Lights.

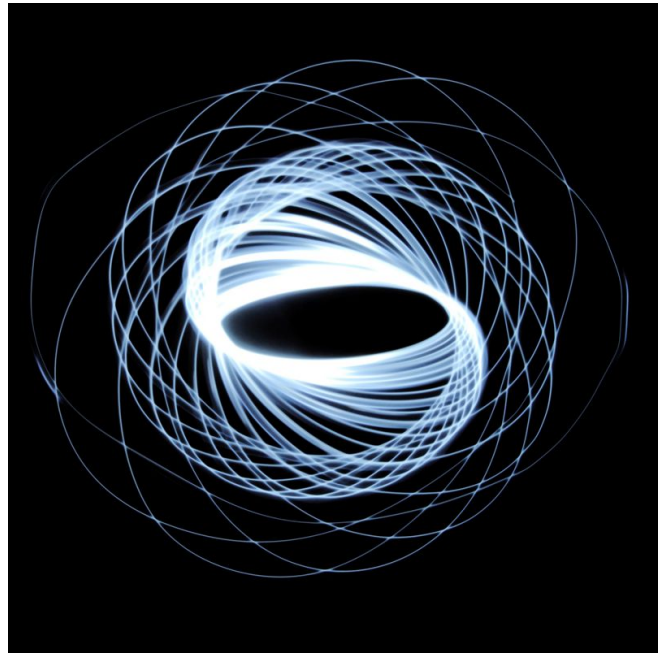
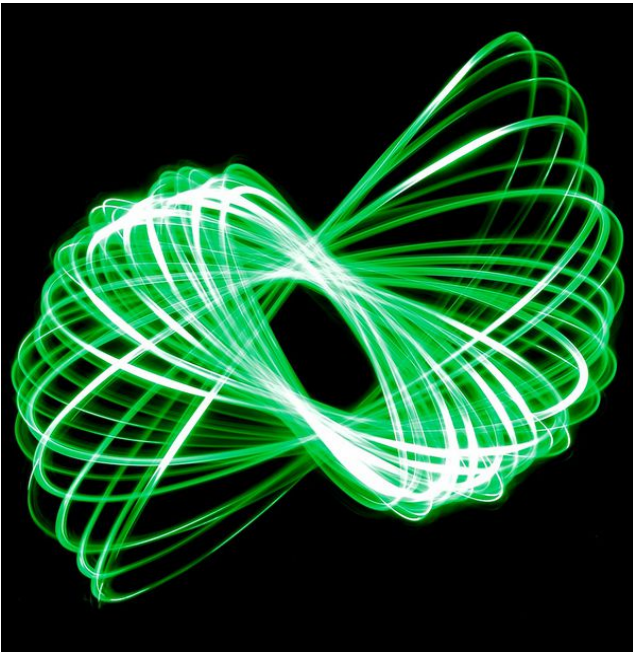






This apple photo was created with a key-chain LED. I simply put the apple on a white board (in a pitch black room) and then frantically moved the Photon light all around the apple, holding it by the key chain ring. You will be able to see things that are faint in the background (such as my bed blankets) unless you use the Burn tool in Photoshop or go to *Image > Adjustments > Selective Color > Blacks*, and then slide the black slider all the way up. This cleans up the background and makes it pitch black so not even the faintest object will appear (they shouldn't appear too much anyway, but it is not a bad idea to burn out the blacks completely).

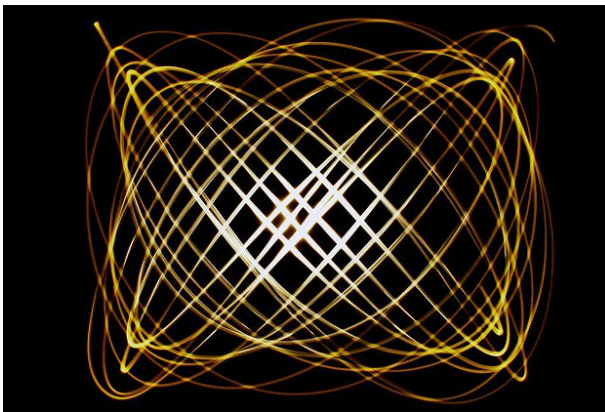
Physiograms



These are called physiograms. How do you create them? Simply tie a string to the end of a flashlight or LED, then attach the other end of the string to the ceiling. A string that is about .5-2 meters is fine.

Once your light is dangling from the ceiling, put your camera on the floor facing upward underneath the light with a wide angle lens on. Put your camera on manual focus. Turn the room lights off and the light source on. Give the light a little push, wait a few seconds for string to balance out from the first few chaotic movements, then take your long exposure. I usually stick to 30 seconds.

Even if you are using a small aperture, the light can spill onto the background. If this happens, you can fix it in Photoshop software by selecting *Image > Adjustments > Selective Color* and then turning up the blacks so the background is totally black. I would recommend using the lowest ISO possible and then try F11 to F36. More physiogram examples can be found [here](#).

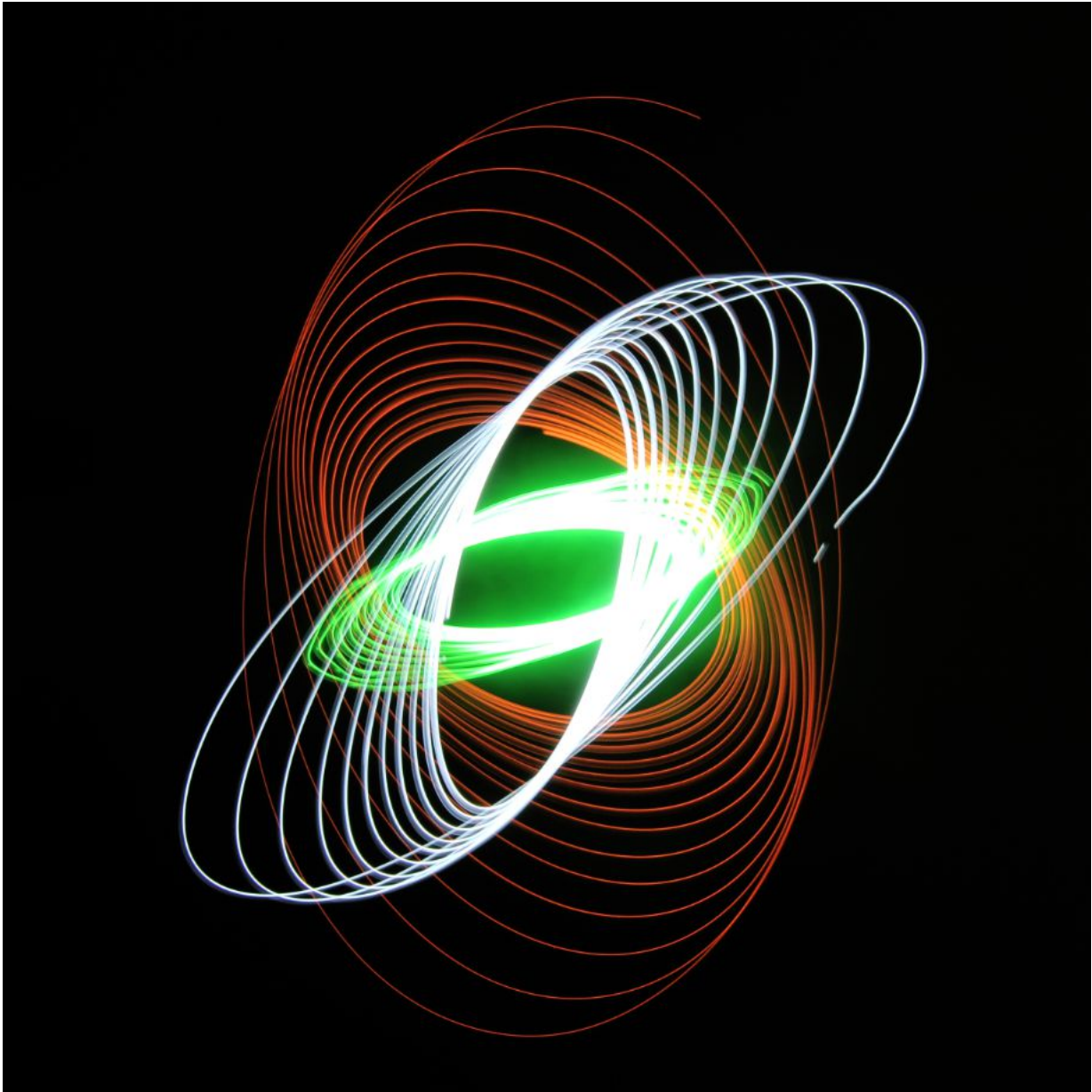


You can also make “compound” physiograms (shown left). This is where you have the string attached to the ceiling in a Y shape, with the light source at the bottom end of the Y.

The Y string will create different patterns that are not just “spirals” like you see above. Try experimenting with different lengths of string on each end (i.e. make the lower half longer, the upper half shorter, etc.) You can also have three or more strings all attaching to the middle string where the light hangs from. Each variation will make a different pattern.

Multi-colored Physiograms can be accomplished by either placing colored gels over your light source or over the camera lens. You can place different colored gels over the lens between several different tosses, or you can place them while the light source is spinning around in one go (shutter speed times are usually 1-5 minutes long when tossing multiple physiograms).

If you do several different tosses remember to place your hand (or lens cap) over the lens between each toss. You can also just take each shot separately and then combine them later in Photoshop by placing the images in a Photoshop document as layers and then setting the Blending Mode on those layers to Screen or Lighten.



Other Light Sources

Flashlights and LEDs are just the beginning. This next chapter will give you the low-down on all the other crazy light toys you can use to make your pictures more extreme.

LED Strips

Sure you can use a single LED as a light painting tool, but why not spice it up 50 times or so and get an RGB [LED strip](#)? An LED Strip is a flexible strip with a bunch of LEDs on them. This enables you to create many parallel lines all in a single stroke.



In order to build a successful LED Strip, you will need these things:

- SMD 5050 RGB LED Strip
- Controller Box and Remote Control (sold together)
- Power source
- Wood or some type of stick to attach the strip to (optional) and rubber bands
- Rubber bands (to mount the electronics to the wood piece)

5050 SMD RGB LED Strip

This is the standard RGB LED strip. With 30 LEDs per meter, it can be purchased in different lengths, usually 1-10 meters. The strip is cut-able every 3 LEDs, and if you have a soldering tool, you can attach additional strips to the current one you have. I would recommend just getting 1 meter of strip.

There are three tiny LEDs in each spot (just like pixels on a tv screen): a **Red**, **Green**, and a **Blue**. These colors can be mixed by adjusting the brightness on each LED to produce colors such as **White**, **Rose Red**, **Yellow**, **Orange**, **Cyan**, **Purple**, **Light Green**, **Sapphire Blue**, **Green Blue**, **Violet**, **Grey**, **Light Yellow**, **Sky Blue**, and **Brown**.

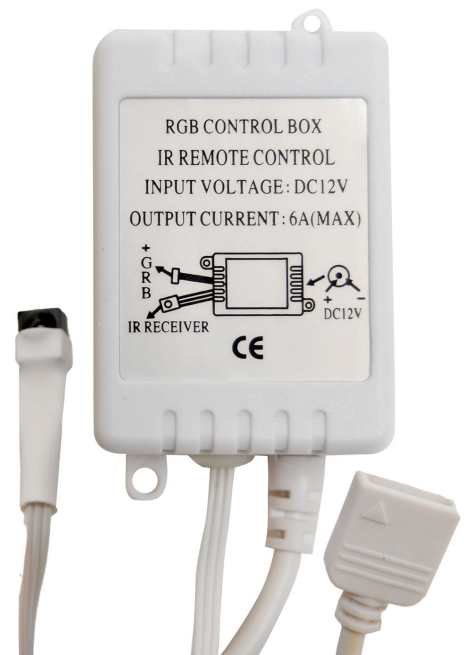
Colorful.



Controller Box and Remote Control

The controller has a port for the LED strip to plug into, a female power input (12V DC) , and an IR receiver to receive signals from the Remote Control.

You can purchase either a *44 key IR remote + controller box*, or a *24 key IR remote + controller box*. The remote and controller box are usually always sold together because you can't use a 44 key remote with a controller box that was made for the 24 key remote or vice versa.



Each remote has several colors you can select and a few specialty modes where you can flash different colors, or fade different colors into one another to create rainbow effects. The biggest advantage of the 44 key remote + controller has is a button where you can adjust the *speed* of how fast the flashing/fading is.

Power Source

We can power the controller box by plugging it into the wall using a 12V DC Transformer, or we can power it by using batteries. The simplest way to power it up using batteries is to get an [8 cell AA Battery Holder with a male connector](#). Simply put some batteries in it and plug it into the controller box and you are good to go!

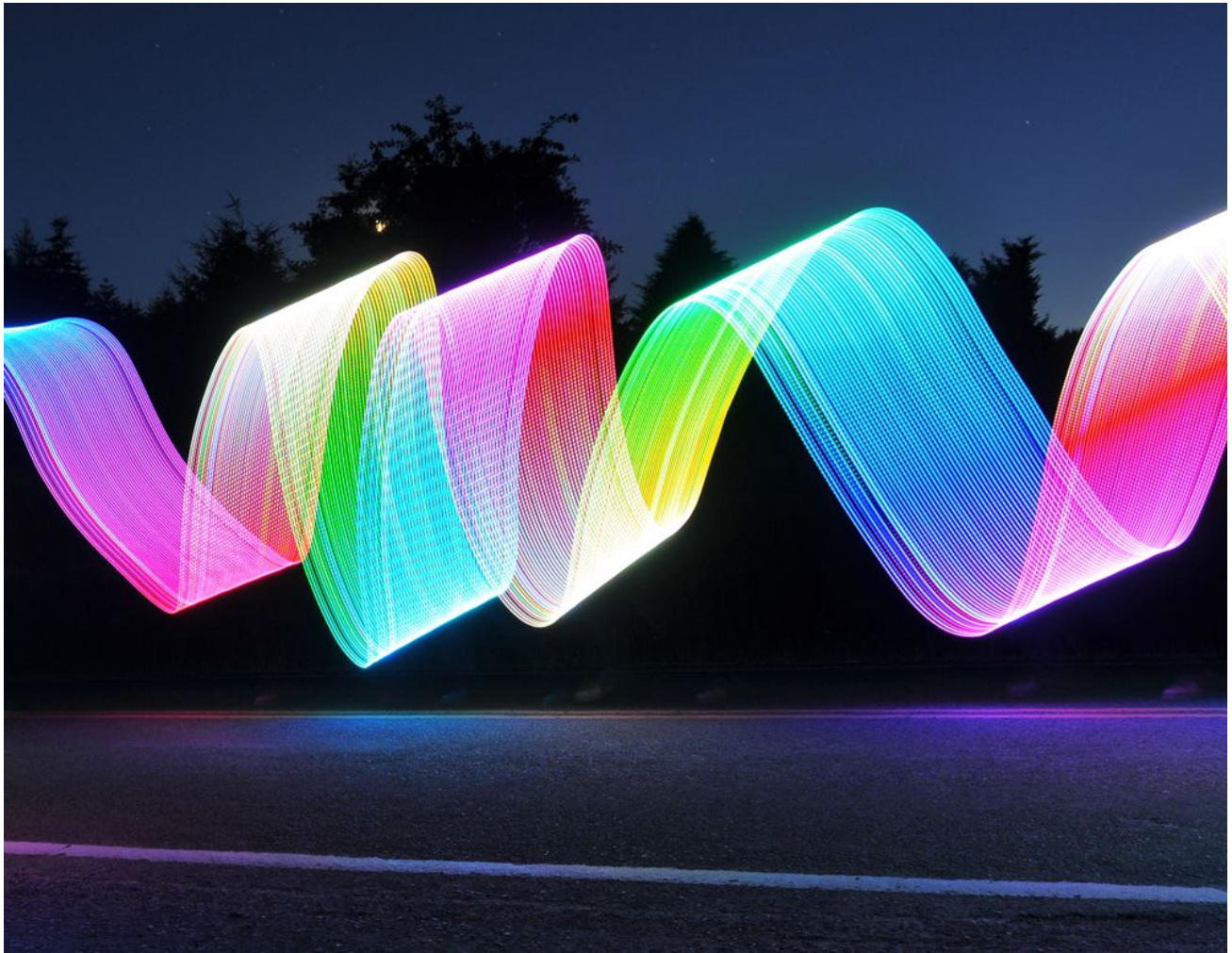


Wood and Rubber bands

To wrap everything up, I mount the electronics to a long piece of wood by using rubber bands. If you don't want to use rubber bands, the LED strip should have a sticky adhesive on the back of it.

Remember to unplug the batteries from the controller box when you are done using it for the night to prevent any sort of battery power leakage.





Bayco Work Lights

An alternative to RGB Strips is to get a Bayco work light. The best one I have found for light painting is the [SLR-2134](#) for several reasons:

- It has 2 columns of 17 LEDs on each column, so it is pretty long and versatile.
- The bottom of the light has four LEDs embedded into the base just like a regular flashlight.
- The switch is a very quick and efficient toggle switch, ideal for light painting.
- Clear casing makes it pretty easy to tape colored gels onto the front.
- There is a magnet on the backside of the light where you can attach an included hook. When the hook is attached, you can hold onto the hook in a stationary position with one hand, and then spin the light around to create circles with the other hand.

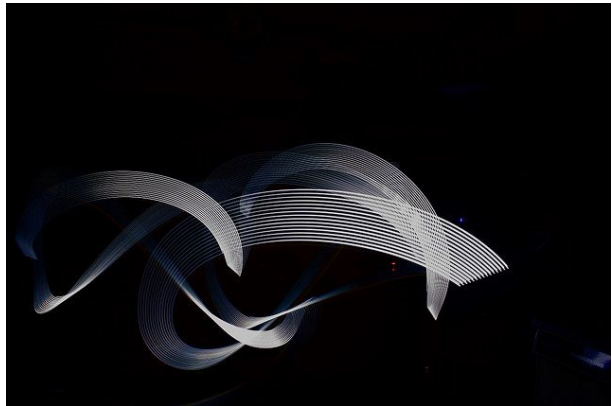
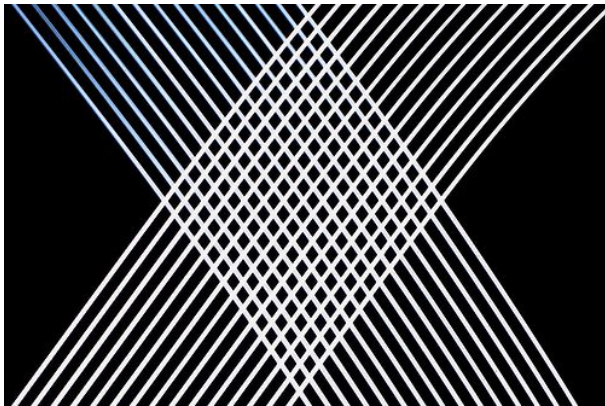
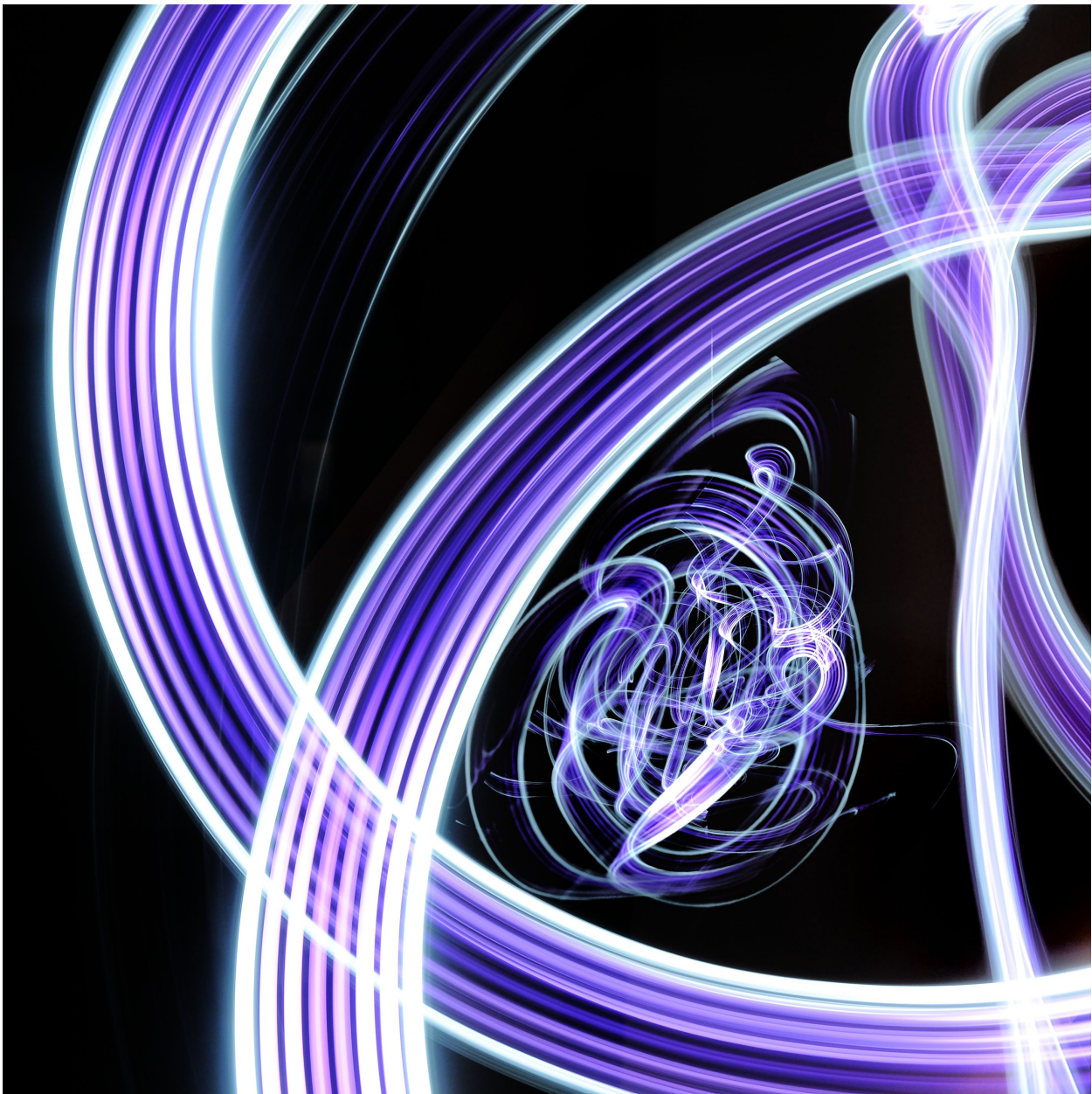


The light in black casing is a small Bayco work light I purchased at a local store and the yellow is the larger [SLR-2134](#) I got from Amazon.



This image was lit entirely using the SLR-2134. I first used the worklight LED strip side to make the concentric circles behind the plant, then flipped the switch on the device to activate the flashlight end to illuminate the bonsai plant from the front. If I only used the LEDs to create the circles behind the plant, it would just be rendered as a silhouette, which wasn't what I was going for.





You can also make a fully customizable programmable LED RGB strip by following this [free step-by-step ebook and video tutorial](#) originally created by TxPilot from Flickr. Be warned though, this light tool is the most complex one discussed in this book, so it will take time and willpower to build this DIY project.

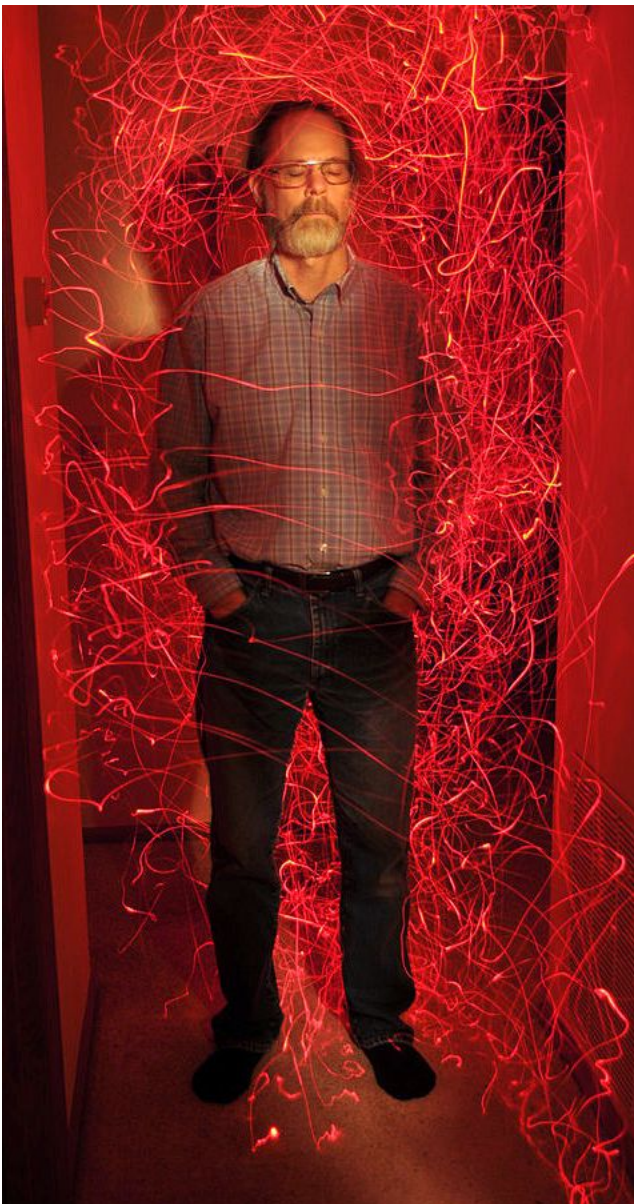


Fairy Lights

“Fairy Lights” are just battery operated LED Christmas lights. These are great for making squiggles and orbs. They come in different colors and sizes. Some only have 10 LEDs and others have 50.

Squiggles

To make squiggles, simply unravel all the LEDs and wave them around frantically in front of the camera when a long exposure is taking place to create a bunch of light trails.



The next cool thing fairy lights can make are **orbs**. In order to make an orb, bundle most or all of the fairy lights with a rubber band or electrical tape at the end of the cord so you can swing it around. Stand there in front of your camera and pick a spot on the ground that looks different from the rest of the ground; there might be a dead patch of grass, a rock, or you can place a quarter down on the ground to use as your marker.

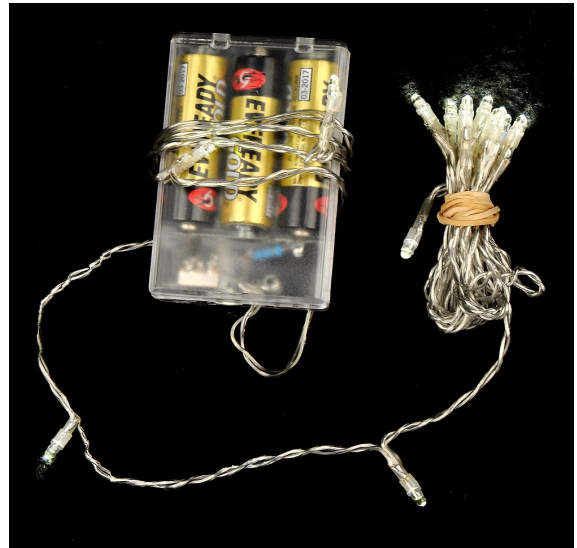
Once you have your marker on the ground in front of you, start spinning the lights around in a circle. Try to keep your arm at a 90 degree angle and have your elbow touching your stomach or hip at all times. After you have get some momentum, start orbiting your body around the marker in a circle and begin your exposure. Continue circling around the marker, making sure that your hand (the pivot point) is directly above the marker and that the lights passes directly above the marker every time.

Watch this [video tutorial](#) to see me do it live.



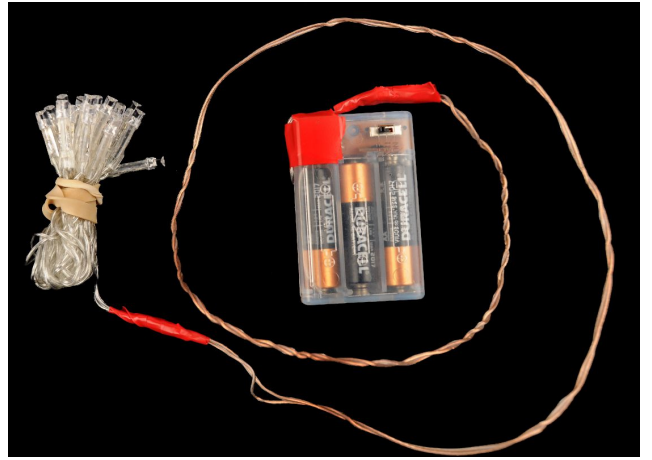
Solid Orbs

The first way is to have most of the fairy lights grouped together at the top with tape or a rubber band while still having some LEDs between the battery pack and the main clump of LEDs. This will create a solid orb that is filled with lines, just like the one below.



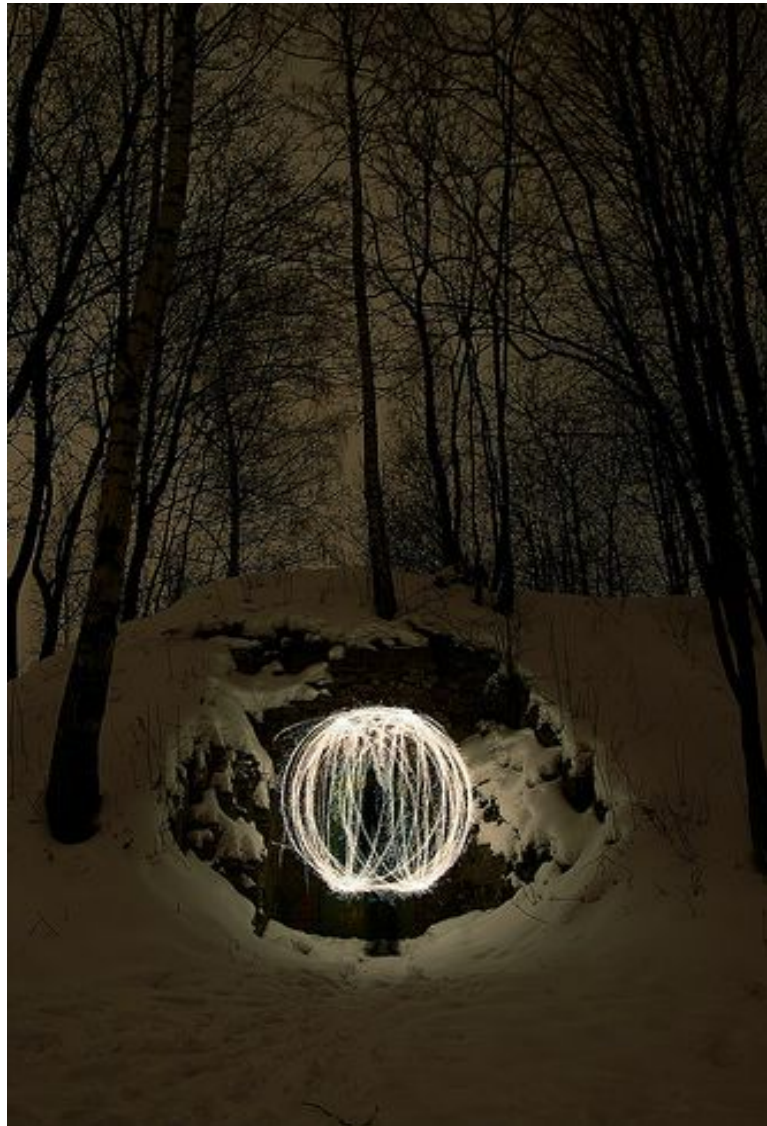
Hollow Orbs

The other way to create an orb using fairy lights is to have *all* the fairy lights bundled together at the end of the wire, with no lights between the main clump and the battery pack. You can achieve this by either placing black electrical tape over the LEDs you don't want lit, or by [cutting the wire and extending it using speaker wire](#) so *all* the LEDs are in use in a clump at the end of the wire. Either way works fine; I used speaker wire on mine but tape is faster. Hollow orbs are popular on Flickr.





This photo by TxPilot was taken with three cardboard cut-outs (the eyes and mouth of the pumpkin) attached to fishing line and then attached to the ceiling. After then the orb was crated behind the cut-outs to render them as a silhouette. The green mist is EL Wire.



Hula Hoop Orbs

Simply tape some fairy light LEDs (along with the battery pack) to a hula hoop and spin it between your hands when a long exposure is taking place - this will create perfect parallel lines that form a three dimensional orb. I've found that the lines come out even more straight when spun on the ground instead of between your hands because there is less margin for error.

Another strategy you can use to get the lines perfect is to attach the hula hoop to a long stick and spin it like a top on the ground. You can make the stick as long as you want and have the longer end be pointing upwards or downwards, depending on how high you want the orb levitated.



Lasers

Laser pens offer highly directional, highly intense light. Laser pens have a few specialty uses. They are best used when quickly shining the light up and down a persons face or body, writing on surfaces, or when shined through embossed glass (this will redirect the light in all sorts of places, it looks wild!). They usually come in green, red, or purple.



Scribble with a [laser pen](#). The example on the left shows a laser pen stroked up and down a models face. The model was very still. Be careful not to get the laser in your eye! The original photograph of this was taken with a red laser pen, but it looks so much more clear when you put it in Photoshop and make it black and white. To do this, click *Image > Adjustments > Channel Mixer* and then put Red on 100% with blue and green at 0%, and make sure "Monochrome" is ticked on.

1 sec. / f 3.5 / ISO 200

You can also write and draw things on walls. If your aperture is open wide enough, and your shutter speed long enough, the glow of the laser has the potential to illuminate things around it. Laser pens are BRIGHT, so be sure to experiment using different apertures. Laser pens come in different colors, [take a look at all of them on Amazon](#). If you want to change the color of the laser, you can also do it in Photoshop by going to *Image > Adjustments > Hue/Saturation...*



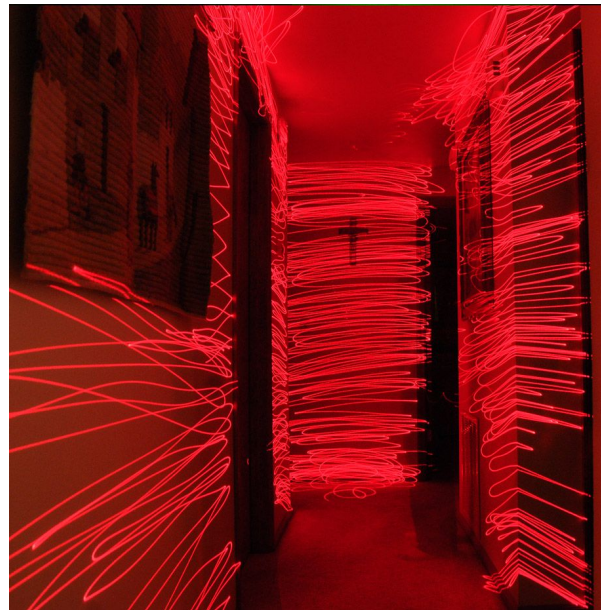
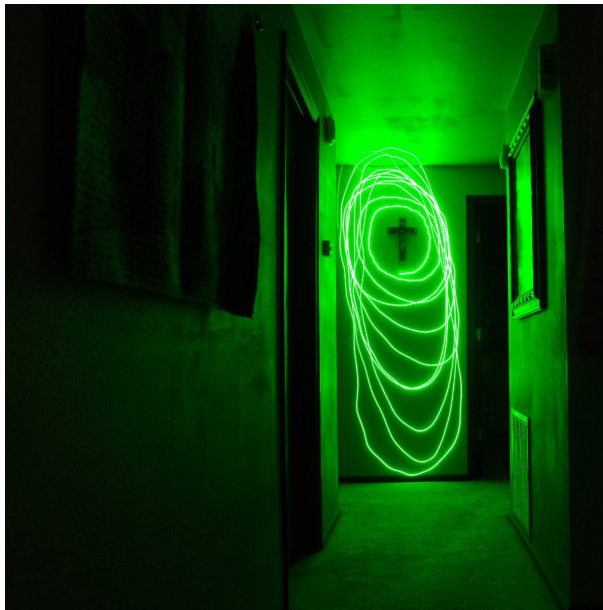
This is another example of taking a laser pen and shining it on a person's body. I think this looks better in color because it gives it that "techno" feel, especially in green. If you want the background to be completely black like it is in this photo, there are three options you have:

- 1) Photograph it outside with nothing close behind you (like an empty field). If you do it this way you can really go wild with the laser and you won't need to worry about accuracy at all.
- 2) Carefully point the laser at your subject making sure it doesn't go on the background.
- 3) Remove the background inside of Adobe Photoshop software.



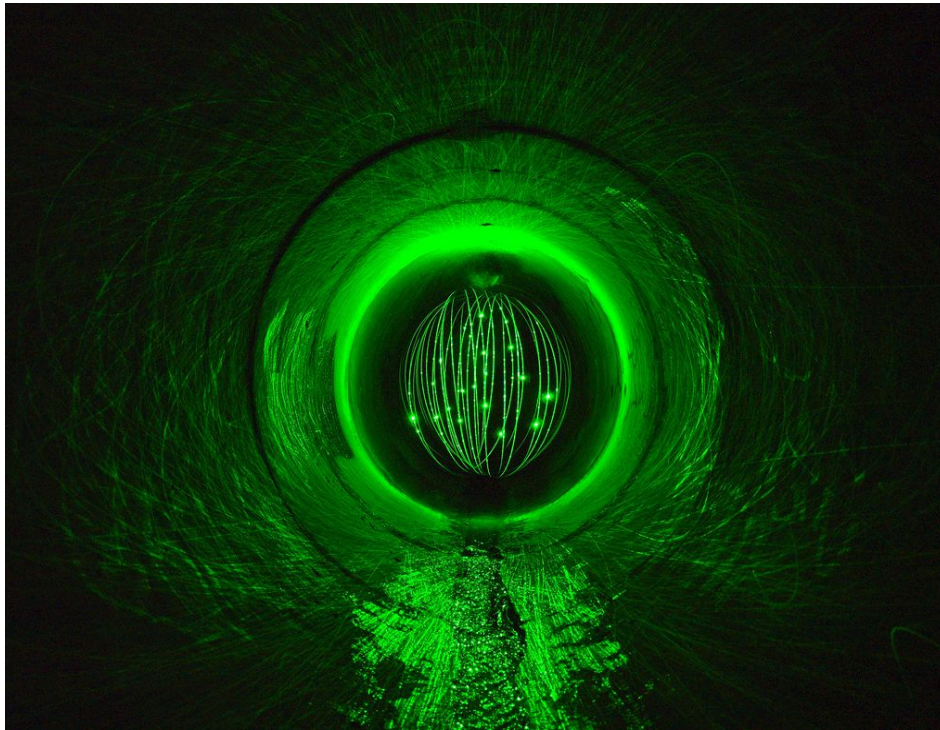


In this photo, I shined the laser pen into the camera lens while taking a long exposure. I used a low ISO, long shutter speed (20-30 seconds), and a small aperture (somewhere between f8 to f22). You can get some awesome images doing this, sometimes you will get crazy effects that look like shiny crystals or diamonds, or stars like in this example. I can't recommend this though, because it is a possibility that you can damage your camera's image sensor.



As you can see above, the green laser is extremely bright. Notice how it illuminates the walls of the hallway just by shining it on the wall that is perpendicular. The red laser isn't as bright, but if you brighten the image or use a higher ISO, you can get similar results.

I didn't think this could be done, but drawing orbs with laser pens is possible!... sort of. This was done with a special laser that shoots out multiple beams in different directions. Most laser pens have the laser deep inside the metal casing in order to hide the beam around the edges, so making orbs with laser pens is more rare than making orbs with LEDs. Notice how the laser can also be seen around the tunnel that it was photographed in, and the “sparkle” effect that is on the orb itself.



Another laser pen technique is shining it close to the ground to create long lines. In this example by [Pensans Photography](#) we see that he has made an orb and then held a laser pen somewhat close to the ground and turned it on and off in multiple places to create the long lines of light underneath the orb.

You can also incorporate fog machines with laser pens, an effect that is rarely done outside of raves and clubs. If you shine the laser through the fog, the fog reveals the laser beam completely and gives a general glow in the atmosphere.



Multi-Directional Laser Pen

You can pick up special laser pens that have twistable caps which split the laser into a hundred or so separate beams. I picked mine up at eBay by searching for “[6 in 1 laser](#)”. You can also [pick one up at Amazon](#) but it is more expensive.

These lasers are good for “stamping” hundreds of bright pin-points on the ground (as seen below), but are also good for scribbling textures on surfaces (walls, floors, etc.).

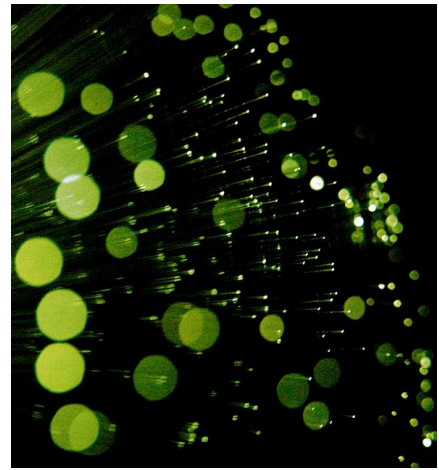




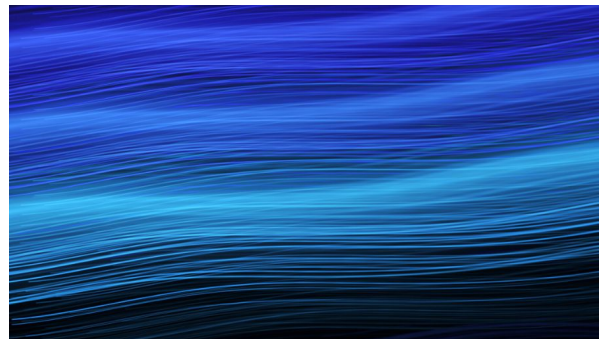
Again, I don't recommend shining your laser into your precious eyes or your camera because it can cause damage to either one of them, but this is what it would look like if you shined the galaxy laser onto your face :)

Fiber Optics

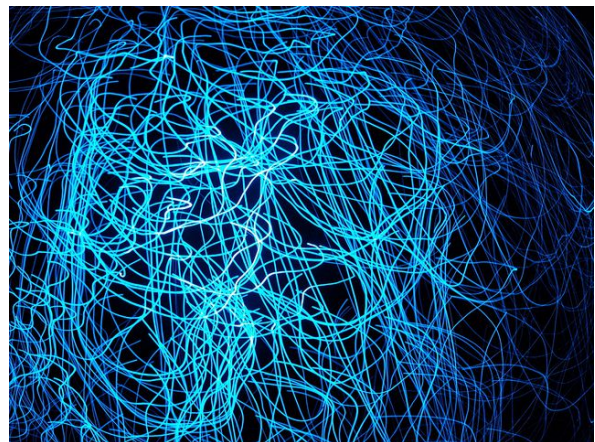
If you have a lens that offers shallow depth of field (50mm f1.8, for example), fiber optic lights can be a fun thing to photograph because half of the lights will be sharp, and the other half will be big bokeh dots. A tripod was used for this shot.



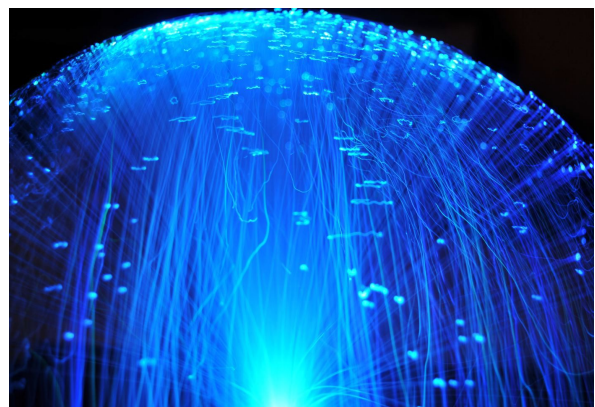
You can also get a smooth flowing type of look by simply 'swooshing' the lights in one long directional stroke from one end of the frame to the other....

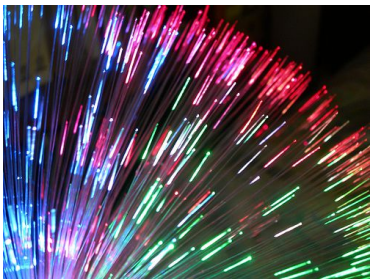


...Zoom in and scribble them around in all different directions....



... Or go wide angle and squiggle them around with the fiber optics still attached to the base holder. The camera will need to be on a tripod for this kind of shot.

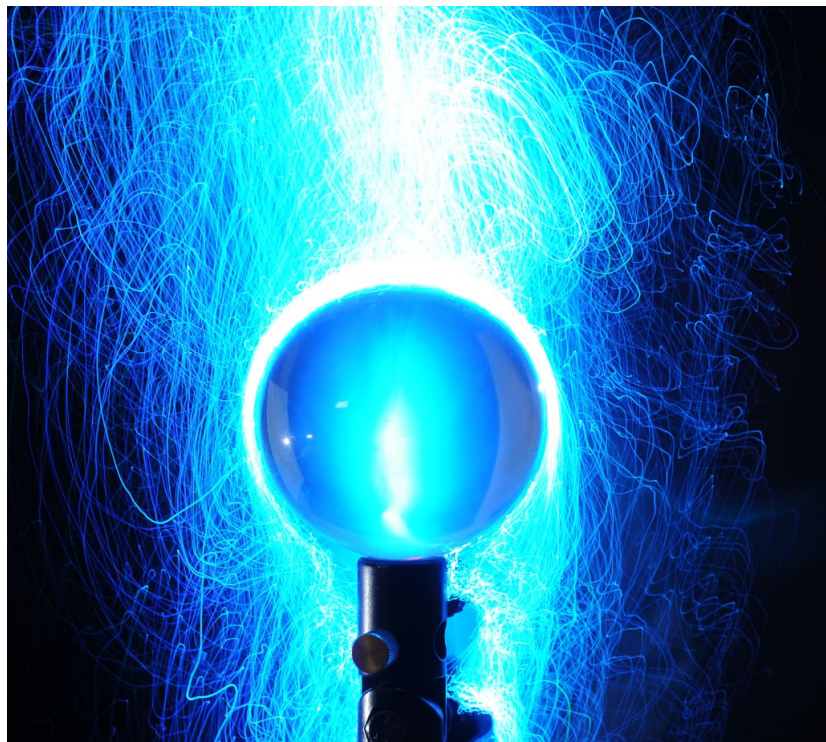




You can also create long exposure silhouettes by using this recipe: Put your camera on a tripod. Make sure your subject is standing still. Make sure there is no light shining on them from the front. Take your exposure, and then start light painting light from behind them, shining the light in the direction of the camera. I remember being told from this photographer that he used a [battery operated fiber optic light](#) that constantly changes colors to create this photograph. That link might not be the exact tool he used but it was the closest I could find from what he described.



You can also swipe the fiber optic lights across an object, and each individual light will render a trail that brushes over it.



Cathodes

Cathodes are tubes of light most commonly found in 12" lengths. The normal application most people use these lights for are cars and computer cases. You will need to wire up your cathode to batteries yourself because they do not come with battery packs included. A step-by-step wiring tutorial will be discussed below, but if you want to have a switch included in your set-up, go [here](#).

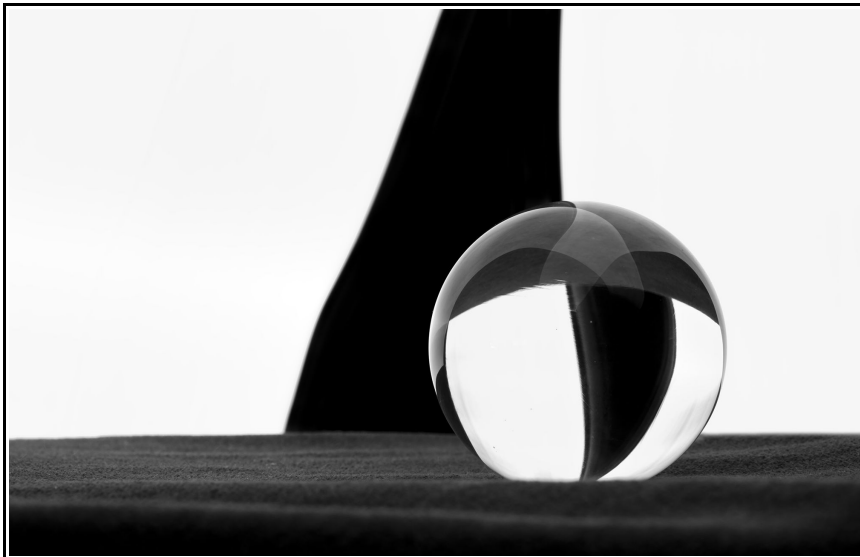
First, you will need to pick up a cathode. The one I recommend is the [White 12" Cathode](#) by Logisys. This package comes with two cathodes, wires, and an inverter. I always recommend *white* cathodes because you can simply place colored gels over the cathode to change the color later.

Side note: The plastic packaging that comes with the cathode can be cut out and fitted over your flash for wedging flash gels over the flash. More about this in the External Flashes section... But, long story short, hold onto the cathode packaging.

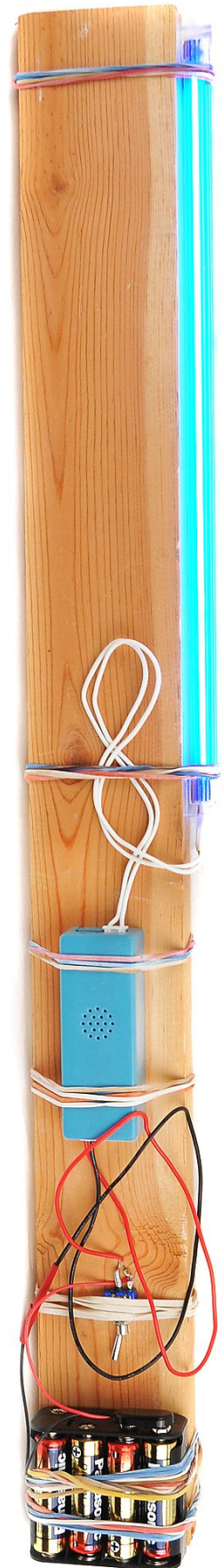
You will need

- [The Logisys cathode](#) that comes with an inverter and wires
- [8x AA battery pack](#) and 8 AA batteries
- [9 volt battery clip](#)
- Piece of wood to mount all this stuff to
- Rubber bands or tape for the mounting
- A [switch](#) (optional)
- [Colored gels](#) to change the color (optional)

Before you put start assembling everything, remember that cathodes are delicate; handle them with care. If you just lightly hit one against a surface, the small cathode inside the plastic tubing can crack and break.



Glass sphere with cathode light reflection.



Instructions

- **Open up the cathode from the packaging and mount the inverter on your piece of wood.** Mount it so that the side with two ports is facing the longer side of the stick.
- Take the bundle of wires out of the package that came with the cathode and **cut a few inches down the red and black wire that is attached to the small connector that plugs into the inverter.** It looks like this:



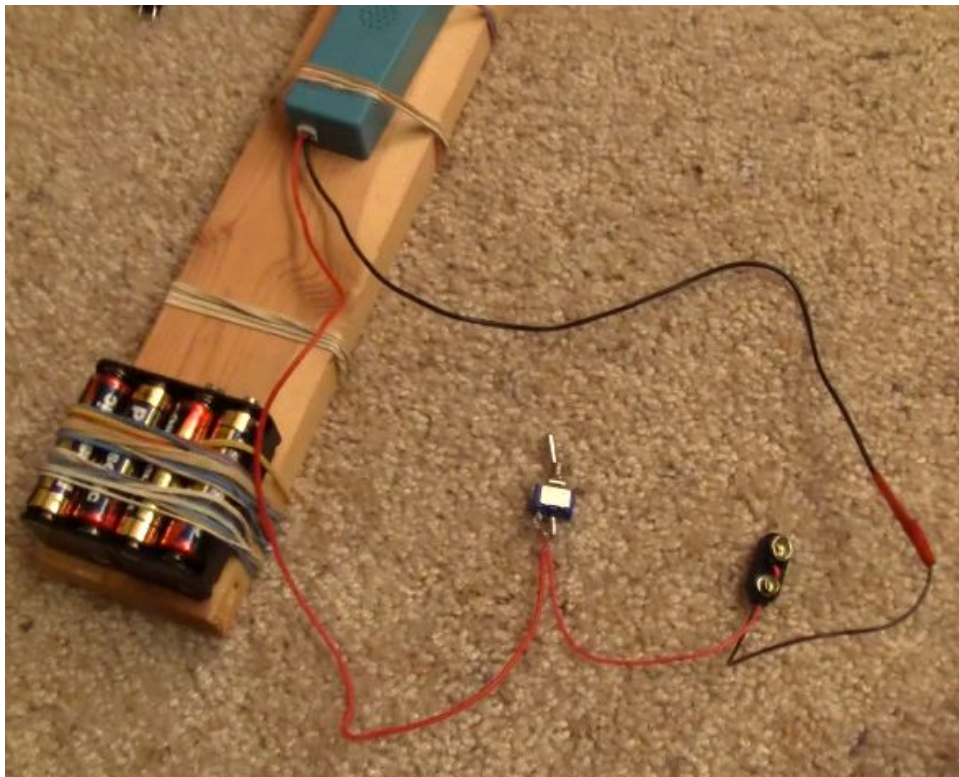
- **If you DO NOT want an on/off switch included in your design, wire it up like this:**

Strip and solder the ends of the wires you just cut to the 9 volt battery clip wires (match black to black, red to red). You can also just use electrical tape if you wish. After that, plug it into the side of the inverter that has only one port.

If you DO want an on/off switch included in your design, wire it up like this:

- Take the red wire you just cut and solder it to one prong on the switch.
- Take the red wire from the 9 volt clip and solder it to the other prong on the switch.
- Connect the black wire from the inverter to the black wire on the 9 volt battery clip.

In the end, it should look like this:



- Finally, plug in one or two cathodes to the other end of the inverter and attach the 9 volt clip to the battery pack to power up your light. After you see that it lights up and is working, mount everything else to your piece of wood.

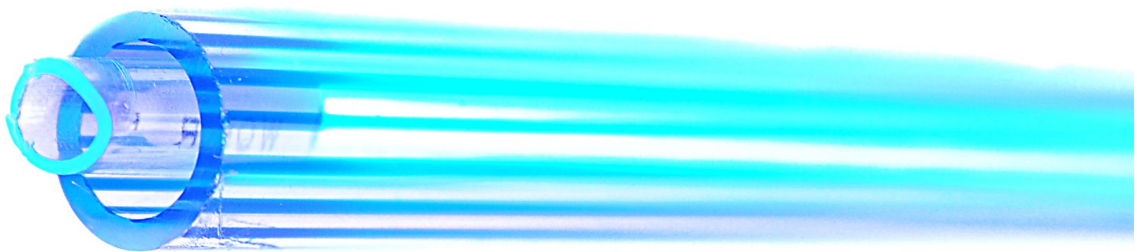
Extras

- If you want to change the colors you can use multiple Roscolux flash gels or cut a [large gel](#) to fit over the entire cathode. If you are using multiple small gels, you can place rubber bands or black electrical tape between each gel to get a thin black line between each color. You can also tape the gels separated from each other (as seen below) to get white lines between each color.



- After the cathode is mounted to the wood you shouldn't have to worry too much about them breaking anymore if you are just waving them in the air, but if, for example, you are dragging it across rough surfaces, you may want to add protection:

Tightly twist off the plastic square cap that is over the outer pipe and insert some clear PVC tubing for extra padding for the cathode. I got mine from Walmart in the aquarium section. The product was labeled “[Aqua Culture 8' Standard Airline Tubing](#)”. You also might be able to find some tubing thin enough at your hardware store, but an aquarium store is a better bet.



Here is a picture of the outer plastic pipe with the square cap twisted off and airline tubing fitted over the cathode for protection. After you put this around the cathode, just re-glue the cap back on and you are ready to rock.

If you want to create a cathode set-up where all the wiring is enclosed, check out this [DIY Video](#).



Right after the exposure began to take place, I fired a flash (located slightly to the right and in front of the camera) on the model to illuminate him and freeze his motion. Next, with my cathode already on, I walked behind him waving the light around as he remained motionless. The picture is intentionally left warm and slightly underexposed to convey mood.

This photograph was taken on a tripod
10 Seconds
F8
ISO 200
“Flash” White Balance
Nikon D300s DSLR
Sigma 17-50mm Lens

If you want an alternative solution to wiring up a cathode, I'd recommend getting a V24 Light Stick, a light sword toy, or a long glow stick.



The [V24 Light Stick](#) is already pre-built to run on batteries and is less delicate than cathode rigs. They come in red, green, white, and a special version that changes colors. However, I still recommend getting the white version, and then if you want to add color to it later, just tape some big [color gels](#) onto it.

The V24 Light Stick is not as bright as a cathode but the tip is slightly brighter than the rest of the stick (this adds a pretty cool effect that cathodes don't have).

Check out the effect the V24 Light Stick gives with the bright glowing tip:



Image created with flash on left to illuminate the model, and red V24 Light Stick on right



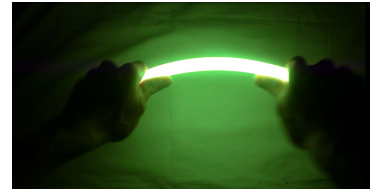
Here's another example of the V24 Light Stick in use.

I mirrored this image later in Photoshop but then erased the mirrored part on my face and legs to preserve the natural pose. External flash was used to illuminate my body and part of the road.



Glow Sticks

Glow sticks are similar to cathodes because the light is encased in a long tube. The *differences* between a cathode and a glow stick is the following:



- Glow stick light appears to be more diffused because of greater surface area of the tube.
- Glow sticks have no electrical parts, so they can be thrown, smashed, and submerged in water and nothing will break. Having no electrical parts is also nice because there are no wooden boards, switches, batteries, or wires you have to worry about.
- Although they cost about \$2 each, they are a disposable one-time-use product. You snap them once to turn them “on”, they last for hours, then eventually die out.
- Often there will be a hook at the end of the glow stick. This is great for attaching a string to the hook to spin it around in smooth circular motions, just like a fire poi.

Glow sticks are available in different sizes and colors, however the color that seems to be most popular, glows the brightest, and lasts the longest, is green. I like using the ones that are 14+ inches long.

Glow sticks should be stored in a cool dry place in their original packaging, away from direct sunlight. Heat and humidity will shorten their life span.

Higher temperatures will make glow sticks glow brighter but will shorten the glow time. Lower temperatures will make the glow stick be a little duller but will glow for a longer period of time.



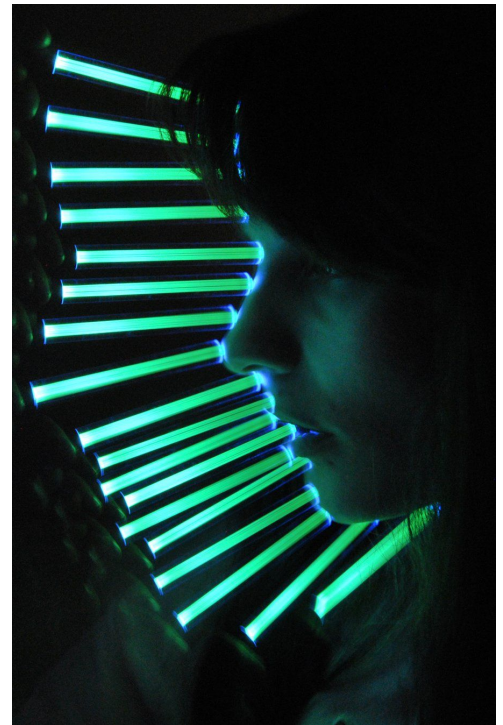
The image above was created by firing an external flash onto the model and then waving two separate 14 inch blue and red glow sticks around behind him.

If you have a light toy that can quickly turn on and off, you can make “copies” of the light by simply turning it on for a split second, switch it off, move it to a new location, and repeat.

This woman used this technique by tracing a straight line down her face while turning the LED Glow stick on and off. Pretty cool - but how would you achieve this effect using a regular glow stick, considering you can't turn those things on and off?

You would have to place a black card, a lens cap, a hat, or even your hand over the lens every time you wanted to cut the light from entering your camera. With the light-blocker in front of the camera, reposition the glow stick, take away the light-blocker, and repeat.

If you break a glow stick to gain access the fluid inside, avoid getting it on your hands. Don't get any fluid in your eyes, and for the love of God, don't drink it. If you want it on your skin to take pictures of, consider using glow in the dark body paint instead.



Glow in the Dark Paint

The photo to the right is another unique long exposure by [toledophotographer](#). He had an assistant paint a person with glow in the dark paint and had him walk under a black light. This idea is gold! The person was standing for about 10 seconds in the back, then slowly walked over closer to the camera and then stood for another 10 seconds or so.



Pop-Up Flashes and Off-Camera Flashes

Flashes are excellent for freezing a subject (usually a person) in place. If you were trying to light paint a person with a flashlight over a period of 10 seconds, the person in question would have to stay very, very still during those 10 seconds in order to render a sharp photograph of them. If, however, you used a *flash*, the time it takes to illuminate the model would only be a very small fraction of a second, and the person would be rendered perfectly sharp.

Off-Camera flashes also work well when illuminating a building or exterior environment, especially when colored gels can easily be placed over the flash.



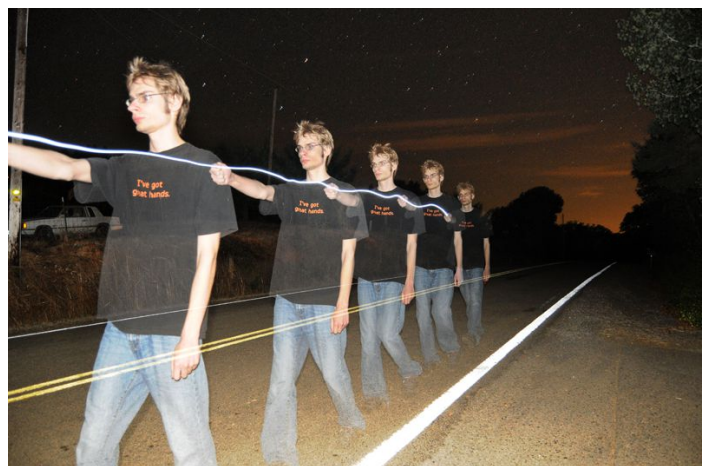
Pop-Up Flashes

If your camera is a mid-range or high-end DSLR, it might have a repeating flash mode. For example, on my Nikon D300s, if you go into the flash options and select *Flash control for built-in flash > Repeating flash* in the menu, you are presented with adjustable variables such as the output level, how many Times it flashes, and the Frequency rate in Hertz.

When you take a long exposure and your subject is moving across the frame when Repeating Flash is on, you will render several freeze-frames in one picture. Repeating Flash can add an effect of motion or pure surrealism, depending on how you use it.



Other than using the pop-up flash for some minor fill-light or the repeating flash mode trick, I wouldn't normally recommend using the pop-up flash for photography in general because the pop-up flash is located right above the camera lens and is aimed directly at your subject (worse possible place and aim the light). If you want flattering light, an external flash will beat a pop-up flash any day.



Off-Camera Flashes

When you use an off-camera flash, the light source is no longer stuck right above the camera, but can be moved around the environment and be placed in any location; this type of light has much more depth and is less flat-looking compared to a pop-up flash.

Off-camera flashes are particularly useful for illuminating urban environments (building interiors and exteriors), natural environments (trees, parks, forests, yards), and people.

Whether you are using a Nikon or Canon camera (the brand doesn't matter), an excellent flash to get for light painting is the [LumoPro LP160](#). The flash cost \$160 and has the equivalent light output to a Canon 580 EX II and a Nikon SB-900, which would cost you \$460. **If you get the LP160, you are saving ~\$300.**

The biggest difference from a manual flash like the LP160 to a modern-day digital flash is that it doesn't come with automatic TTL metering. TTL metering is where the flash output is automatically adjusted for you, which isn't necessary for light painting.

One other thing that the LP160 doesn't have compared to a modern day flash is an infrared Auto-Focus Assist Beam.

Normally, if you wanted to focus in the dark, you would have to illuminate your subject with a light, focus on the subject, turn off auto-focus, and then finally take your exposure.

If you are using a modern day flash's infrared AF Assist beam however, you can literally auto-focus in pure darkness when the flash is mounted onto your camera and it will find your subject and lock the focus on it. Even though this is a cool feature, 90% of the time I illuminate my subject with a light instead of using the infrared AF Assist beam.



LumenPro LP160



Nikon SB-700

Wireless Triggering

If you want to have your flash unit detached from the camera and fire right after the shutter is released, I would recommend getting the [RF-602 wireless flash transmitter and receiver](#).

In some situations, you will want the wireless triggers. In others, you won't need them.



Flash Gels

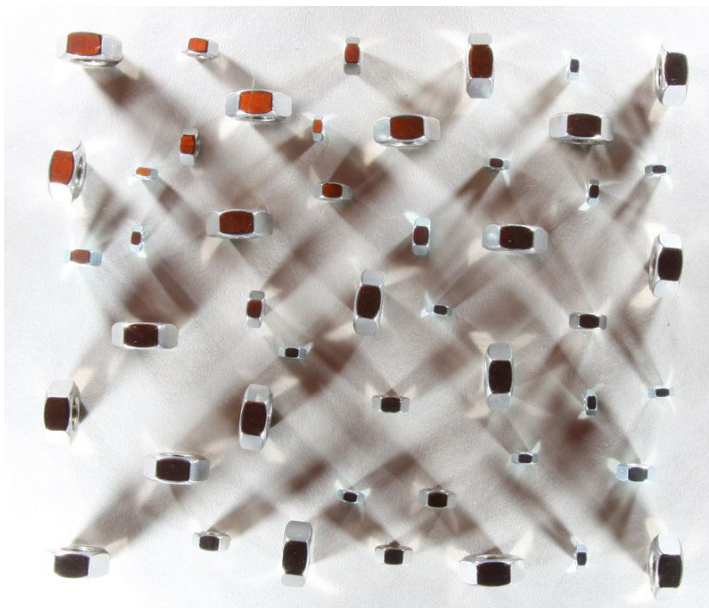
Now the *really* cool thing that can be done to flashes is to make the light colored. In order to do this, you'll need to buy a pack of [colored gels](#) and then make a simple plastic cover for your flash in order to wedge/slide the gels between the flash unit and the plastic cover.

In order to make the plastic cover, I actually cut the clear plastic packaging that came with the Logisys cathode that was described a few pages back. It was cut so it folds around three edges of the flash, with the two wide sides having Velcro® attached for easy removal from the flash, and then a rubber band around all three edges to ensure the third flap doesn't come loose and rip off. If you have no clear packaging material or Velcro tape, you can tape clear packaging tape to itself (to make it non-sticky), and then tape that to the flash unit with a new piece of tape.

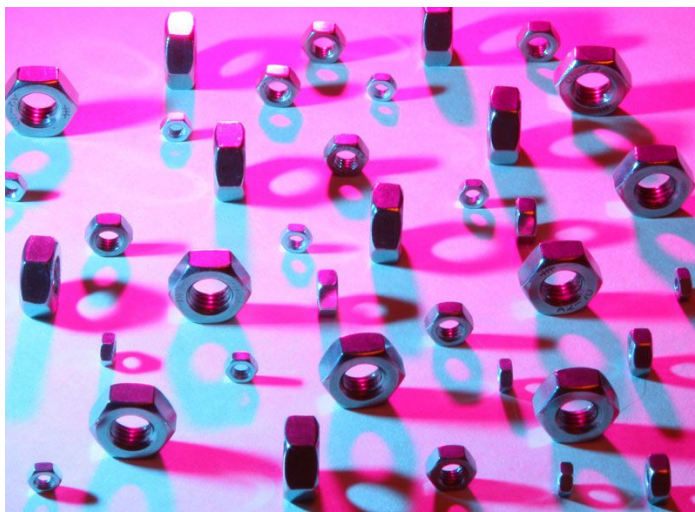




A trick you can do with an external flash is to take a long exposure in the darkness and fire the flash multiple times on your subject in different areas in the frame while the exposure is taking place. You will end up with “copies” of your subject. Doing this also causes your subject to look like a ghost if the background is illuminated.



During a long exposure, you can also fire the external flash around your subject several times to get multiple directional shadows. Here's an example of a bunch of hex-nuts using this technique. The flash was placed low to the ground and fired four separate individual times from all four corners.



Here is another shot where a flash was fired twice in two locations with a different colored gel on each fire.

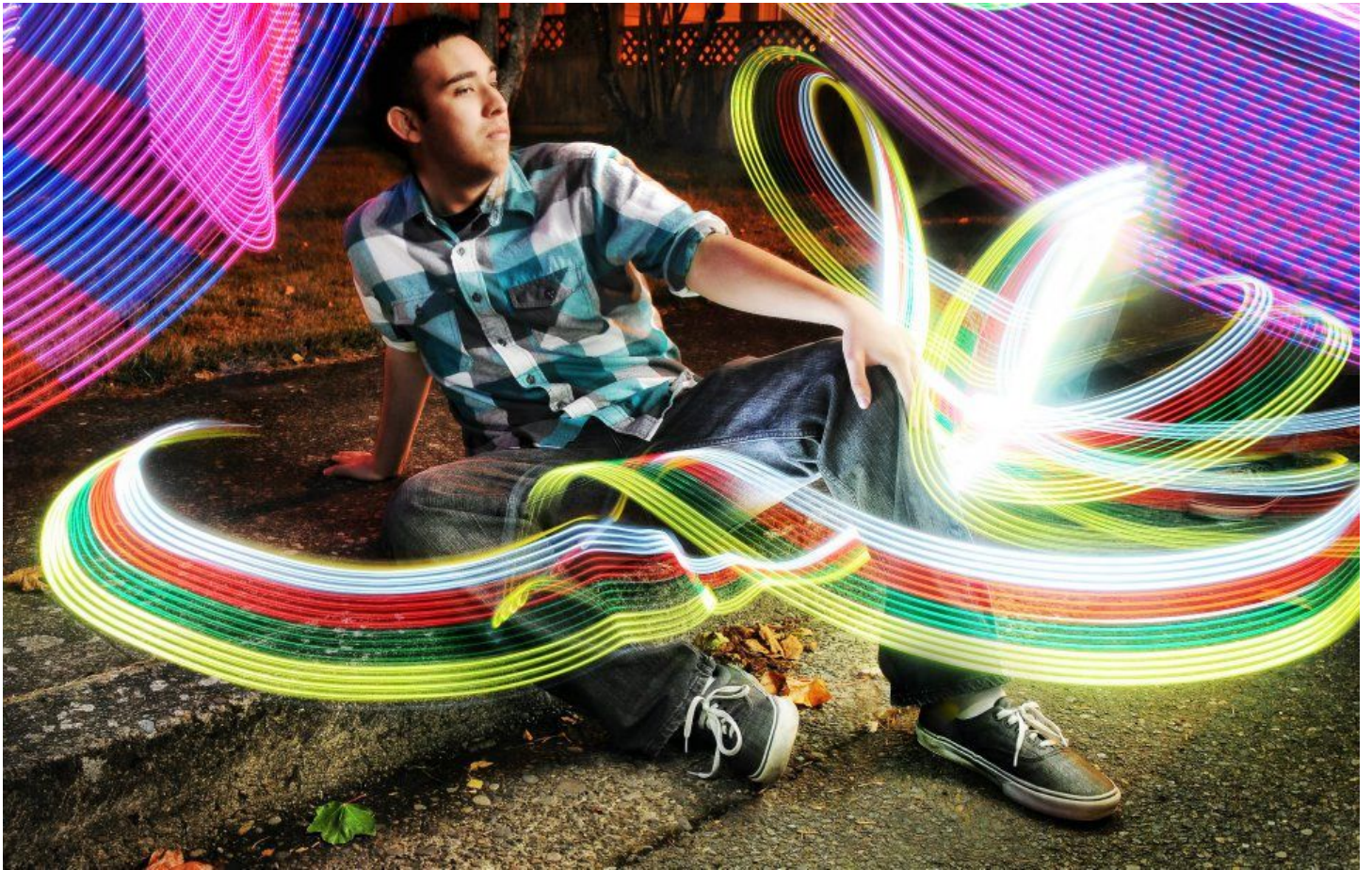


Keep in mind that you can use flash gels to change the color of flashlights and LEDs as well. If you have a large flash light, use [larger gels](#). The photo above was taken with LEDs, the one below with flash.





This photo was taken with a blue flash aimed at the flowers near the top, green from the left, and red from the bottom. When you mix red, green, and blue light, it will form white, which is why the center appears to have less of that super-strong saturated color than the edges.



F 6.3, ISO 200, 8 Second exposure.

Lighting: One flash slightly to the model's left, one flash directly in front of model; both aimed down ~45 degree angle with umbrellas. The camera and the flashes were all mounted to tripods.

Here is a great example of how you can combine external flash with light painting. In this picture I used the Bayco worklight with red, green, and yellow colored gels taped in front of the LEDs to change their color. And RGB strip was used for the purple light strokes behind the of the model.

Next, to illuminate and freeze subject (preventing any motion blur,) I used two external flashes attached to light stands with white shoot-through umbrellas. The umbrellas diffuse the light to make it look much more professional and flattering. The wireless RF-602 flash triggers were used to trigger each flash. The cool thing about this set-up is that it is completely mobile, you don't need any electrical outlets here because everything runs on batteries.

We all know that flashes freeze motion, right? Well, it does. And it does it very well! However, the neighborhood street lamps and the light wands in this scene give off **continuous lighting** that can still introduce blur onto your model, especially if your subject can't hold perfectly still for a few seconds (no human can be perfectly motionless). This is why you have to compensate for motion blur - Let's talk about that on the next page.

Reducing Unwanted Motion Blur

See how the model is a little blurry in this photo (especially near the eye)? The blur is apparent because he moved just slightly while the light-wands, being a continuous lighting source, were swirling around him.



If this is happening to your pictures, the best thing you can do is tell your model to hold as still as possible, swirl the light wands further away from your subject, shorten the exposure to a reasonable length (10 seconds max if street lamps are on), and put the flashes on a higher powered setting and then close the aperture of your lens (or lower the ISO) to adjust for the brighter flash. This will lower the effect of the constant lighting and raise the effect of the external flashes.

Flash Stencils

Flash stencils allow you to accurately shoot light from an off-camera flash and burn a custom design into your exposure. In order to make a good stencil you will need some type of container with a small opening to stick the flash in (like a cardboard shoebox, or a custom container which will be discussed on the next page), and a large opening on the opposite side to tape the stencil to. The stencil itself can either be made from one of the following:

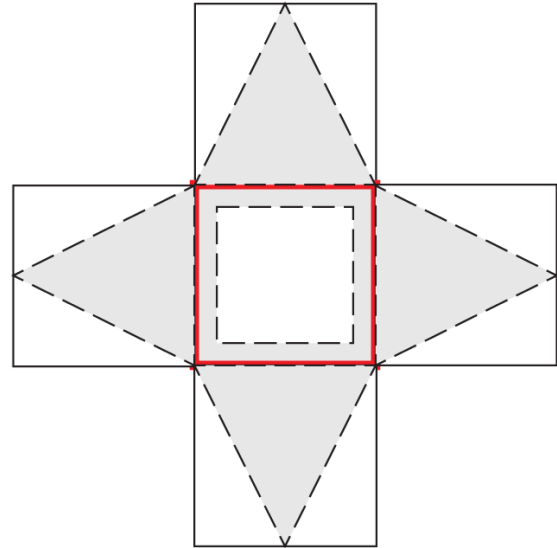
- Two pieces of paper stacked and taped together with your design printed identically on both. You need 2 printed copies stacked on top of one another in order to kill the light completely in the black areas. Using double-sided tape in between each sheet of paper works best, but regular tape works too.
- Cereal box cardboard, (Use an Xacto knife to cut out the design) with opaque paper (eg. tracing paper) taped to the outside of the stencil (this allows the light to hit it and show up in your photo). This type of stencil is a tiny bit better but requires a lot of time invested into cutting the design.



Here is a high quality custom container you can make to place your stencil on and stick your flash in.

- Five 12"x12" pieces of cardboard, plus some extra 1"x12" or 2"x12" pieces for the flaps (optional but recommended)
- Black spray paint
- Black duct tape
- Sharp razor cutting knife

Take the five pieces of cardboard and lay them out in a cross design (one piece in the middle with the remaining four on each side of that one piece).



Next, cut a rectangular hole in the middle about an inch smaller than the pieces of paper you printed out (I'm used standard 8.5"x11" letter printer paper, so cutting a 7.5"x10 hole would work fine.)

Cut the remaining end pieces into triangles. You should end up with a design that looks like the shaded gray areas in the illustration.

Next, spray paint one side of all the pieces with black spray paint in order to reduce reflection, and (ideally) the other side with white to encourage reflection. The cardboard I was using was already white on one side so I didn't bother spray painting both sides.

Let the paint dry over night.

Place your cardboard pieces on the ground with all the black sides up, arranged like it is in the illustration. Take black duct tape and tape up the end pieces to the middle piece (the red areas in the illustration represent tape). Tape it up with two or three layers to make sure no light will leak through.



Now it's time to make it three dimensional. Flip the entire design so it is flat on the floor with the white side facing up. Fold up all the end pieces to make a black pyramid. You will notice that the tips of the triangles are touching at the top of the pyramid - cut out and opening near the tip of the pyramid so your flash can fit through.

After you cut it so a flash can roughly fit, tape up the end pieces to one another so everything is now enclosed.

It should now look just like the one in the picture.

Now the next step... You can either make the front of the casing have flaps on the edges so you can slide interchangeable stencils in and out of the casing (both printer print-outs and true cardboard stencil cut-outs), or you can simply tape the stencil onto the front of the casing.

Taping the stencil directly to the front of the casing is the only surefire way to stop 100% of light leak. Creating flaps will block ~98% of light leak.



The light stencil used to create the image above was created with flaps.

Here are some images from TigTab, a user on Flickr who has made some of the most aesthetic light stencils images out there.





An aluminum pot was placed in front of a black blanket mounted to the wall, and then was light painted with a portable fluorescent light (you can see the reflection of the vertical white stripes on the pot), then the flash stencil was flashed twice above the pot.



City Lights

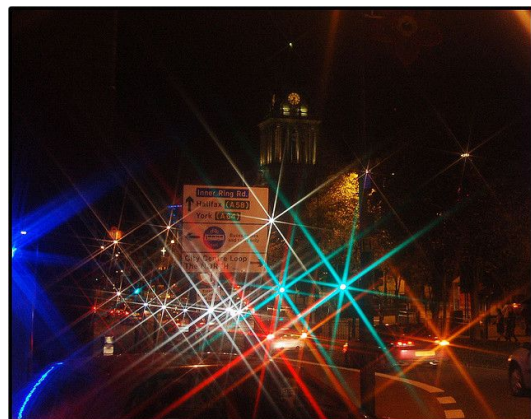


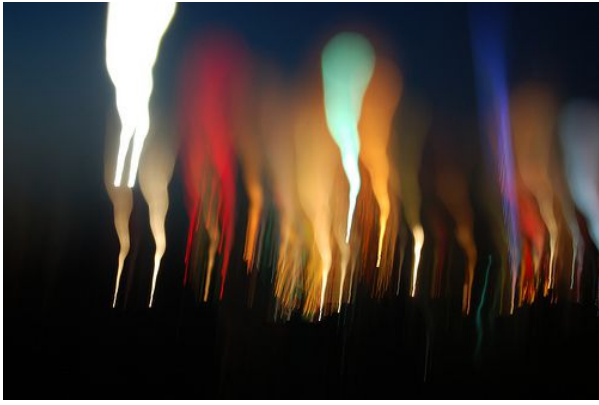
Traffic has always been the classic example of long exposures. A tripod must be attached to your camera in order to take these shots. Make sure to take off any filters you have on your lens to reduce flare and hotspots. Try messing around with the white balance to change the color of the scene.

30 sec / f18 / 50mm/ ISO 100



Okay, I lied about the filter thing... sort of. There are star filters available that turn the streetlights into stars/flares. You can buy the filters with different crossings. 4X, 6X, and 8X are the most well known. The image on the left was taken with a 6X. Do a search on Amazon for [cross filter](#) or [star filter](#) and you can take a look around and get the one you like.





These are city lights from a far distance.

While taking a long exposure in BULB Mode, tilt your camera up and down (or from left to right) while moving your focus ring in and out of focus at the same time. The camera records the light turning from sharp points into big blurry bokeh blotches. This effect is best done when using wide apertures. F6.3 / ISO 200 / 55mm



If you have a tripod on you, and you're in an amusement park of some kind, long exposures of rides always come out great. Ferris wheels are a classic example, but the effect works with any ride that moves with lights.

For a long exposure photographer, going to an amusement park at night is like a kid going to a candy store. There are so many different lights to take pictures of!



This is a long exposure inside of a car interior.

In order to get a shot like this you will need to have your camera on a tripod or at least have it resting on the back dashboard.

I've seen people extend the middle leg out and have it on the floor, then take the two short legs and tie them down to the back seat. Check out this [tutorial on Flickr](#) to see what I mean.

You can use an external flash or a flash light to light up the interior of the automobile. You can also take shots from the *outside* of the vehicle while it is moving. I've used the sun roof before, and I've also stuck my camera outside the window on a monopod to get rare angles. Use the camera's self-timer or a remote if you do this. Manual focus might also help.

Fire

This section will discuss fire dancing, fire, sparks, sparklers, and steel wool. Ready.... aim....

Fire Dancing!

Fire is a significant “element” in nature that can be captured beautifully with your camera. If you ever see a fire dancer and you happen to have your tripod and camera on you, take some long exposures.

A flash was used to freeze the motion of this fire dancer, while the remaining time of the exposure was used by running around frantically, swinging a lit fire poi to create fire trails.



Linda
Fire Trails



This tool on the left is a [fire poi](#). This is what fire dancers use to create the fire trails. It is made up of Kevlar® wick on one end of the chain and a handle on the other end. The Kevlar wick, which can be reused many times, should be soaked in white gas -- otherwise known as Coleman® fuel -- before being lit with a lighter or match. Coleman fuel can be found in the camping section of any given department store.

Lamp Oil also sort of works, but starting the flame takes a while to get going. Lamp oil burns much slower compared to Coleman fuel and lasts longer, but the flame isn't as “hot” and wild. When the Kevlar wick is dipped in just Coleman fuel, it will ignite *immediately* with a large flame.

I just use Coleman fuel most of the time because it works so well, but sometimes I'll create a mixture of both Coleman fuel and lamp oil. I never use just lamp oil because it is too difficult to ignite on its own and the flame tends to get smaller when swinging the poi around vigorously.





Fire dancing is an art form in and of itself and requires months of practice before performing safely. If you really want to get more involved in this performing art, pick up a [training DVD](#) or visit homeofpoi.com for more information. Otherwise, just do what I do and stick to basic circular patterns. Better safe than sorry!





D3S_7462.NEF



D3S_7460.NEF



D3S_7447.NEF



D3S_7448.NEF

This is a combination of several exposures. With the camera on BULB mode, a remote was used to open and close the shutter. I had to literally park the car in the middle of the road, get out of the car, grab the flash, and fire it at the car from two different angles. This is what the first two exposures are in the film strip.

Next, after I got those shots out-of-the-way, I grabbed my fire poi and lit it on fire. Starting from the end of the road away from the car, I ran up the road towards the car with the poi dragging on the ground. You can see that it made a noticeable ghost trace of myself. This was burned out later in Photoshop, but I should have been wearing all black clothing and used a higher F number to reduce the brightness of the flame.

This photo was taken in a rural area as well, so there was no traffic at 3AM here (but always be prepared if there is! Having someone be in the car would be ideal when performing this technique.)

To combine the images, they were put into a Photoshop document as layers and Screen was used for the Blending Mode of each layer. Then a layer mask was created on each layer to selectively erase certain parts from the desired layer. For example, the orange lighting in front of the car on the last two images on the filmstrip was erased because I saw it as being too harsh.



You can also make **torches** by using [adhesive Kevlar wick](#). Torches allow more control if straight, non-circular lines are being drawn with the fire.

After wrapping the Kevlar wick around a metal pole, grab some copper wire and wrap it around the wick as tight as you can to prevent the wick from unraveling.

Remember that the copper wire does have the ability to fall off the wick and land on your hand and burn you. Although this isn't extremely likely, it's never a bad idea to be cautious. Wear gloves if you want and periodically check the copper wire after every dozen or so burns to see if it is still tight around the wick.

Colored flames still need to be tested with Kevlar wick, but [this video](#) describes how you can make a variety of colored flames by mixing different chemicals.

The blue photo below was created with a butane torch.



This image a combination of several images that can be seen below.



Image 1 – I dipped my torch (seen right) in Coleman fuel, lit it, and traced a pentagram star pattern in the middle of the road while a 30 second exposure was taking place (Tripod was used, of course). The top part of the road was also briefly lit with an LED flashlight. A remote control was used for the camera so I could have the torch in the correct starting position as soon as the exposure started.

Image 2 – I tilted the camera up just a bit to capture more of the horizon and sky as well as lighting up more of the road with an LED flashlight. Both Image 1 with Image 2 were repositioned and combined as a panorama inside of Photoshop. A layer mask was used to blend the images together smoothly.

Image 3 – I placed this star trails image over the previous two and took a black paint brush and simply erased the tree that you could see on the left side of image 1. After doing this, the dull horizon and sky originally from Image 1 and 2 was replaced with something a bit more dramatic: Star trails!

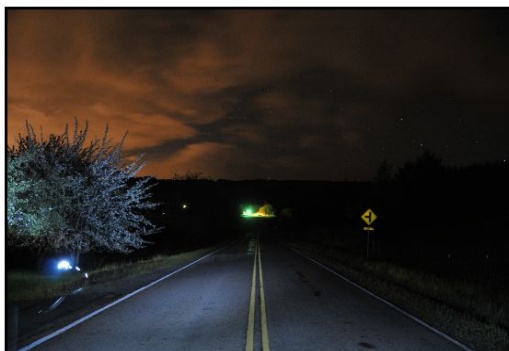


Image 1



D35_4257.jpg

Image 2



D35_4261.NEF

Image 3





Here is a simplistic shot where all I did was swish the torch in a circular pattern. If I remember correctly, I think the on-camera flash was used to illuminate and freeze the motion of my body.

Sparks

These two photographs were sparks coming out of a burn barrel. When the material that is burning collapses, sparks will swoosh up into the air all at once. I used an exposure time of 1.5 seconds and an aperture of F5.6.

The second image was the same thing, except I spun the focus ring in and out of focus while the exposure was taking place. Half of the sparks are really blurry and the other half are sharp. It looks like hot dreamy lava... perfect for a background texture.



Sparklers



7 sec. / f22 / ISO 200

This is just a standard long exposure of a firework sparkler in motion, taken on a tripod. Keep in mind that if you use a flash, the person holding the sparkler will show up in the photograph. Also keep in mind that if you shoot at F22, the sparks will be isolated on a black background, but if you shoot with a wider aperture, the environment around the sparkler will be lit up by the ambient light it gives out.

Besides sparklers, “California Candles” and “Solar Torches” also work extremely well. They are much larger in comparison to sparklers and shoot out a larger quantity of sparks.

If you want to learn more about long exposures with sparklers, here is an [article and video tutorial](#) I created that describes how to take photos of them in more detail. That link also has a secret trick that will show you how to make psychedelic patterns with them inside Adobe Photoshop software.





7 minutes, ISO 100, F18.

Sure, you can use sparklers by themselves in an empty dark space to create abstract photos, or you can *trace objects* with sparklers instead. Cars, bicycles, and sometimes even human beings make great subjects. Just be careful not to burn anyone, or catch hair on fire



If you are photographing people, remember that the long exposure will record the sparks of the sparkler, and the flash will freeze the person.

It is typically best to have the flash fire near the *end* of the exposure and not the beginning.





In this photo, an [external flash](#) was put on a [light stand](#) with an [umbrella](#) and was directed at the model from a ~45 degree angle from the right and a ~45 angle from above. We had two people light the sparklers outside the frame. As soon as the sparklers were lit, the camera button was pressed to take a picture (20 seconds, f5.6, ISO400), the off-camera flash then immediately fired via the [wireless sync](#), and then the sparkler guys went into the frame and started to scribble lines with a paper sparkler behind the model and a metal sparkler on the ground near her boot.

Sparklers made with paper material will usually create sparks that fall to the ground, and the metal ones will seem to “pop” more, without creating long trails of falling sparks.



Non-Paper Material



Paper Material

Sparklers are bright; if you get them too close to your subject, they will -- without doubt -- blur your model if the shutter speed is long. Remember to tell your model to stay as still as possible, and remember that the person working the sparkler (ideally wearing all black clothing) needs to be in constant motion in order to prevent the light from making them show up in the picture.

Steel Wool

If you want to really heat things up, pick up a package of steel wool, tie it to a chain, heat it up, and take long exposures of it spinning around. The sparks go *everywhere*.

I personally use a whisk (purchased at a thrift store) attached to a laminated steel cable with a little handle on the end to easily spin perfect circles instead of a chain (seen below).



Simply place the steel wool inside of the whisk, light it on fire using a lighter or 9V Battery, and then spin it around in a circle to get the sparks flying. I highly recommend being fully clothed with a hoodie and long sleeves. Wearing all black is the most strategic, because black won't show up as much in the exposure.

[See my steel wool youtube video](#) to see exactly how to spin wool.

The type of grade to get for steel wool is 0, 00, 000, 0000, "fine", or "very fine", etc. I don't use anything above grade 1 because it doesn't burn very well.



Location, location, location. Spinning above water is extremely cool as it gives great reflections of the fire (plus it's got the whole 'elemental' theme going for it).



My favorite environment to spin steel wool is in the cold wet snow - it is very safe when there is a significant amount of snow, I have had absolutely no problems.

Another popular environment where people like to spin steel wool is inside of a tunnel or in or around large concrete structures, because the sparks end up hitting the concrete and bounce off the walls.



EL Wire

[Electroluminescent wire](#) (EL wire) is a strip of thin copper wire coated in phosphor which glows when an alternating current is applied to it. These wires have clear plastic protective sleeves over them which can come in different colors. EL Wire is flexible and varies in color, length, and thickness. When the EL Wire is “draped” and “dangled” across the frame during a long exposure, it will look like a mist if you are using thinner EL Wire, or like big bold flames if you are using thick EL wire (5mm).

I purchased my 3 foot portable 5mm blue EL Wire from [elwirepros.com](#). A 2x AA battery holder inverter is included in the kit, so you don't need to purchase the power source separately. Or wire anything up. Everything will be ready to go out of the box.

Other stores that sell EL Wire include [CoolNeon.com](#), [elec2go.com.au](#), and [thatscoolwire.com](#).





iPhone, iPad, and Android Apps

There are several apps for the iPhone, iPhone Touch, iPad and Android specifically designed for light painting. You can type in words and then have them projected onto the pixels over time as you drag the screen across space to give an impression of 3D light painting.

Some of the apps include:

- [Holographium](#)
- [Holo-Paint](#)
- [Penki](#)
- [Aurora Bulb](#) (Android App)
- [Time Exposure](#) (Android App)



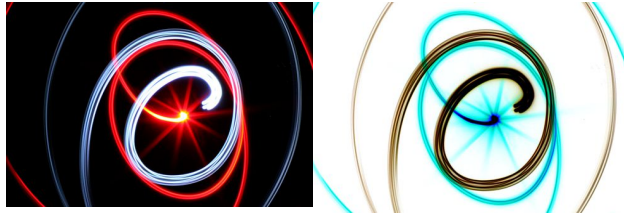
Light Painting Techniques

Here are a bunch of “tips, tricks, and techniques” you can use in light painting.

These tricks apply to any of the light sources listed in the previous section.

Inverting

You can invert any light painting by pushing CTRL+I on the selected layer in Adobe Photoshop software.



Camera tossing and abstracts

You can literally throw your camera up into the air and spin it while it is taking an exposure and then catch it when it comes down! This works well with wide angle lenses. You can also just wave your camera frantically to get long exposure abstracts. Try zooming in and out and moving the focus ring while doing this.

Lights on wheels and hoops

Putting LEDs on wheels and hoops can generate some pretty cool designs. The image on the right is a long exposure of a bunch of LEDs attached to a wheel inside of a tunnel.

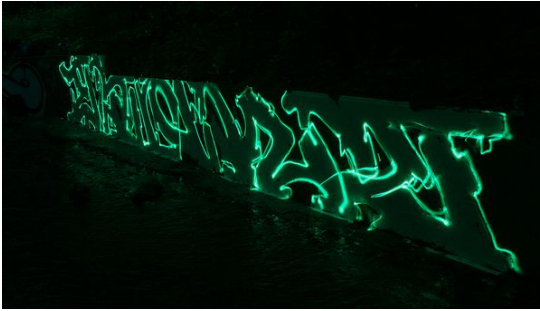


Reflections and mirroring

You can do a light painting over a body of water (like a pond or something) and then, because of the reflection, you will get a naturally symmetric light painting. You can then rotate the photo 90 degrees to create vertically symmetric designs. The same technique can be done with mirrors.

Writing Text

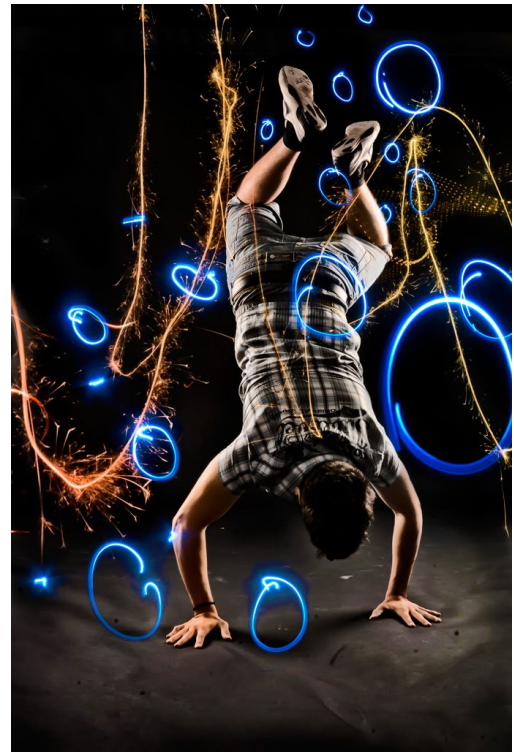
This might seem kind of obvious but it's worth pointing out. LEDs are great for writing letters! Keep in mind that the alphabet picture on the right took a long time to create. Each individual letter took the photographer about 7 attempts each before the final result was compiled in software.



Combining different lights

And of course, lets not forget about combining all the different kinds of lights and using flashes.

These images were taken with two 80x120cm soft boxes on both sides of the model. The short flash burst freezes the mode to render them motionless, and then the rest of the exposure is painted with light.



Domes

To create a dome, simply attach a light to the end of a broomstick and then hold one end of the broomstick on the ground while moving the other end of the broomstick around in the air. Think of the end that is on the ground as a pivot point and try not to move it or slide it out-of-place. You can alternatively put a stake in the ground, attach a rope to the end of the stake and a light on the other end of the rope, but this is more difficult. You can also create a dome by simply putting lights on a stick and then placing it on the ground, then moving the stick on one end to the ground and moving the other end around in a rainbow pattern, just like [this](#).



(11/17/2012) A new way to create perfect domes is by using two pegs and a bicycle wheel with LEDs on the wheel. There is currently a video tutorial [here](#) – more information about this technique will be coming in the future.

Blending Multiple Exposures

This technique will give you lots of options in Adobe Photoshop software. Your camera will need to be locked up on a tripod to ensure that it won't move. Here is how it works: First, take several exposures with different lighting conditions. In this example I am using a garden. Each shot was 30 seconds long and each had different things lit. The first shot is just ambient light coming from the LED to illuminate the foreground, the second shot is me going crazy with the LED, and the third and fourth shot has the LED behind the bird bath only.



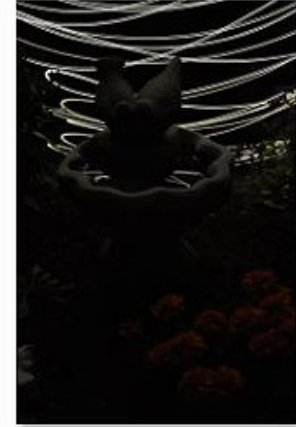
D3S_4601



D3S_4602

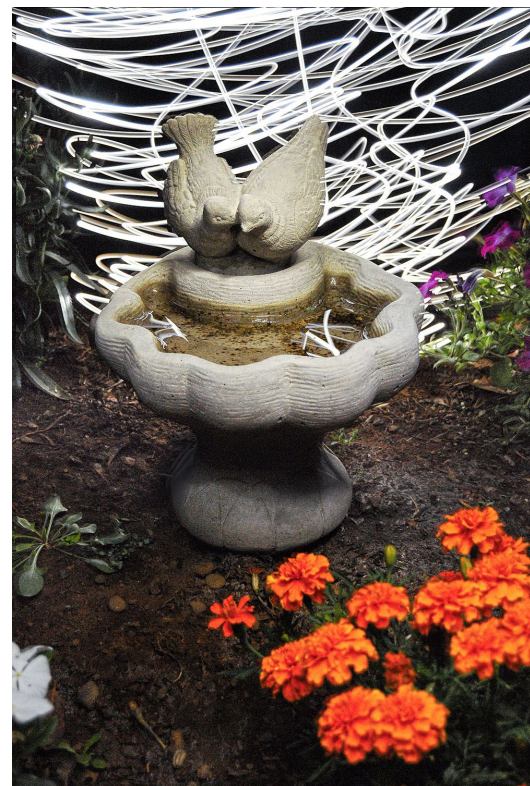


D3S_4603



D3S_4604

Once you have taken multiple exposures with different 'lightings', open Photoshop and click *File > Scripts > Load Images into Stack* and select your images. Once they are all loaded, go into the layers window and change each layer's blending mode to *Lighten*. Once you do that, you'll see all of your exposures combined! Pretty cool huh? You can also change the Levels and Curves on each individual layer and even disable the layers that you don't want. Click *Layer > Flatten Layers* when you are done and make some final adjustments.



Light Stitching (Unofficial term)

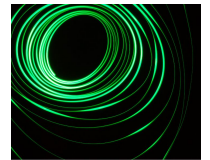
This is a great technique you can use to create very complex light paintings. It falls more into the 'digital art' category but I thought it wouldn't be a bad idea to mention it in this ebook. It's all "special effects" after all. What you do is take tons of separate shots of different light painting designs. The image on the lower left was created with dozens of different photographs. Each swirl, curve, dot, and line are all separate photos.

After you have taken all your shots, load them up into Photoshop by clicking on *File > Scripts > Load Files into Stack...* This will put all of your images into separate layers in a new Photoshop document. After that is done, change the Blending Mode on all the layers to Lighten, Screen, or Linear Dodge (Add).

Now you will have to move around, reshape, and resize each photo to create something like a face, animal, building (ie something recognizable!). To do that, simply select your layer and push CTRL+T (CMD+T for macs) to enter Free-Transform mode. You'll now have the option to rotate, warp, move, scale, distort, and add perspective to the layer/selection. Right click on the selection to pick which function you want to use.

When you are all done putting all the layers together just the way you like them, click *Layers > Flatten Image*. This puts all the layers into one. Then go to *Image > Adjustments > Selective Color* and select *Blacks* from the dropdown menu and then move the *Black* slider up. This removes the background to make it completely black and clean looking -- which is important.

The image on the lower right was created by only using some of the lines from the green swirl long exposure image above it. When in free-Transform mode, the Warp function was primarily used to re-curve each duplicated line. This takes at least one hour to complete and you have to use the eraser tool to smooth out the ending of the lines so they blend smoothly together.



You can also create abstract patterns with this technique. In order to make things symmetric, simply duplicate the layer, change the blending mode to Lighten, flip the image horizontally and/or vertically and then overlap it with the original layer. The image on the right is a good example of this. Both of the images below were created with a bunch of different long exposure photos of fireworks.



Light Painting Perfect Circles (by [Dennis Calvert](#))

RGB strips are great because you can light paint perfectly parallel lines that are smooth and precise. This is great when you want to make perfect circles. Check out this tutorial by Dennis Calvert to learn how to do it!:

What you need:

1. The stand from a [utility light](#).
2. A paint roller.
3. Lights.



Step 1:

Tape your lights to the paint roller.



Step 2:

Stick your paint roller on top of the light stand

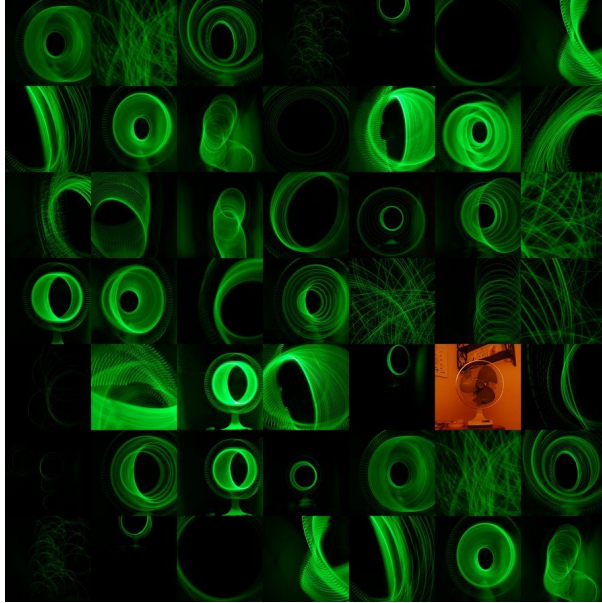


Step 3: Move the paint roller around in a circle.

Bam! You're done. Wasn't that easy?



You can also put a strip of LEDs or any light toy onto a *fan* to create a perfect circle!



Textures

Hold your camera about a half a meter away from a pile of Christmas tree lights and frantically swish the camera in different random directions while taking a 5-30 second exposure. You can use these textures to overlay on top of other photos.

Experiment using the smallest aperture you have available on your lens and the lowest ISO number. This ensures that you are only capturing the streaks of light coming from the Christmas lights and no other ambient lighting in the room.



This was made by using an omnidirectional Maglight circling around level with a CD. The CD had a bunch of waterdrops on it. The unique surrounding lighting source makes everything colorful.

[Video tutorial](#)

Well, I hope you enjoyed this part on Light Painting! The next section will be going over generic long exposure effects.

If you need any additional help or inspiration, there is a Flickr group called [Light Junkies](#) that has tutorials on light painting and is probably the best resource on the internet to find more information. You can talk to the people there, ask questions etc. There are links on the main page and on the discussion boards that are very helpful, including a bunch of Do-It-Yourself projects for making homemade lights.

Here are some other resources on this subject if you need any more help or inspiration:

[Light Junkies Flickr Group](#)
[#Light-Painters DeviantART Group](#)
[DIYPhotography.net Light Painting Section](#)

Here are some significant light painters on Flickr:

[{ tcb }](#)
[tdub303](#)
[Poole-shooter Cindi](#)
[Dennis Calvert](#) (and his [gear](#))
[TxPilot](#) (and his [gear](#))
[jedimind](#)
[DoctorTongs](#)
[lightmechanics](#)
[jannepaint](#)
[Crack Light District](#)
[Fiz-iks](#)
[CFYE](#)





Lightning

This example is obviously lightning. I find that a lot of people on Flickr use F8 at ISO 200. Using long exposures (like 5 minutes) is great because you can capture multiple strikes of lightning in one frame, right in your camera. However, because super long exposures introduce noise on the camera's sensor, you can help eliminate that by just taking a bunch of 30 second exposures one after the other, and then stacking the frames in Photoshop and using the Lighten, Screen, or Linear Dodge (Add) for the blending modes.



If the lightning you are photographing is striking in an unpredictable way and you don't know where it will hit next, simply zoom out to a wide angle. You can crop the photo later in Photoshop if you want a better composition.

Notice that this image has the beautiful water reflection underneath the lightning. This makes a great composition because the reflected light illuminates the environment almost twice as much.

2 sec / F5.6 / ISO 100



If you have a lens with focus markings on it, just set it to Infinite and you're ready to go! No more auto-focus hassle. This was a 7 minute long exposure.

Motion Blur

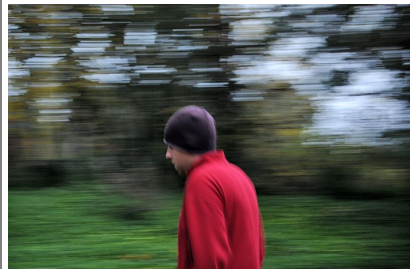
Motion blur effects occur when the shutter speed is between $1/50^{\text{th}}$ of a second to 1 second and something is moving in the frame when the exposure is taking place. Now, this may seem kind of obvious, especially after going over light painting, but motion blur is more useful during the day than at night and special light toys don't play as big of a role. Here are some examples of blur:



Subject is stationary.
Camera is stationary.
1/6 sec.



Subject is moving.
Camera is stationary.
1/6 sec.

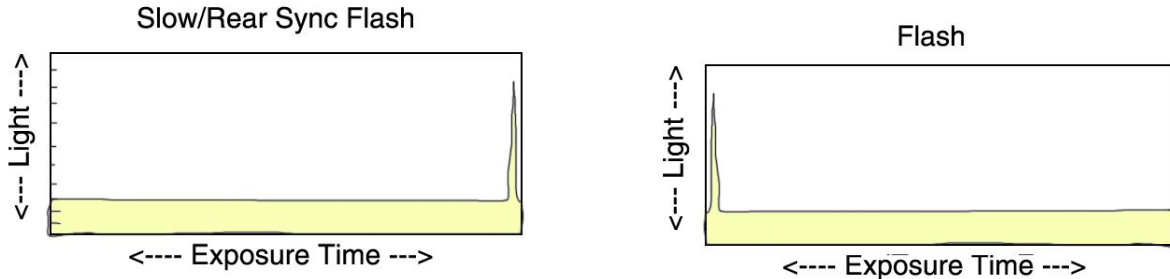


Subject is moving.
Camera is moving along
with the subject. 1/10 sec.





Now let's introduce some on-camera flash into motion blur. On-camera flash will allow us to freeze our subject but have the background motion blurred.

Cameras will sometimes give you the option to assign the flash to go off at the beginning or end of the exposure. In most cases it is best to have the on-camera flash fire near the *end* of the exposure. Check your instruction manual to see if your camera has this option; it is usually referred to as "rear sync" or "slow sync".



As you can see in the diagrams above there is a very narrow but very significant burst of light at the beginning of the exposure. This is the flash burst coming from your on-camera (or external) flash. The second diagram shows the same thing, except the flash burst is at the end of the exposure. Throughout the rest of the exposure, we can see that the light remains constant; this is the **constant light** that is shining on the environment (light coming from the sun, lamps, etc.).

 <p>Subject is moving. Camera is moving with subject. Flash fires at the end of exposure. F6.3 / 1/5 sec.</p> <p>Because of the shorter shutter speed, a significant amount of ambient light is eliminated.</p> <p>Why doesn't our model look blurry? Because the flash froze him at the end of the exposure, that's why! :)</p>	 <p>Subject is moving. Camera is stationary. Flash fires at beginning of exposure. F3.5 / 1/2 sec.</p> <p>Because of the longer shutter speed (and wider aperture), more of the ambient light is able to go through the lens and hit the camera's sensor for a longer period of time. This makes the environment more bright.</p> <p>Keep in mind that the wider aperture also makes the light coming from the flash appear brighter.</p>
--	--

Check out [13 great slow sync flash images](#) on Digital Photography School.

Using Filters to Increase Shutter-speed Duration

You can also create long exposures of landscapes during the day by using a tripod and an extremely dark filter that attaches to the front of your lens. The filters I recommend using are the [B+W filter](#), an [ND400 filter](#) (I'd really recommend this one), or even an [Infrared filter](#). Taking long exposures during the day is useful for blurring water, blurring clouds, and even removing moving subjects like people and cars from the scene. I'll show you examples of all of these methods below.

Long exposures are excellent for ocean waters splashing against rocks. The longer the exposure, the more misty the water will look.

Depending on how dark your filter is, you'll sometimes need to make sure to get the scene in focus before putting the filter on, and then switch it to manual focus. We have to do this because sometimes the camera can't see what is going on with the filter on.

Switch to shutter priority mode (or manual mode if you are comfortable with it) and make the exposure as long as you can get it without overexposing your image.

If you find that your images are coming out too bright, make sure you are using the lowest ISO number possible (something like ISO 200 or lower), and the largest F Number you can (something like F22).

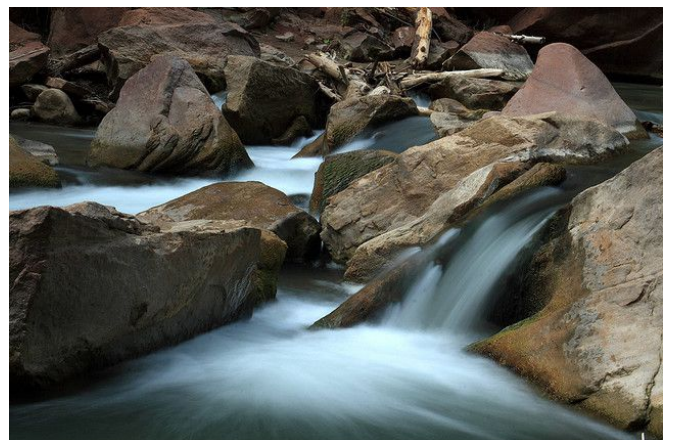
If you want to take exposures longer than 30 seconds, you will either need a cable release or a remote, depending on what camera you have. More explanation on 'going past 30 seconds' in a single exposure is covered in the Star Trails chapter.



Blurring Waterfalls and Beaches with Long Exposure

Long exposures of waterfalls create that 'soothingly smooth' effect that is very popular. To get the smooth water effect, you should have your shutter speed set to anywhere from 1/8th of a second to 30 seconds or longer.

Also keep in mind that pressing the shutter button causes camera shake, thus making your picture a little blurry. In order to eliminate this completely, I use an RF602 wireless remote for my camera. This way I can take a picture without touching the camera at all. "Mirror lock up mode" or "exposure delay mode" also helps reduce vibration. Just use your camera's self-timer if you don't have a wireless remote, cable release, or mirror lock up mode.



Waterfall Long Exposure Example Chart:



15 sec ,



5 sec ,



1sec ,



1/5 sec,



1/8 sec,



1/10,



1/30,



1/80,

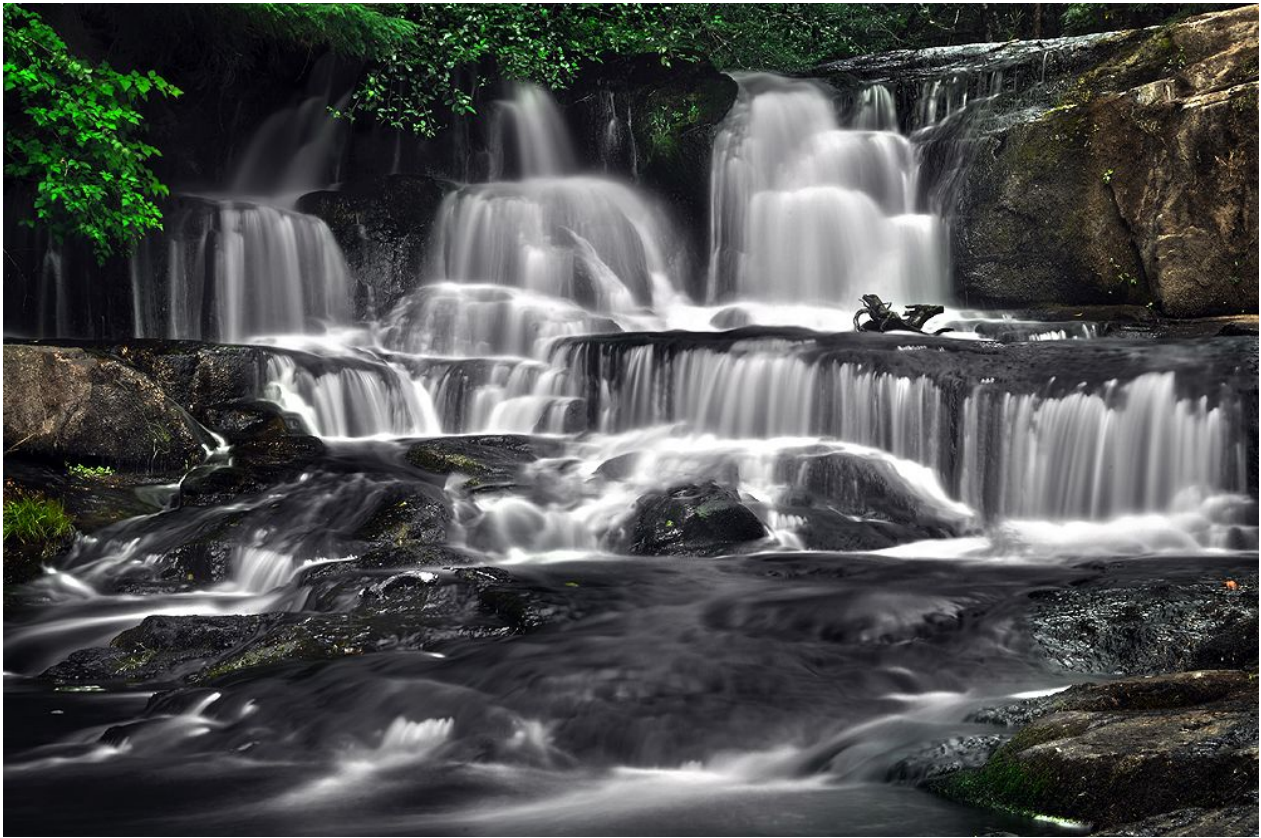


1/200,



1/1000

As you can see, the water becomes more defined when the shutter speed gets faster. I can literally see the form of the bubbles and splashes at 1/1000th of a second even though they are still a little blurry. The first six images have a green tint to them because I forgot to set the white balance to compensate for the ND8 filter I was using. The speed of flow also plays a roll on how smooth the water will look.



The photo above is another example of how long exposures of waterfalls create that smooth, soft glow to them. This was captured using an ND8 filter on my lens and is processed with a technique called HDR to enhance visible shadows, highlights, and color. I will talk about HDR later in this ebook.





30 Seconds / ISO 1600 / F4.2

If you don't want to deal with ND Filters, just shoot long exposures at night.

Shine a flashlight or laser onto your subject as a focusing aid.

Blurring Clouds with Long Exposure

Because clouds move over time, you can capture that movement through the use of long shutter speeds just like you can with water. The sky is usually much brighter than what you see on land, so you may have to wait until dawn or dusk to capture the cloud movement, depending on how dark your filter is. Sometimes there is heavy wind and the clouds move much faster than usual. This can really help you out if you want to capture the blurry cloud effect.



You can also try using a [graduated neutral density filter](#). ND Grad filters are tinted on the top half and clear on the bottom half. This makes up for the sky being too bright, evening out your exposure for both the foreground and the sky.



Blurring People

Remember how I said you can take long exposures to remove people from a composition? Well, I wasn't kidding. In this example the exposure was obviously shorter than 30 seconds. Think of the possibilities though... You could set up your camera in a high place aiming down at a crowd, -- a sea of people -- take a really long exposure and it would just be a big blur. [Alexy Titarenko](#) has excellent photographs using this same technique. Take a look at what he has done by clicking that link and looking at his gallery.



Long Exposure + Square Format

A technique that seems to go hand and hand with long exposures during the day is to make the image black and white and crop the image into a square. I've seen a lot of photographs taken in this style and find it fascinating. Folks at [fotoblur.com](#) seem to appreciate this style.



This is a long exposure of a crowd of people walking on a sidewalk with only one person standing still. 1.3 seconds / f6.3 / ISO 200

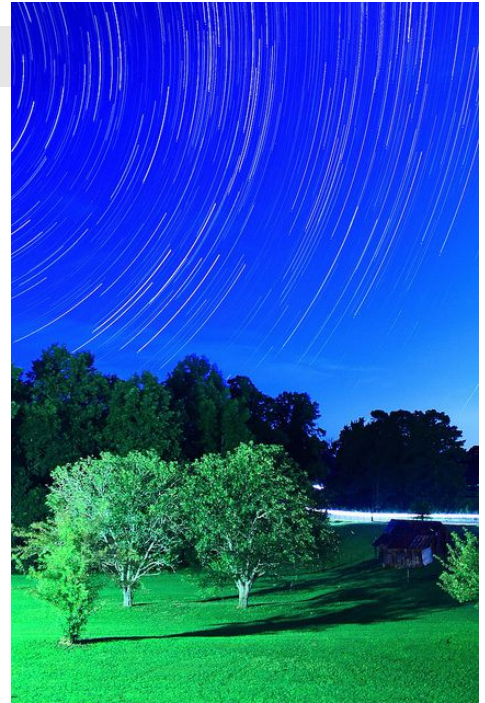
Star Trails

The Earth moves and spins around in space while the stars in space remain stationary. Because of this phenomenon, we can record this movement and make a star trail photo by taking a bunch of 30 second exposures one after the other and then combining them together on the computer.

In order to take star trail shots you need three essential things: A DSLR with a continuous-shooting mode, a tripod, and an external shutter release or rubber band.

Things to consider before capturing star trails:

- Having the camera battery 100% charged is ideal.
- Star trail shots in the city because the city light bounces off the atmosphere and causes the entire sky to glow. Ideally, we only want the stars to glow. It is ideal to take star trail photos on a cloudless and moonless night 90 minutes before/after sundown/sunrise.
- If you are shooting on a cold damp night you might notice fog buildup on the front of your lens. This can blur the image. In order to prevent your lens from fogging up, you can either use some [anti-fog cloths](#) on your lens before shooting, wrap some [hand warmers](#) around your lens with a rubber band or gaffer tape, or get a [miniature fan](#) to constantly blow wind onto your lens.
- Pointing your camera in different directions will give you different star trails. For example, if you are in the Northern Hemisphere and you point your camera to the North Pole, you will see circular trails as the stars rotate around Polaris (The North Star). Pointing your camera South will give you horizontal trails, and pointing it East or West with an extreme wide-angle lens will give you curved parabola-like trails across the sky. If you want to quickly and effortlessly find the North Star when shooting on location, check out the [Google Sky Map app for Android phones](#).
- Turn the noise reduction OFF in camera because it will take a long time for the camera's processor to remove the noise and it can't take a picture during that time. Plus, it drains battery life. If you take a 30 second exposure, your camera will then take another 30 seconds to remove the noise. Not cool.
- If you are using a 17mm lens, you will have to have your camera taking exposures for 4.5 hours to get a star trail that starts at one edge of the frame and ends at the other. If you are using a longer lens like a 480mm, it will take around 18 minutes to render an edge-to-edge star trail. 30mm lens would be about 48 minutes. I personally usually go as wide as I can when I'm doing star trails.



Camera Settings for Star Trails Photos

Before jumping in and taking the main sequence of star trail shots, I like to take a few RAW shots of the foreground, light painting the scene if possible. If I don't end up light painting the foreground, I'll just make sure that the exposure is well exposed by raising the ISO and widening the aperture in order to make it bright enough so that the sky isn't 100% black but instead has a glow to it.

After I have a few bright shots done, I'll re-adjust the camera settings to something like F2.8, ISO 400 (down from 800, 1600, or 3200), 30 Seconds. I start taking the main sequence of shots. These shots will come out dark, but if you zoom in on the preview screen and can see the tiny stars in the frame, you are good to go. Make sure your camera is tightly attached to a tripod for ALL shots so that everything will all align perfectly on the computer. I like shoot the main sequence as Large JPEG files instead of RAW to preserve space.

Focusing

Use auto-focus and place the focusing point on the brightest star in the sky. Focus on the star then turn auto-focus off and leave it off for the rest of the night. You are now free to recompose your shot.

If your camera is having a hard time focusing on a bright star, switch to manual focus and spin the focusing ring around to the infinite symbol or focus on a light that is located very far away in the distance.

Exposure Time and ISO

If you are taking a bunch of 30 second exposures and combining them on the computer, ignore this entire section. This section only applies if you were to take a single super-long exposure. The following formula, however, will tell you how to calculate the proper exposure for *any* super long exposure shot, not just star trails:

Let's calculate the exposure by taking a 30 second test-shot exposure with a really high ISO number and the same aperture we will be using for the actual non-test photo. Take one 30 second exposure at F4 and ISO 3200. If it looks properly exposed, all you need to do is put your ISO back to 100 and multiply the 30 seconds by 32. If you are using ISO 800, multiply it by 8.

The number you get after multiplying the shutter speed by the ISO will tell you what shutter speed is needed (in seconds) when shooting at ISO 100.

So, you took a test shot with a shutter speed of 10 seconds, ISO 3200, F4, and the picture looked well exposed on the back of the LCD preview screen, simply multiply 10 by 32. This will give you the new shutter speed (in seconds) needed to get the same well exposed picture at ISO 100, which would be 3200 seconds.

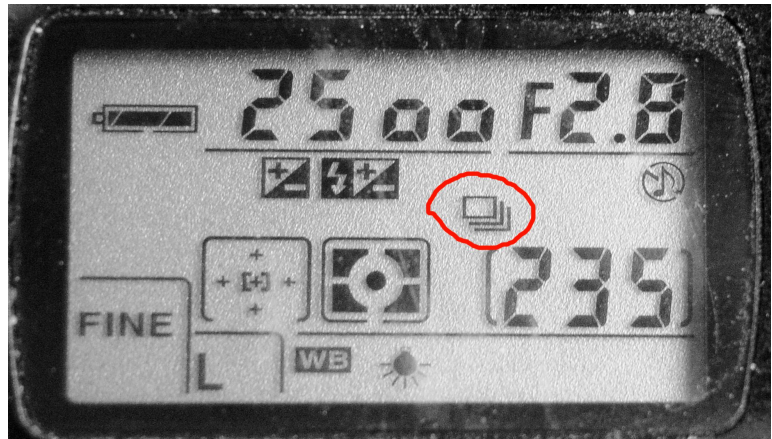
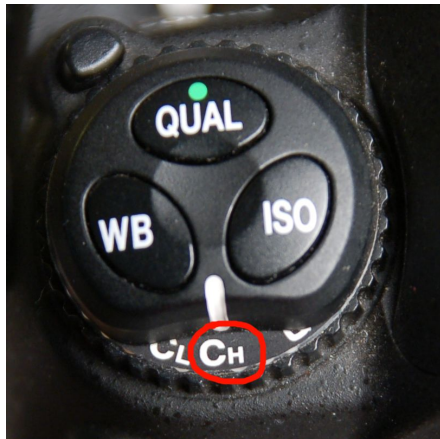
White Balance

Use anything other than Auto white balance. If you set the white balance to Tungsten, the sky will be rendered as blue. If you select Shade as the white balance, the sky will be rendered as more of a warm red orange color. Anything between the two will render the sky purple.

Taking the Exposure(s)

Remember how I said we were going to capture the motion over a really long period of time by taking a bunch of 30 second exposures and then combining them together on the computer? Here is how to do that:

First, **set the camera on Continuous-Shooting mode** (this is where you hold down the shutter button and the camera keeps taking exposures one after the other like an automatic machine gun). These are sometimes labeled with different names or symbols. Here's what they look like on a Nikon D300s and a Nikon D50:



Next, **put the camera into Manual Mode and set the shutter speed to 30 seconds**, and then **lock the shutter** in using a [remote shutter release cable](#). If your camera doesn't accept any remote shutter releases, you will have to wrap some rubber bands around the shutter button and wedge a small wad of paper or some other small object between the rubber band and the shutter button – I'm using an LED in the example below. Once you do this, the camera should be firing one 30 second exposure after the other. You can leave your camera be and walk away from it while it takes pictures all night long but beware that there could theoretically be animals about that could knock it over, or a thief who could steal it!



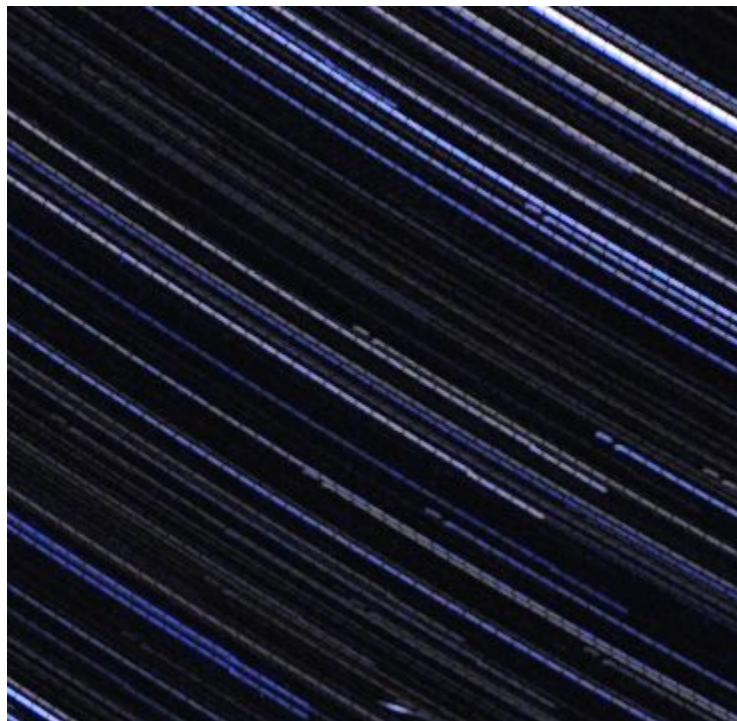
OR



This simple method of using a cable release or rubber band is superior against the old fashioned single exposure method because:

- Taking a bunch of 30 second exposures and then combining them later on the computer will result in less noise in your photograph compared to taking a single 20+ minute single exposure.
- You don't have to worry about the camera running out of battery power and ending up with no shot like you would if you were taking the entire star trail photo in one exposure.
- You don't have to worry about calculating the exposure value. This method gives you freedom to take a few shots of the foreground being light painted and exposed properly, then move on to taking the star trails sequence.
- You don't have to worry about something bright going across the frame and ruining your photo such as car headlights beaming directly into the camera lens. If this happens, just delete the frame.
- You can make animations of the star trails moving across the sky in post-production. Can't do this using a single exposure.
- You don't need to use an intervalometer (an intervalometer is used for taking shots at set timed intervals) that wouldn't do a good job of taking a star trails photo anyway. Some intervalometers require that the interval be set to 33 seconds instead of something like 31 or 30. This will produce a bunch of gaps in your star trail, rendering the trail more like a dotted line. Putting your camera on continuous-shooting mode and then using an external shutter release cable or rubber bands ensures that you are capturing each photo with the shortest delay time possible.

The only downside to taking multiple exposures is that there will be a bunch of tiny little gaps 1-2 pixels wide throughout your entire star trail due to the slight delay time between the exposures. Even though the gaps can only really be seen when you zoom in on the picture to 100%, there is a software program that can automatically fill in all the gaps for you - this will be discussed later.



Combining The Exposures

Here is how to combine all the exposures together on the computer:

Using Startrails.de Software

Download the Startrails.de program and run it. This works only on Windows, so if you are on a Mac, use the Adobe Photoshop method below.

Under 'File' you will see “open images” and “open darkframes”. A dark frame is a reference photo for Startrails.exe to reduce noise. The darkframe needs to be taken with the same shutter speed, aperture, ISO, and white balance as all of your regular images, except it has to be taken with the lens cap on your lens to make everything black. Ideally you should take one darkframe before and after the main star trail sequence (You should do it before and after because temperature affects noise intensity.) Loading a dark frame is optional. However, for now, just click “open images” and select your images.



Once you have loaded all of your images – and if you want, a dark frame – click *Build > Startrails*. It will then take a long time to process all of your images. Once it is done, just click *File > Save Image* and you are done!

Using Adobe Photoshop Software

You can also combine the photos in Photoshop by going to *File > Script > Load Files into Stack* and then loading your images up and clicking OK. Wait for all the images to be placed into the new Photoshop document, and then select the top layer and change the blending mode to “Lighten”. Now right click on that layer's text and select “Copy Layer Style”. Next, Select all the layers by initially having the top layer selected and then left clicking the bottom layer while holding the shift key. Right click on one of the selected layers and hit “Paste Layer Style”. You should now see your star trails. If you want to increase the general glow of the entire sky, make a few of the layer's blending modes to “Screen” (1-10 layers usually does the trick).

If you want to fill in the gaps of all the star trails or artificially make the trails longer, there is a \$35 program available called [Star Tracer](#) (the free version marks the image with watermark.)

Secret Star Trail Tricks

Here are some cool tricks you can implement in your star trail shots:

Fading Star Trails

Over a long time, while the camera is taking the exposure, you can rotate your focus ring out of focus so that the stars gradually fade out [\[example\]](#)

Star Trails with Illuminated Foregrounds

Remember that you can use flashlights, car lights, or a campfire to illuminate the foreground subject.



D3S_3788



D3S_3789



This image was compiled from several layers of photos. I took about five images of the tree being lit up in different ways by my flashlight, but only used two of them (as seen above). It's always good to have extras. I took some shots with the flashlight shining on the edges of the tree, some in the middle, some all around, some bright, some dark, etc. This gives me options later in post-processing. I can blend the exposures together and mix-and-match until it looks good.

After I got enough shots of the tree being lit up, I started the star trail sequence and took a little over 420 frames, each 30 seconds long from 9:30PM to 1:30AM at F3.5 using my 18-55mm lens set at 18m with an ISO of 200. Then I brought my fogged up camera inside and compiled the sequence in Startrails, put it in Photoshop to make it brighter, did some color adjustments and added the illuminated tree to the scene....

Note: I live in a rural area, so I didn't have to worry about light pollution. Plus, I have a deck out near the back of my house so I didn't have to worry about animals like deer knocking my camera over.

Dotted Star Trails

If you are taking a single long exposure, put something in front of the lens (like your hand) to block the light from coming in. Do this in regular intervals. Say, 10 seconds to expose the light like normal, and then 40 seconds with the object hanging over the lens to block all the light out. Keep repeating this and you should get dotted star trails.

If you are taking a bunch of 30 second exposures and combining them, then select every 10 frames or so when you import them into startrails.exe and you will get a result like this:



The photo above is an example of dotted star trails. Every 8th frame was selected and put into Startrails.exe. Here is a quick and easy way to select your frames: When you are in Startrails.exe and have just finished clicking *File > Open Images*, view your files as tiles/thumbnails/icons and resize the window until you see 5 column of icons. Simply select the first column of icons and you are set to go! You just successfully selected 1 out of every 5 frames in a couple of seconds.

Note: You could theoretically make every frame a different color so every dot would progressively shift hue.... this would probably take a long time and you would need to write a script or something for it to work. If any extremist out there does this, let me know!

What if you don't want the stars to streak at all, and want them to just be dots in the sky? In order to find the longest shutter speed you can take without getting motion blur on the stars, divide 500 by the [focal length in 35 mm terms](#). A 28 mm lens on a 1.6 [crop factor](#) camera yields: $500 / (1.6 * 28) = 11$ seconds.

$$500 / ((\text{Sensor crop factor}) * (\text{Lens focal length})) = \text{seconds}$$

So, if you were using a 28mm lens with a 1.5 crop sensor, the calculation would look like this:

$$500 / 1.5 * 28 = 11.9 \text{ seconds}$$





If you want a regular shot of the stars without them in motion, you will need to crank up the ISO to the ~3200 range, open up your aperture as much as possible, and set the shutter speed to as fast as possible (it will be several seconds) while still getting a decently lit exposure.

In this shot, the house and yard was illuminated by an external flash. I simply walked across the scene with the flash in my hand and fired it on the house, plants, etc, while walking. I walked all the way to the back of the house and put the flash on full power and pointed it straight up to illuminate the trees behind the house, firing it twice.

Other fun long exposures



A creative use for the ND filter would be to take a picture of a watch or clock. In this 4 minute long exposure you can see each second hand as it moves around the clock



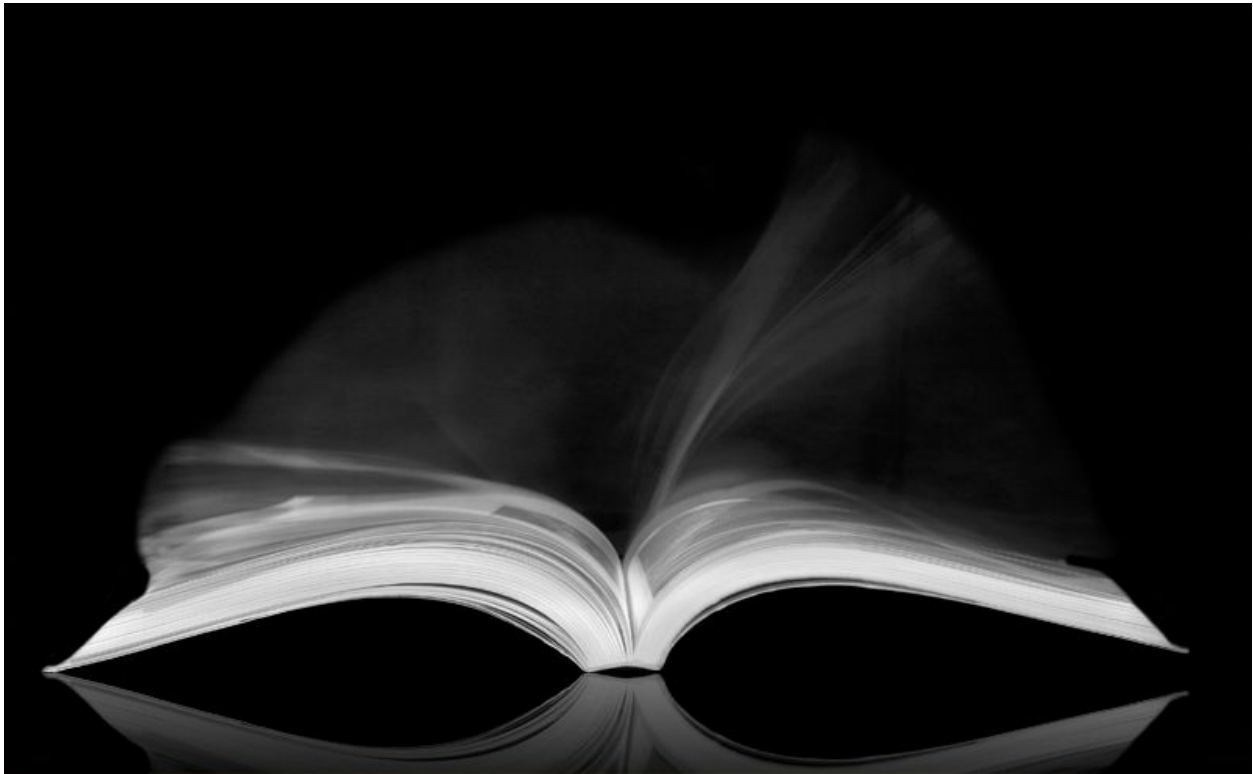
These eyes were constantly moving around and around while the camera took a 1.5 second exposure. No Adobe Photoshop software was used!



This was a one second exposure. The eye was left open during the first half of the exposure, and then shut during the second half. It works best to do this trick on a tripod, but you can get away with no tripod. Basically what you're seeing is the eye both open and closed at the same time.



These are long exposures of snow falling at night time. The snow was illuminated with a light (flashlights, LEDs, and houselights all work fine). 3 seconds.
I have created a video on this technique [here](#).



Here is another great long exposure idea. Take a book, light it up, and turn the pages during the exposure. Anything with subtle movement can be expressed with long exposures. In order to make the background black, use the Burn tool in Photoshop. The book can be lit up by a Maglight or LED (as discussed earlier).

To create the natural reflection, get a black board and a piece of glass surface to place on top of it.

You can get the reflection inside of Photoshop by duplicating the layer and then flipping it vertically by selecting the top layer, then by pushing CTRL+T, then right clicking and selecting Flip Vertically. Set the blending mode of the layer to Lighten and then simply drag the layer down to create a reflection. Then you can make it more realistic by dimming down the Opacity of the layer, and then by darkening the bottom half by using the burn tool, or by creating a gradient on a layer mask. If any of that confused you, watch [this video tutorial](#) on making reflections in Photoshop.

2 seconds / F10 / ISO 100



1/6 Second

These dancers were on a dark stage with stage lights shining constant light on them. As they were jumping up and down, I took a shot. The lagging shutter in combination with the jumping motion produces a dreamy effect where the models look like ghosts that are melting down into an abstract blur

Solargraphy

Solargraphy comes from the Spanish/Polish word Solarigrafia which was developed for the Solaris project during 2000-2002 launched by the photographers [Slawomir Decyk](#), [Pawel Kula](#) and [Diego Lopez Calvin](#). Since then, many things have changed... Other projects appeared, but we never could have imagined that it will be so spread around the world in such a short period of time. At the moment there are many people all around the world active and related to the main idea of what [Project Solaris](#) was, making great work, and leading it on his own way. So, from the other hand it seems like this project is not over yet. Thanks to people like [Tarja Trygg](#) from Finland and [Diego Lopez Calvin](#) from Spain, the idea is still alive. Take a look at the [Tarja worldwide Solargraphy map](#), it's really amazing.

The images you see on this page are Solargraphs. Solargraphy is the process of taking very long exposures (6-12 months) with home-made pinhole cameras to record the light of the sun. These exposures were taken by [Diego Lopez Calvin](#). If you would like to make your own solargraph, there is a written tutorial on how to do it [here](#).





Module 2

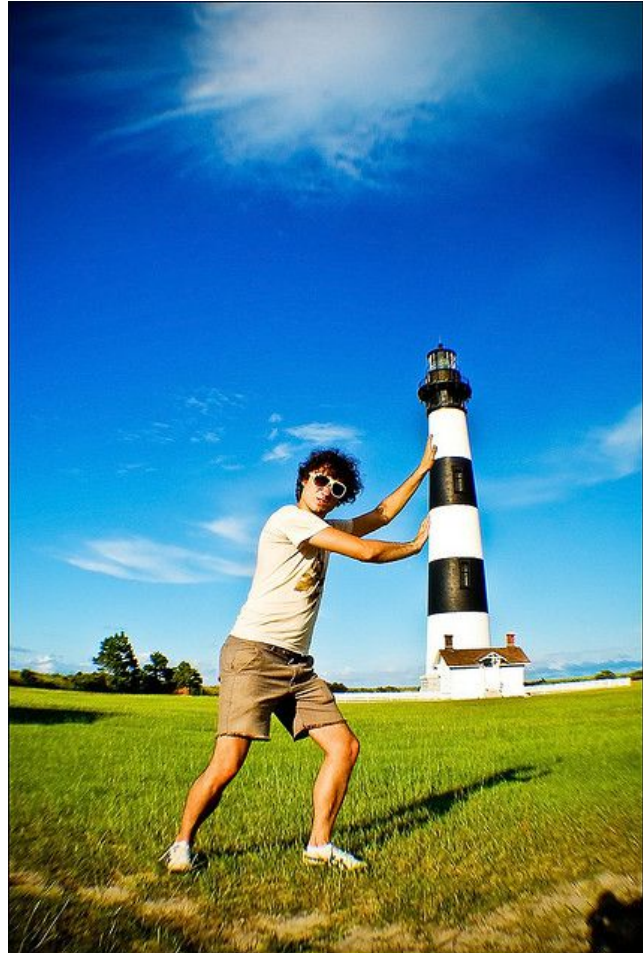
TRICK PHOTOGRAPHY AND SPECIAL EFFECTS



In-Camera Illusions

Forced Perspective

This trick -- as well as all the others in this section -- can be done right in-camera with no Adobe Photoshop software. For these shots, all you have to do is carefully align the camera in front of your model until they appear to be interacting with something behind them. More examples of these can be found [here](#), [here](#), and [here](#). If possible try to use the smallest aperture possible in order to increase depth of field so everything is in focus.





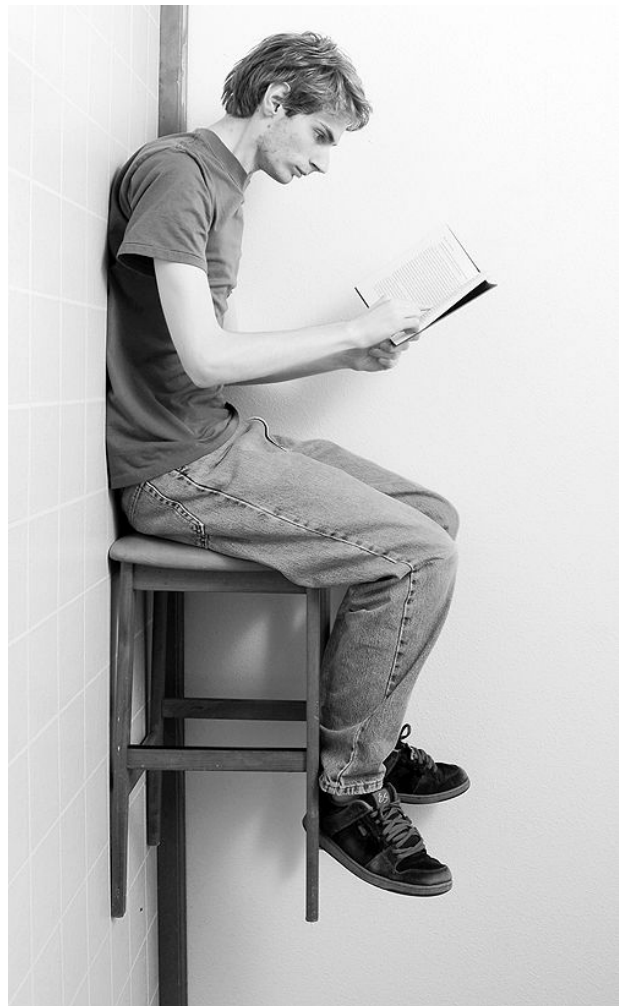
Rotated Perspective

I discovered this trick after reading [Photo Fun by Webster Watts](#). The photo on the right can be achieved by taking the photograph horizontally and by having a plain background. All you have to do is flip it 90 degrees on your computer and then it will look like you are climbing up a mountain.

It also would be ideal if the ground was flat with no grass, but this was the best area around my house. Doing it on top of a wall is even better because you can get down at a low angle which will eliminate trees and other distracting things in the background.

Another example of rotated perspective can be found [here](#),

If you have a big empty room you can put your camera somewhat low to the ground and rest on the ground and rotate the picture 90 degrees. It will look like you are falling or attached to the wall.





The camera was tilted 90 degrees clockwise while Darren here “sat” in a chair on the floor, balancing on his back. The wads of paper were attached to a fishing line hanging from the ceiling, and the bin was glued to the wall.

There is one thing that potentially tells the viewer if the perspective was rotated: gravity pulling the model's hair down to the floor. Even so, I like the effect it gives!



This photo uses Rotated Perspective to the point where the subject matter is pretty much unidentifiable but still intriguing.

The original photo can be seen to the right, it is just a cement stairway leading up to a bridge. Once it is cropped tight, it is hard to tell what is going on. To make it even more difficult I added a waterfall at the top end of the stair way in Photoshop, flipped the image vertically, and then made it black and white and added some illustrious HDR toning to it.

Subjects like this may seem few and far between, so always be on the look out.





As you can see the main image on the left is a combination of the two images on the right. The landscape was flipped vertically, and the cloud picture was actually shot *above* the clouds while riding in airplane above the Pacific Ocean. The cloud photo was also rotated horizontally in order to keep the directional shadows in each picture consistent with one another.

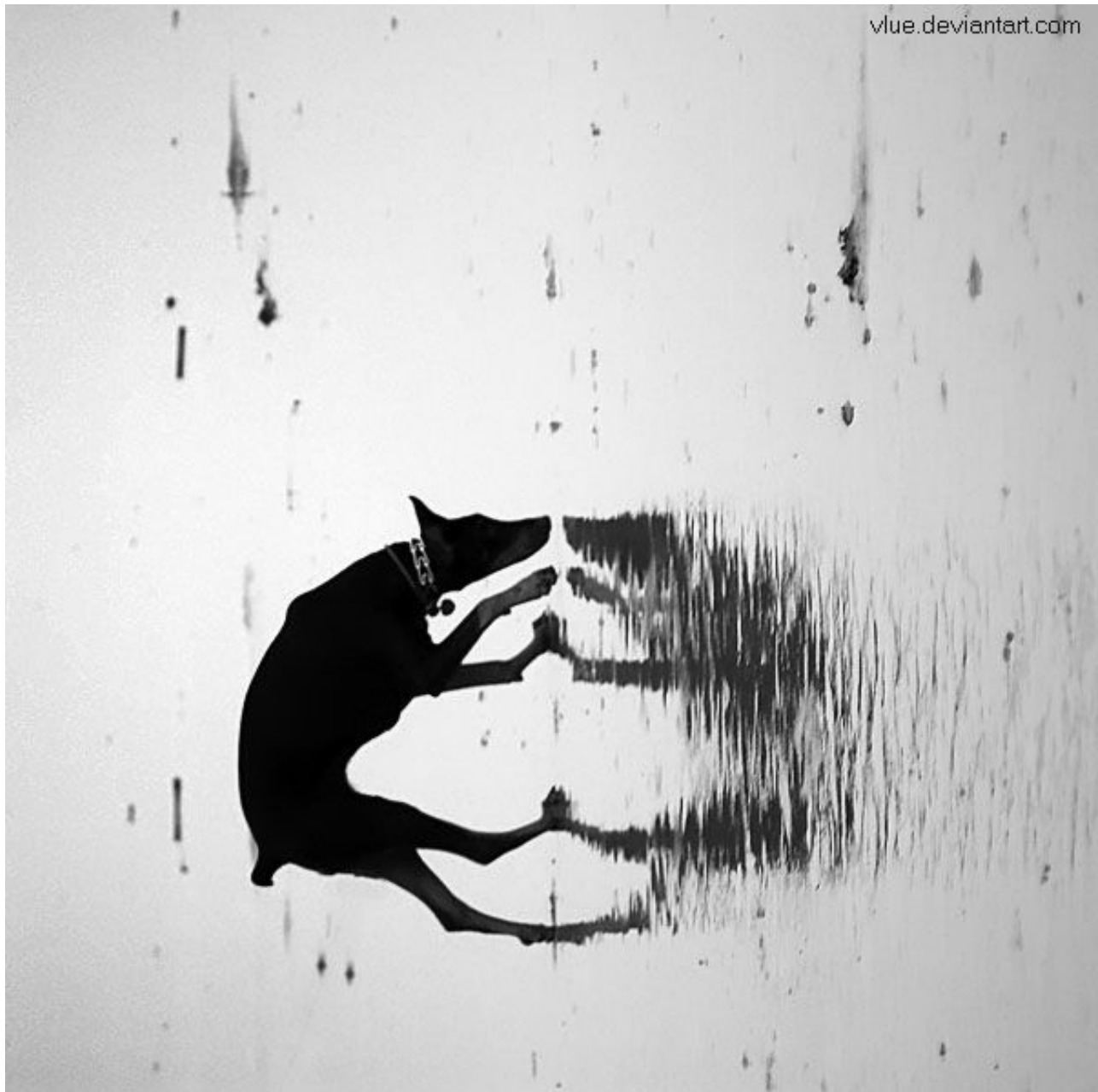
If you are ever riding in a plane, remember to take some shots of the clouds so you can superimpose them in other compositions.

[PORG](#), one of my favorite photographers on DeviantART, has many rotated perspective photos of people in fields, just like the one above.

Upside-Down Reflections

This is a classic trick that always comes out interesting. If you ever see a pond, lake, or puddle, turn your camera upside down and zoom in to get a close crop of the reflection. You will usually want the focus point to be on the *reflection* and not the actual water surface, but try experimenting with both. This produces a surreal effect.

Try experimenting by throwing a rock in the water to create ripples, or place different things on the water surface such as leaves and oil. If the water is on the street or on the sand and it isn't raining, the reflection will come out pretty solid; but if it is in a large pond or a river, the reflection usually comes out more distorted depending on how still the water surface is.







Shadow Heart

This kind of photo is really easy to produce. All you need is a circular object like a ring or a lens filter, a big hardcover book, and a light bulb shining above and behind the circular object. In this particular photo, the lens filter was balancing between the pages. It took a while to get it to stay put. No Photoshop software was used at all, other than making the image black and white and increasing the contrast. Use a clear light bulb (unfrosted) for a harsher shadow.



Unscrewed Light Bulb Trick

Take a light bulb (frosted white is best) and place a small flashlight or LED directly behind the bulb. It will appear to be turned on, even though it is not. The reason why this trick is so cool is because the light bulb isn't screwed into anything. What a bright idea!



Reflections in Animal Eyes

Turning your camera's flashbulb on and take a photo of an animal in the dark. The angle usually has to be just right for this effect to occur, but it is pretty spooky looking when you finally have got the shot!



Monitor Droste

This effect can be achieved by taking a picture of your desktop, making that picture your desktop wallpaper, and then taking another picture of your computer screen, and then make that picture your wallpaper, and so on. I put my hand in front of the monitor every time on the example to the right.



A very similar trick can be done by pointing your web cam at your computer screen. It will look like a never ending tunnel of monitors going into an infinite abyss. It also works when you plug your camcorder into the TV in live-view mode while pointing the camera at the TV screen.



Reaching into the Monitor

This trick is really fun to do and requires no Photoshop at all.

First, hide all the icons on your desktop and take a wide angle photo with your hand in front of the screen, making sure that the edges of the monitor and also whatever is behind it. Make that image your desktop wallpaper background. Then, place the icons back onto the desktop and open a small window and place it where your hand is on the screen. Lastly, take another photo of your monitor, but this time just zoom just enough so that the frame of the monitor is not seen. You could also take a screen-shot.



Transparent Screen

This trick can be done with and without Photoshop. Take a look at some [transparent screen groups on Flickr](#) and [this post](#) for more examples.

Without Photoshop

Aim your camera at whatever is behind your closed laptop screen, then take another photo with your laptop screen open with the previous image set as your desktop background. The most important part is zooming in at just the right spot. This can be done with a desktop monitor as well, but you might have to move it.



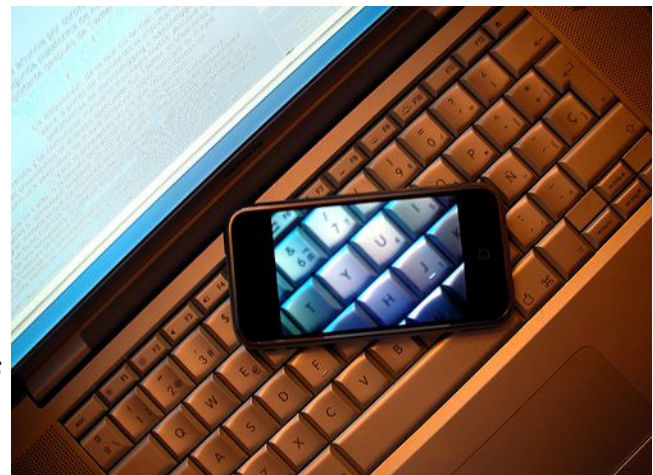
With Photoshop

Put your camera on a tripod and place it in front of your laptop. Take one picture of your laptop screen open and another picture of your laptop screen closed. Next, bring both of the photos into Adobe Photoshop and stack them on top of one another as layers. Have the photo of the laptop screen open be the top layer. Simply erase the inside of the screen and you will be able to see through it perfectly, with no mismatch at all.



You could also blur the image a little bit by selecting the inside of the screen, and blurring it by clicking Filter > Blur > Gaussian Blur.

Then give it some color change by first trying out *Image > Adjustments > Auto-Tone* or *Auto-Color*. Further experiment by messing around with *Image > Adjustments > Curves*.





Daddy Long Legs

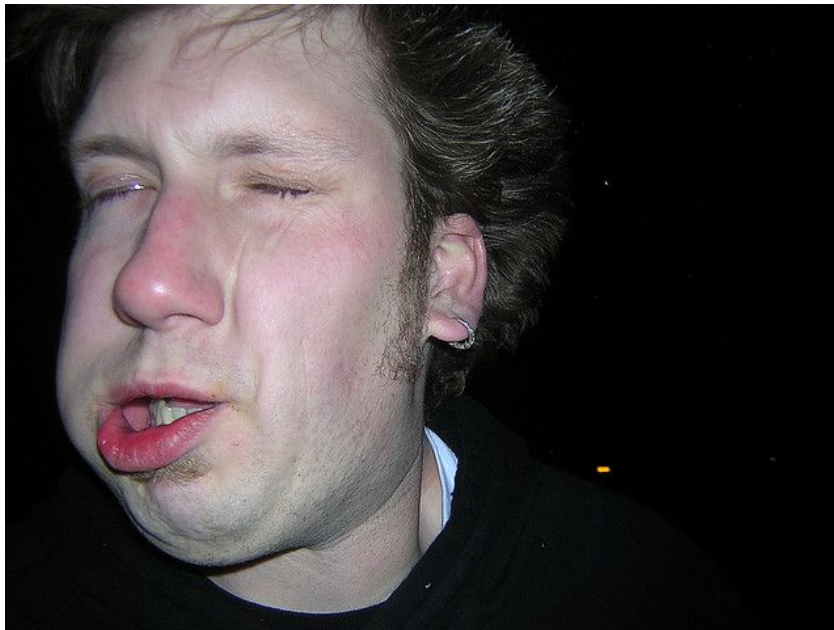
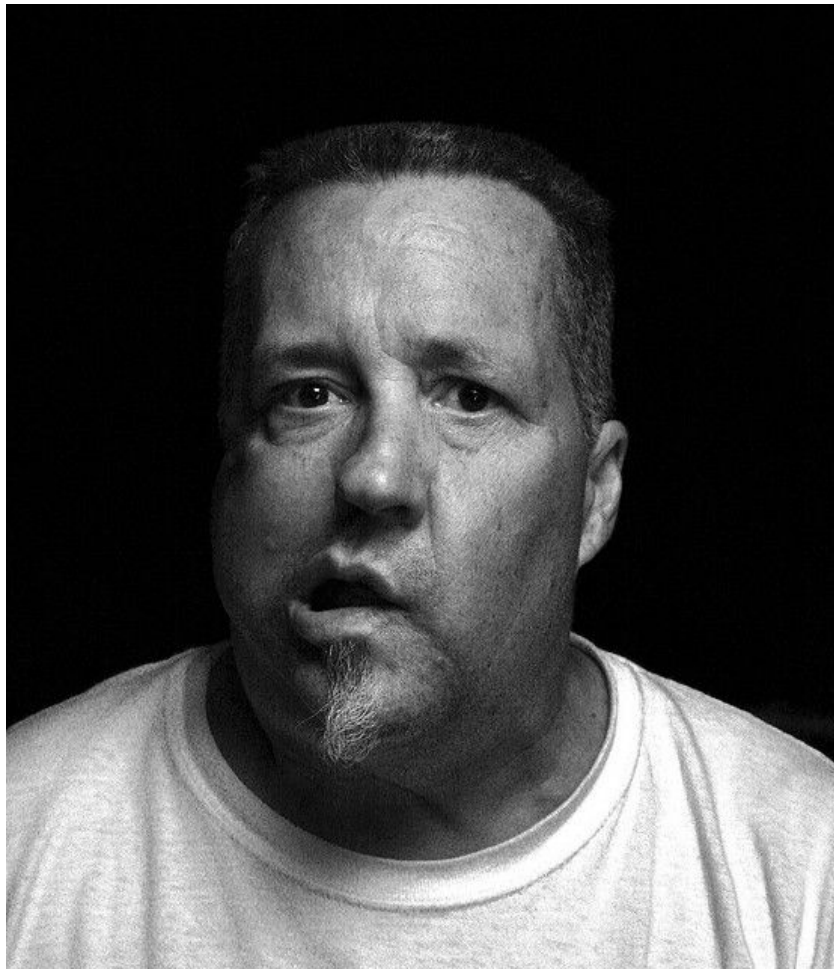


If you want a shot like this done all in-camera, all you have to do is have two models, one at the top of the slide with the legs entering into it, and one model backed up into the slide, with their legs sticking out.

However, I actually used Photoshop for the picture above. All I did was take two shots of myself in the two positions and then used a layer mask to reveal only the legs in the second photo. More about Layer Masks in the Photoshop chapter.

Jowlers

“[Jowling](#)” is a funny technique where you shake your head back and forth really fast while keeping your face muscles loose. Take the photo with your camera flash on to freeze the motion.



3D Stereoscopic Photography

3D Stereoscopic photography is a huge topic that takes a long time to master completely. Before reading this chapter, I would recommend reading the first half of this [introduction article to 3D photography](#) to get a foundational understanding of how it works. This chapter will go over the things needed to get started in successfully taking a stereoscopic image.

Taking The Initial Photos

How do you take an initial 3D image with your camera? For most normal subjects being photographed (things like objects and people 5-50 feet away from the camera), we actually need two separate pictures taken about 65mm (2.5 inches) apart from one another because our eyes are typically 65mm far apart from one another.

It's not always 65mm though; it will need to be separated more or less depending if you are photographing something really far away or really close up. A rule of thumb is to move the camera at least 1/30th of the distance to the nearest significant object in the photo.

Taking the two pictures when the cameras are further separated is useful for vast landscapes or cityscapes that are far away. Sometimes the camera distance will have to be several meters in order to render a nice 3D pair – this is called [hyperstereo](#). People take these pictures in airplanes and in tall buildings simply by flying across the scene or moving from room to room throughout the building to get good lens separation.

If you are photographing a close-up macro shot (a flower, for example), you will want the lens separation to be less (around a half inch or so) – this is called [hypostereo](#).

Using a Loreo 3D Lens Attachment

The simplest way to take a pair of images would be to get a [Loreo 3D lens attachment](#) for your DSLR. This is a simple attachment that has a prism inside of it that projects two images side-by-side onto the camera's sensor. The downside is the image quality isn't fantastic like it is when using fantastic lenses.

Using A 3D Digital Camera

Another simple way to take stereoscopic images is to use a [3D digital camera](#). Although this may have its limitations, most of the “set-up work” is pretty much done for you and is great for most normal applications.



Using One SLR Camera

Then you can use your DSLR with regular lenses, of course.

This method produces high quality images and works best when you are photographing stationary objects and environments. Photographing anything that is moving (people, animals, fluttering leaves, etc.) won't come out well because it takes too much time to move the camera and take a new picture.



In order to take a 3D pair using this method, you will need to follow these steps:

1. Put your camera into full manual mode with manual focus and manual white balance. Be sure that all settings are identical for each picture you take.
2. Take one picture, then move the camera to the left or to the right a few inches and take another picture.

With each picture you take, you can either have the two camera positions *aimed toward your main subject* so that each shot is taken at a slight converging angle; or have each camera positioned perfectly parallel to each other (this is what I do).

[More info parallel vs converged shooting.](#) Look [here](#) too.

You can take the two shots by hand or by using a tripod that has a horizontal rod feature as shown in the picture. Shooting it on a tripod or rod is more accurate because the camera remains level throughout the two camera positions.

Remember that for most subjects 6-40 feet away from the camera, it's generally a good idea to separate each shot by ~2.5 inches because this is the distance between each human eye.

3. Combine the pictures on the computer (discussed later).

Using Dual SLR Cameras

If you want to take a perfect stereoscopic image, the best way to do it is to use two identical cameras with two identical lenses.

You will have to mount each camera on a [stereoscopic bar](#), then mount the bar onto a tripod. If you want to take two vertical shots instead of horizontal (viewing two vertical pairs is easier), you will need a [bar like this](#).

Remember, the human eyes are roughly 2.5 inches apart from one another, so if you are photographing anything that is 6-40 feet from the camera, it is fine to have the lenses be around 2.5-3 inches apart.

We need to tell each camera to take the picture in sync with each other at the exact same time. There are basically three ways to do this:

- By hand (Least accurate, but it can work.)
- Using a wireless IR remote or a dual shutter release (Simple. Cheap. Accurate.)
- Using the [SLR Shepard](#) (Most accurate but also most expensive.)

[Additional information on camera synchronization.](#)



Post-Processing and Viewing

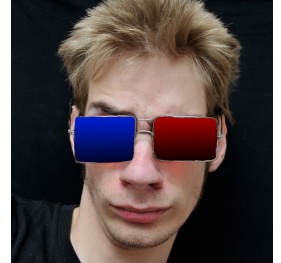
Now that you have two photos, you need to put them together and view them. There is a list of software programs [here](#) ready to be downloaded for a number of operating systems. The free one I use is for Windows and is called StereoPhoto Maker ([tutorial here](#) and [here](#)).

All the different software programs will work in different ways, but there are a number of universal standard ways to view your stereoscopic images:

Anaglyphs

The first way is called an anaglyph - this type of projection is where two images are displayed on top of each other, each image being colored red and cyan. It is then viewed by putting on classic red and cyan [3D glasses](#).

The red image is then seen by the left eye, and the cyan image by the right eye. The brain interprets this information, enabling you to see it in 3D. Anaglyphs work best when you don't want any fantastic color in your image, because viewing the image through 3D glasses will change the color to a mix that primarily consists of red and cyan.



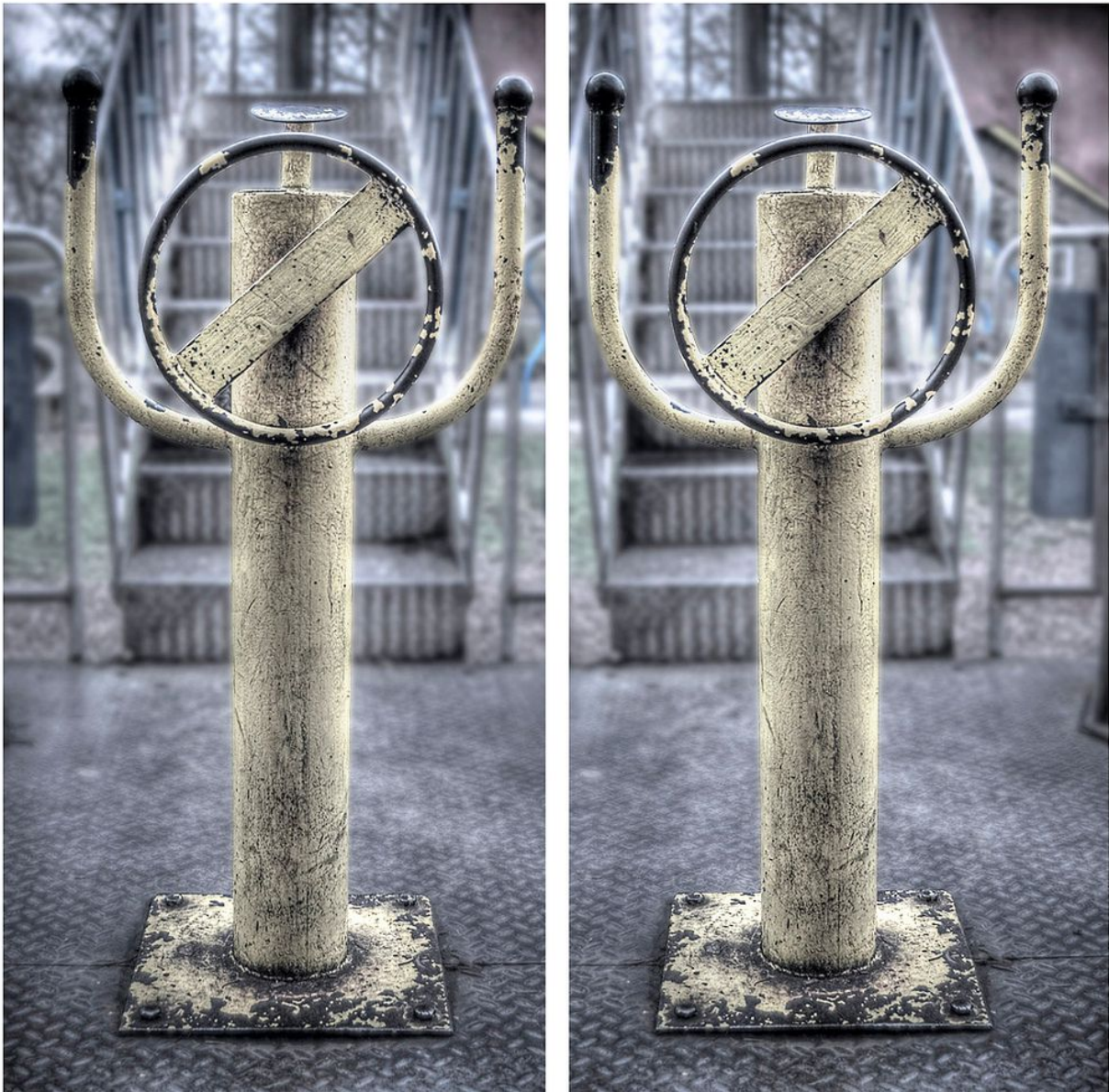
[View more anaglyphs](#)

Cross-View

This is where you display two images directly horizontally side-by-side and then view it cross-eyed. I personally prefer this method because it is really easy to cross my eyes, lock the image up, and enjoy viewing it flawlessly in full color.

The right image should be displayed on the left, and the left image should be displayed on the right. If you don't re-order the images when you are creating your pair, everything will look inverted and wacky.

This method is not for everyone because not everyone can cross their eyes effectively.



[View more cross-view pairs](#)

Parallel-View

Try this method if you can't get the cross-view to work. Instead of crossing your eyes, force your eyes to focus further away out into the distance as far as you can, then lift the 3D image pair in front of your face, keeping your eyes focused into the distance, moving the image closer and further away from your eyes until they lock up. I find this method very challenging but some people find it easier than the cross-view method.



[View more parallel-view pairs](#)

Wiggle-Stereo

You can also [create wiggle animated GIFs](#) where the animation rapidly displays the two images back and forth over and over again. I find this method pretty cool and artistic. You don't need glasses and you don't need to refocus your eyes. You can view wiggle-stereo animations on [this website](#), and of course [this website](#).

Time-Slice Effect

There is another variation to wiggle-stereo animations where, instead of taking just two pictures, you take dozens if not hundreds of pictures with hundreds of cameras at the exact same moment in time with each camera carefully positioned around a subject (moving subjects are the best). [Here is a video that explains the crazy technique](#), and here is an amazing [example of dolphins jumping out of the ocean and being froze in mid air](#).

While we are going a little off subject here, another really cool thing you can do with animated GIFs and photography is to create [cinemagraphs](#).

Additional 3D Links:

- [Guidelines and Rules of Stereoscopic Photography](#)
- [10 Rules For Good Stereo](#)
- [Stereoscopy.com](#) and [3DStereo.com](#) are probably the largest websites on 3D photography, complete with information and products.
- [Autostereogram](#) Wikipedia article
- [Stereogram](#) Wikipedia article
- [Huge list of 3D photography topics](#)
- [3D Gogle](#) is a program that lets you convert a 2D image into a 3D image by manually “painting” in the depth map onto an image.



High-Speed Photography

It would be nice to take super high-speed photos with only a camera, but because normal camera shutters take pictures with a slight delay, we need to freeze the motion using an external flash or digital strobe instead. We do this by putting our camera into BULB mode or by taking a long exposure of the subject after cutting off all ambient light so it doesn't show up in the final picture, and then fire an external flash unit or digital strobe at just the right moment.

You will need three things in order to take a high-speed photograph: A **DSLR**, an **external flash unit or “speedlight”**, and a **controller with a sensor** that triggers the external flash or strobe to fire at the right split second. The sensor could be a microphone, so that whenever you hear a balloon pop, a wine glass shatter, or a bullet fire, the flash will go off; or it could perhaps be a laser, so that whenever an object passes through the laser and breaks the beam of light, the flash will be fired.

The Camera

Remember that we will be in a dark room with the camera taking a long exposure with the flash being triggered sometime during that exposure. Because the flash is freezing the motion, this gives us the option to use any type of camera we so desire! Film, Point-and-shoot, DSLR, you name it. The only criteria is that the shutter speed needs to be set to several seconds in length (~2-10).

The Controller

The controller that I use and recommend is called [The Time Machine](#). The Time Machine is an excellent versatile tool for not only triggering a flash for high-speed photography, but also for programming complex time-lapses, time-displacement streak photography, high-speed waterdrop collisions (a “Drip Kit” for The Time Machine is available separately), measuring the duration of a flash in millionths of a second, and many other things. The maker of the device provides an array of sensors available for The Time Machine as well.



The Time Machine is a great device to add to your photographic equipment collection. Even if you don't use all the features it has today, chances are you will want them in the future. This machine will be using its maximum potential when used with a DSLR, but normal high-speed photography can be done with it even with a point-and-shoot.

There is also another less expensive controller on the market called the [Universal Timer](#). It's focus is just high-speed photography, not time-lapses or any of the other features that come with The Time Machine. Another one available is the [Cognisys StopShot](#), which, like The Time Machine, has a drip kit available.

Then there is the Do-It-Yourself route. If you are familiar with electronics, there are [many tutorials on the internet](#) and on YouTube that provide DIY instructions on how to make your own flash trigger, including ones for the Arduino. This is the cheapest solution, but also the most time-consuming.

Delays

Whether you are using The Time Machine, the Universal Timer, or you're making your own trigger from a circuit board, the basic principle of high-speed photography remains the same: to trigger the flash at just the right moment.

In order to obtain this goal, you can adjust the controller so that it triggers the speedlight *immediately* when, for example, it hears a balloon pop; or *delay* it by a few milliseconds in order to capture the perfect moment.

With high-speed photography, every subject you photograph will call for different delays; You will have to work off of trial and error, repeating the process over and over again with different delay times until you get a good shot.

The External Flash Unit(s)

External flash units have a shorter flash duration compared to big studio strobes, so I recommend using these. In general, the lowering the power output of the external flash unit will make the the flash duration faster; try to use anything below 1/8 power.

Nikon calls their flashes Speedlights (SB-600, SB,-700, SB-800, etc.), and Canon calls them Speedlites (580EX, 430EX, etc.).



You can also use more than one flash unit to illuminate your subject if you so desire. The most surefire way to sync 2 or more flashes so all of them flash at the exact same time would be to use PC-Sync cables coming from the Time Machine into the flashes. This also ensures that the signal is going to the flash as fast as possible.

The second best way would be to use the secondary flash as a slave.

The third way.... I've tested triggering two flashes with the RF-602 *wireless* triggering system, but depending on what you are shooting, each flash is just a little bit off and causes a double image... Using the RF-602's are not recommended in this situation. PocketWizards haven't been tested. PC-Sync cables are the fastest method possible.

Microflash Systems

If you want to take *extreme* high-speed photographs, where you can *freeze bullets in mid-air* and have them be *sharp*, you will need the [SPOT Flash made by Prism Science Works](#). These are expensive but the flash duration lasts only a microsecond, so your photos will be extremely sharp and contain very little -- if any -- motion blur.

Normal flashes have a flash duration of roughly a millisecond, which is 1/1,000 of a second. Microflashes have a flash duration of a microsecond, which is 1/1,000,000 of a second. Pretty fast stuff.

Because the SPOT flash costs a few thousand dollars to buy (or a few hundred dollars for a monthly rental) and the average person won't be using such a specialty item, let's just talk about the regular flashes for now!



Canon 580EX II Flash @ 1/128 power, ISO 200, F10.

Notice how the bullet is a little blurry.

Motion blur is unavoidable when using regular flashes, even at 1/128 power.

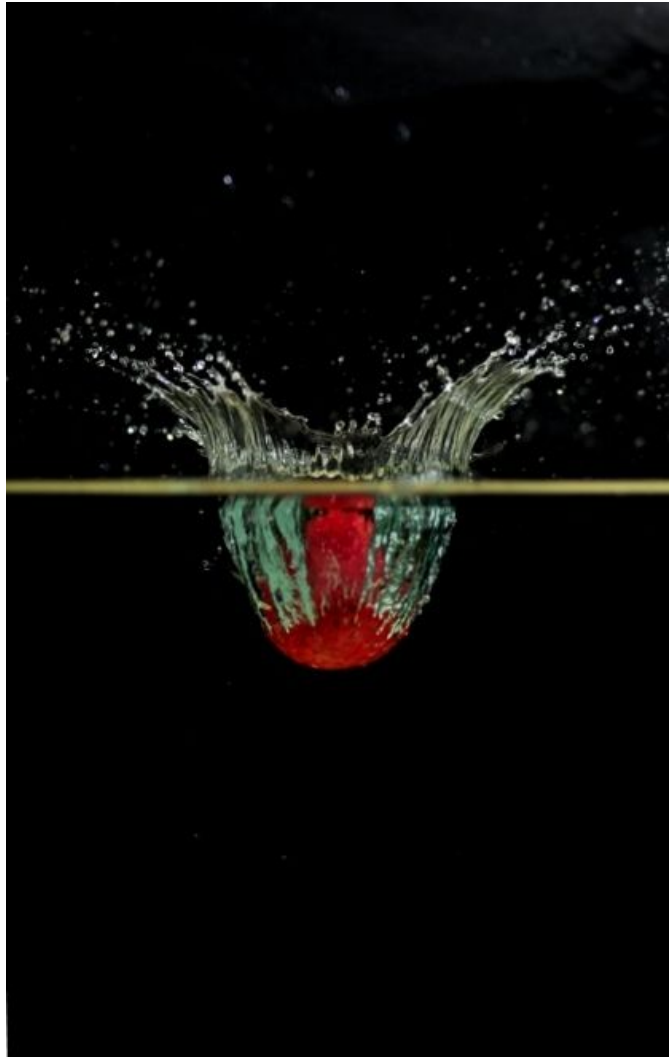


For this shot, I put flour inside of a bottle and then placed the balloon over the bottle opening and tipped the bottle upside down to let gravity push the flour inside the balloon, then gave the bottle a little squeeze to blow any remaining flour into the balloon. After that, I put the balloon over a water faucet and put a little bit of water inside of it (in order to make the flour stick). Finally, I put the balloon against my good ol' mouth and blew into it, tied the ending off, shook it up, then stabbed it.

I may be wrong, but if I remember correctly, the delay was 0.02 milliseconds. This was taken with one flash at a 45 degree angle from the camera. And of course, for all high-speed photos, the camera was on a tripod in full manual mode, including manual focus.

If you get flour, corn starch, sugar, water, paint, saw dust, etc. stuck to the inside edges of the balloon and then pop it, remember that the stuff will splatter everywhere. Do this outside and away from your house.

Try experimenting with different substances stuck to the outside of the balloon and inside the balloon at the same time for extra fun. Also experiment with filling the balloon up with thick smoke! Or even better, colored smoke! Or even better, colored smoke mixed with sawdust or something else!



Water has been a popular subject for high-speed photography, as well as popping cornstarch or water-filled balloons , shattering glass or plastic, and blowing up food and other items .





No high-speed triggering system (ie. Time Machine) was needed to capture this shot of my fist punching water in a half-filled fish tank because the splash of the water just isn't fast enough to really need it. All I used was three external flash units with the RF-602 wireless flash trigger to sync them (one aimed at the background, one aimed directly to the left side of the hand at a 90 degree angle, and one aimed to the right of the hand at a 45 degree angle). None of the flashes were on full power, because remember, the more power output you have on a flash, the longer the flash duration will be, and that, in turn, would promote motion blur.

You can use The Time Machine to take fish tank shots if you *want to*, but I find that doing anything involving a fish tank usually doesn't require The Time Machine. As soon as my hand punched the water, I pushed the button on the camera to take the picture.

Remember to use a tripod and use Manual Mode on your camera. Manual exposure, manual white balance, and manual focus settings.

You can see the set-up used for this shot by watching my [youtube video](#). If you want to give the water a green/aqua blue color, just use some green or blue food coloring and mix it in. It doesn't take that much; probably five drops maximum.



Here is another shot using a black background instead of a white one.

The flashes were in the same position, except I killed the one that was previously flashing on the white board because I wanted the background as black as possible.

Photoshop was used to burn the background pitch black and to remove waterdrops that splashed onto the glass. Use a Squeegee if you want to remove the waterdrops on the glass.





This photo was taken with The Time Machine and The Drip Kit. The Drip Kit allows you to accurately shoot 1 or more water drops from a sprout and then trigger the flash at just the right moment with very precise timing, again and again, without working off trial and error like you would be traditionally using a bottle or bag with a hole in it to create drips. The Time Machine allows you to adjust how many drops you want to shoot, what size you want them to be, the interval time, and the flash delay. This photograph is a collision of two water drops.

Milk was filled all the way up to the top of the wine glass before shooting, and the liquid that was in the Drip Kit container was water with red food coloring. The milk appears to be pink at the top because I shot a bunch of different pictures before the one that is presented above.

There was one flash behind a shoot-through umbrella located to the right of the image with a small white cardboard reflector located to the left of the image. The reflection of the cardboard reflector showed up as a reflection in the wine glass, so I removed it in Photoshop by making a selection of the wine glass, and then using the Mixer Brush Tool to blend/blur it into the milk.

Bubbles



We can photograph interesting colors of bubbles by putting a straw into a container of bubble solution and blowing into it, or by having the bubble mix in a flat film form, contained in a rectangular shape.

In either situation, you will need a container filled with bubble mix. The container I am using is about 5"x7"x4" and is filled with 80% regular bubble mix (you can buy this at any store), and 20% [glycerin](#) you can get at a pharmacy or online.

If you want to photograph round "bubble planets" like the one above, simply mix and stir the bubble solution around and then blow air into the mix using a straw while slowly pulling it away until you see that a good sized bubble is formed. I find that keeping the blow constant works well, even while pulling it outside of the bubble.

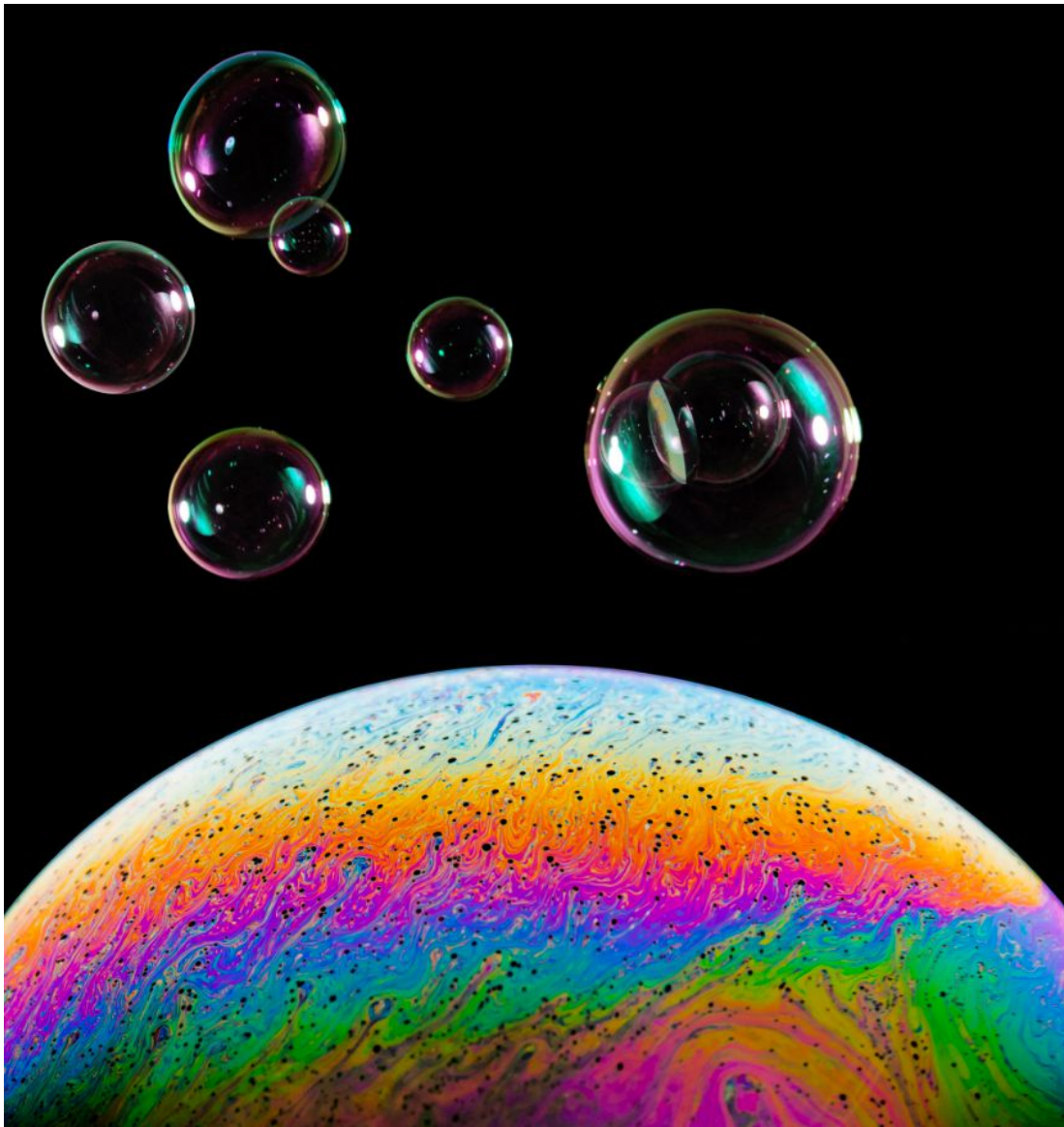
At first you will notice that the surface of the bubble is clear with no color. Wait around 30 seconds to 2 minutes until the bubble starts to deteriorate and you will soon start seeing vibrant colors.

You are going to need a softbox, or at the very least a very bright and large DIY diffused constant lighting solution (a lamp with a white cloth works fairly well; just make sure you are using a bright enough bulb; mine was 500 watts) Place the softbox as close as you can to the bubble; mine was 1-5 inches directly above the bubble, which is ideal. If you can't have your light above the bubble, then you might have to have it more to the side, which works fairly well, but it isn't ideal.

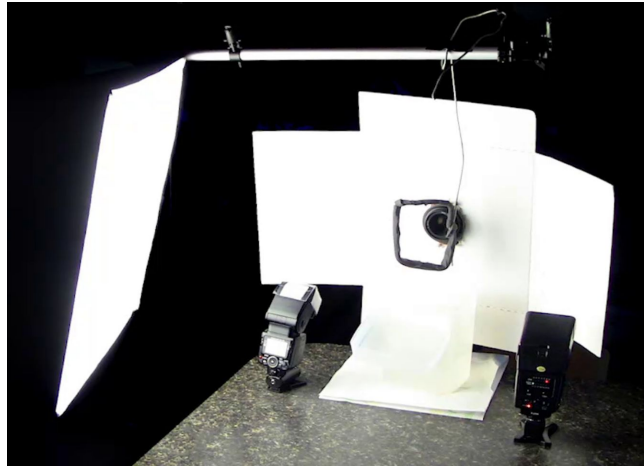
A black background is ideal. I use a simple black blankie.

Next you will need to get a closeup shot of the bubble, this is the trickiest part. You can hand-hold your camera, but I recommend using a tripod. Use whatever tool you can get your hands on in order to focus as close to the bubble as possible... [Macro lenses](#), [magnification filters](#), [extension tubes](#), and [lens reverser adapter rings](#) are all available options. Using a macro lens will give you the best image quality, but all I have are extension tubes and lens reversers, so I used that.

You might find yourself needing to open the aperture or raise the ISO. You can adjust camera settings as necessary, but be sure to keep the shutter speed fairly fast to ensure you don't get any motion blur. I wouldn't go any slower than 1/60th of a second.



The little bubbles above the large one was a separate photograph and was added in later in Adobe Photoshop. If you want detailed instructions on how to photograph normal bubbles, [there is a video available from Learn My Shot](#).



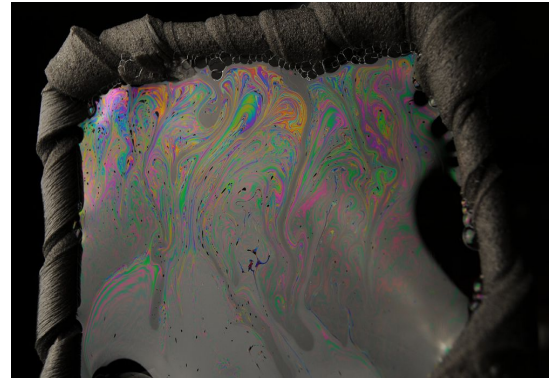
You can also photograph colorful bubble mix when it is a **flat film**. You will have to photograph it at a slight angle due to the angle of light and the reflection of your camera showing up on the surface of the film. If you want your depth of field to be sharp across the entire frame, use a tilt-shift lens. I'm not using a tilt-shift lens because they are very expensive and only are useful in rare situations, so only about 80% of the frame in all my shots are in focus.

Take some thick aluminum wire, bend it into a rectangle shape, and attach it to something like an overhead pole (I used a [light stand](#) with an attached [reflector holder](#) extending outward).

Wrap some type of cloth or foam rubber around the aluminum wire for the bubble mix to soak into. I used [sponge rubber tape](#), also known as weather stripping or rubber foam. I sliced off the non-stick surface of the sponge with scissors because it acts as a “cellular wall”, making liquids difficult to travel past it.

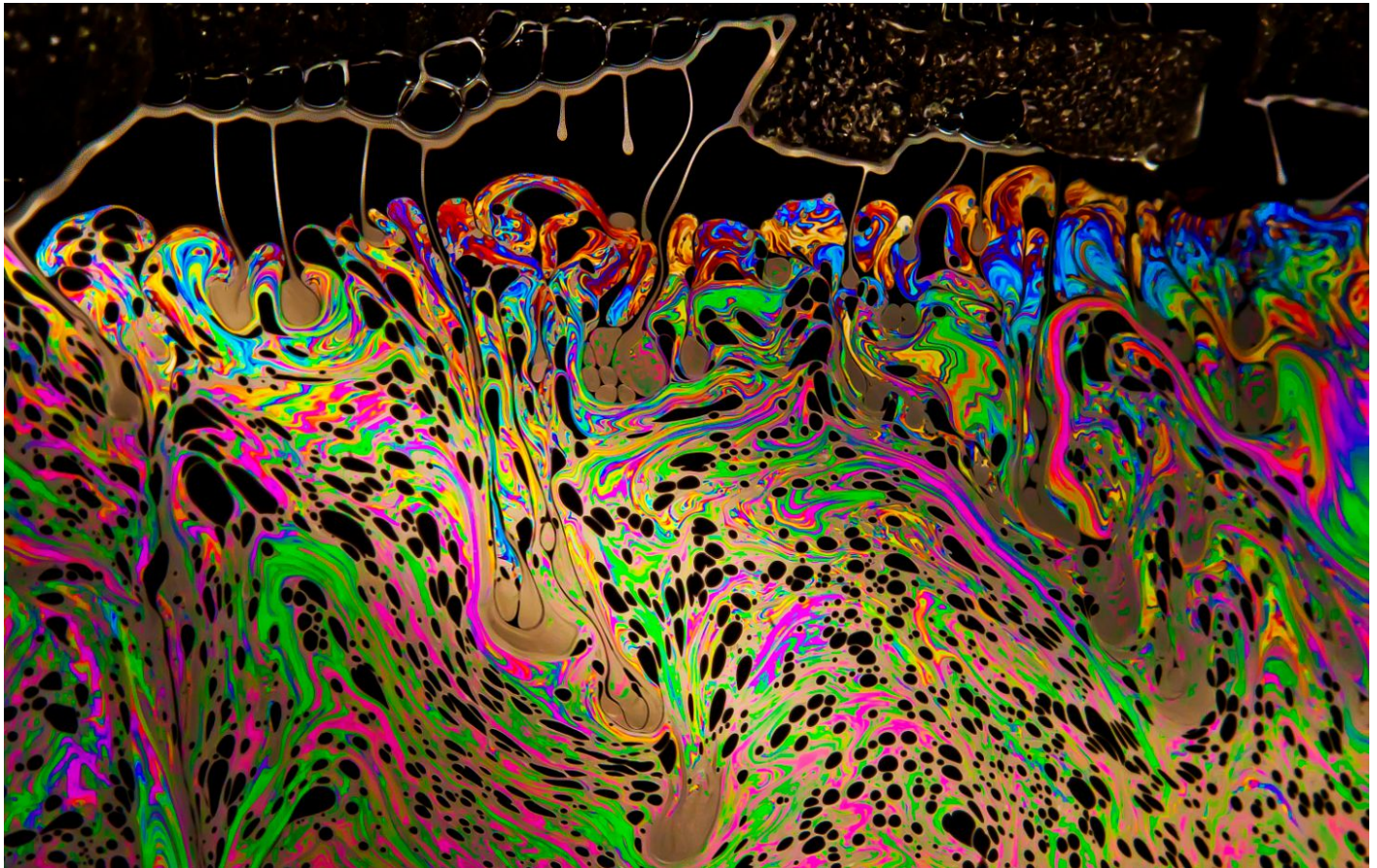
In order to illuminate the bubble film for *focusing* purposes, use soft box or lamp aimed at the bubble film. In order to illuminate the bubble film for the actual *photograph*, bounce the light coming from two external flashes off a white surface.

The white surface I am using is an [LP mailer](#) with a hole cut in the middle that fits snugly around the camera lens. Using one flash will work okay, but using two flashes is perfect because it gives out more light and also has a greater change of illuminating the entire film.

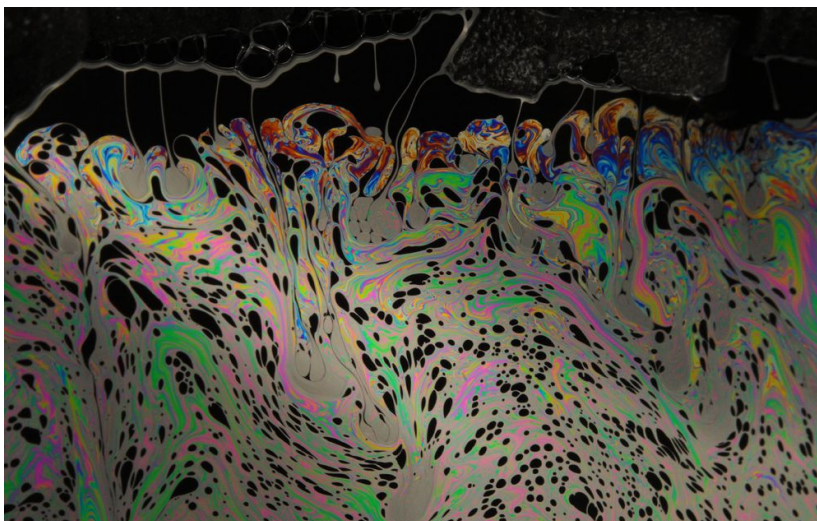


Both of my flashes are on full power (or at least half power) and are being wireless triggered using the [RF-602](#), this allows me to use the ideal ISO100 and F8-F11 combination, with a 1/160 shutter speed. One flash is being triggered wirelessly using an RF-602, the other flash is being used as a slave.

And of course, use a tripod :)



If you take the photos in RAW mode, you can bump up the Vibrance and Saturation which will help make the image more colorful. The big RAW photo above was enhanced using Adobe Camera RAW inside of Photoshop using the parameters seen to the right of this text. The small photo below is the original.



White Balance: Custom

Temperature 3250

Tint +2

Auto Default

Exposure 0.00

Recovery 10

Fill Light 100

Blacks 25

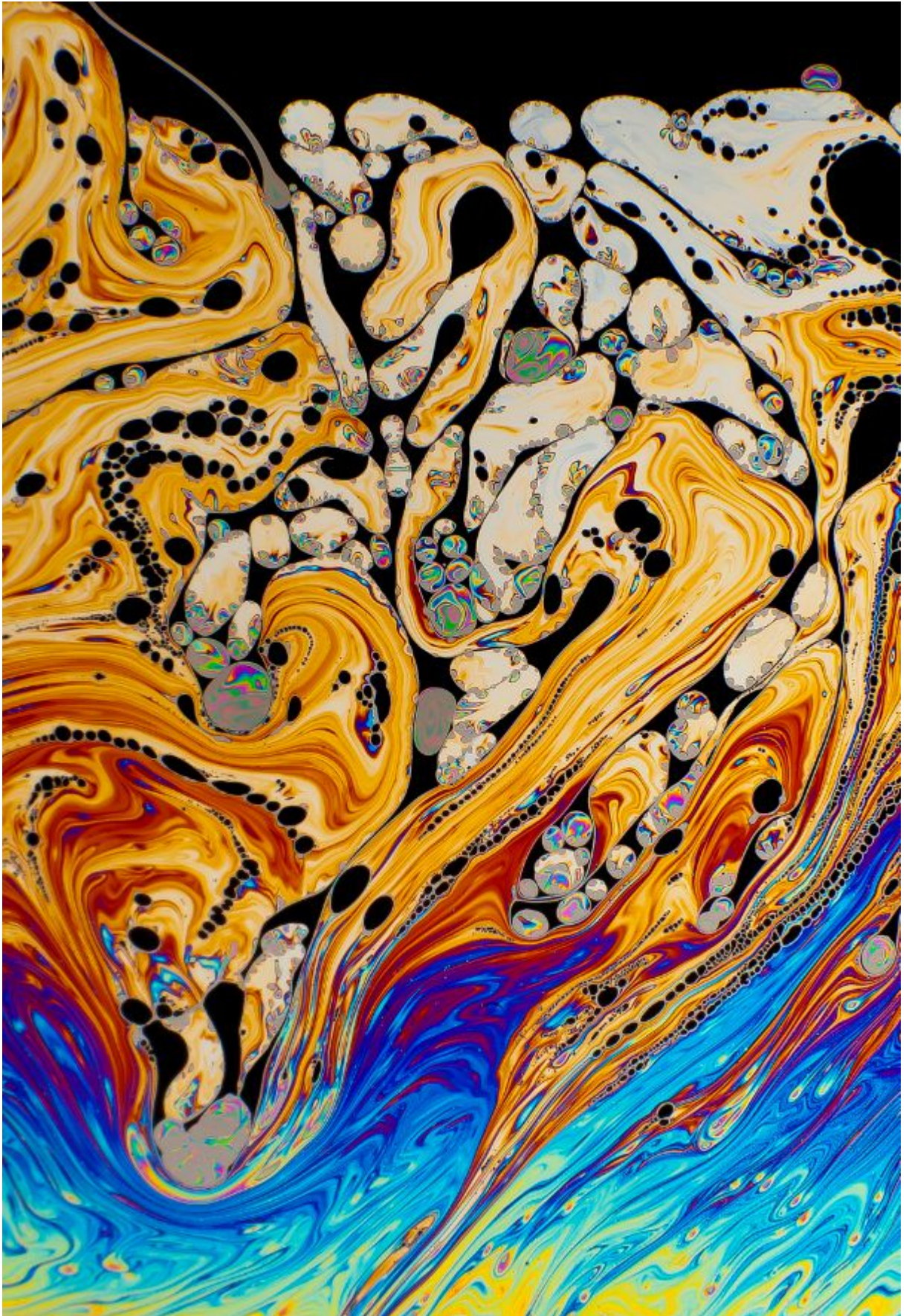
Brightness +35

Contrast +100

Clarity +49

Vibrance +50

Saturation +52



Smoke

Here is what you need to do in order to capture a picture with illuminated smoke:

- Get an incense stick (or some other type of smoke generator) and place it in an incense stick holder.
- Make sure the background is black. I mounted a black blanket to the wall. If you are shooting in an open space outside at night time, you won't need this.
- Mount your flash to the side of the incense stick.
- Place a lamp or any other type of constant lighting source near the smoke so you can see it (I used a powerful flashlight). This can also help the camera to auto-focus on the smoke, although it won't be easy. If auto-focus doesn't work, switch to manual-focus.
- Sync your flash up to your camera so that whenever you take a picture, the flash will fire right along with it. I used the [RF-602 Wireless Flash Trigger](#), but you can use anything.
- Use rubber bands to attach some construction paper to each side of the flash in order to make sure the light doesn't spill onto the background or get into the camera lens.
- Zoom in your flash (if you can) in order to narrow the beam and direct it forward.
- You can place colored gels onto your flash to get different colored smoke, or just do it in Photoshop.
- You can adjust the camera and flash settings differently, but here are the ones I was using and that I recommend you use:

Shutter-Speed: 1/160

Aperture: F8-F11

ISO: 100-200, rarely 400

White Balance: Flash

Flash Power: 1/1 or 1/2 power

Focus: Whichever works; I switch back and forth between manual-focus and auto-focus.



You can see in this picture (which is actually just a screen-capture from the [Trick Photography and Special Effects video](#)) that I was using *two* flashes. This isn't necessary at all, but if you want to get two different colors of smoke by placing colored gels over each flash, it can sometimes produce semi-interesting results compared to just one color.

Once you have your photo taken, you can then bring it into Photoshop and make the background completely black by taking a black paint brush and going over everything outside the smoke, burning the shadows with a large soft brush near the edges of the smoke, and then finally, if you wish, going to *Image > Adjustments > Selective-Color* and taking down the Blacks a little bit to make the blacks just a little bit more black inside the area of the smoke.

After that, your image should be perfect. You can then do many different things with them, such as applying color gradients, mirroring them, inverting them, and combining them with other photographs, like the one on the right.

The smoke you see on the photo to the right was actually three separate smoke photos, I just put them near each other to make it longer. Then, I set the Blending Mode on the smoke layers to "Lighten". This will render the black background of the photos invisible.

Finally, you can add a color gradient. Make a new layer and switch the blending mode of that layer to Color or Hue. Grab the Gradient Tool (located in the same drop-down icon as the Paint Bucket Tool) and choose your colors near the top left of the screen. After that, simply drag and drop your cursor over the picture to draw your color gradient.



There is more information about smoke photography and post processing on the Trick Photography and Special Effects video.

Fake Smoke



Smoke appears to be coming from this apple, but let me tell you this, that is not real smoke at all! This photo was made by taking a small flashlight and holding it about 6 inches above the apple with the beam of light focused on a string that was dangling down from the flashlight. The exposure time was about 8 seconds, so all I did to create the “smoke” was move around the light and string above the apple while the exposure was taking place. The light was also shined on the front side of the apple for about 2 second to illuminate it more from another angle.

There is a free video tutorial on youtube where you can see my set-up, camera-settings and more here: <http://www.youtube.com/watch?v=tXX3z7IGhb4>

Bokeh (Youtube video [here](#))

[Bokeh](#) is a classic photography technique where the background of the image is blurred. You can make a bokeh blur by following one or more of these guidelines:

- **Use the widest aperture available on your lens.** The 50mm f/1.8 and 50mm f/1.4 lenses are popular lenses for producing bokeh effects because the aperture is very large on these lenses.
- **If you are using a zoom lens, zoom in as much as possible.** A 200mm lens zoomed in all the way at f/6.3 will produce bokeh blur almost as good as the 50mm 1.8.
- **Get your camera as close to your subject as possible** while still remaining in focus. This will create more separation from the foreground to the background and the bokeh blur will be greater.

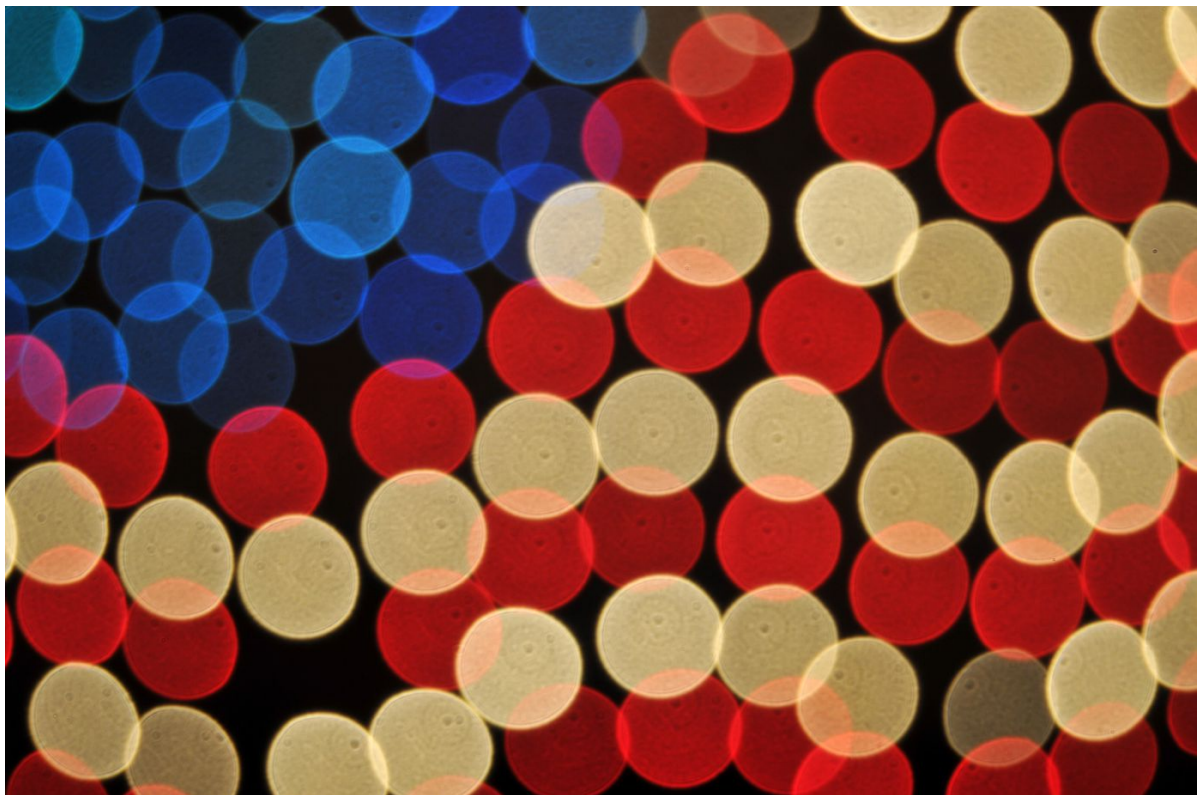
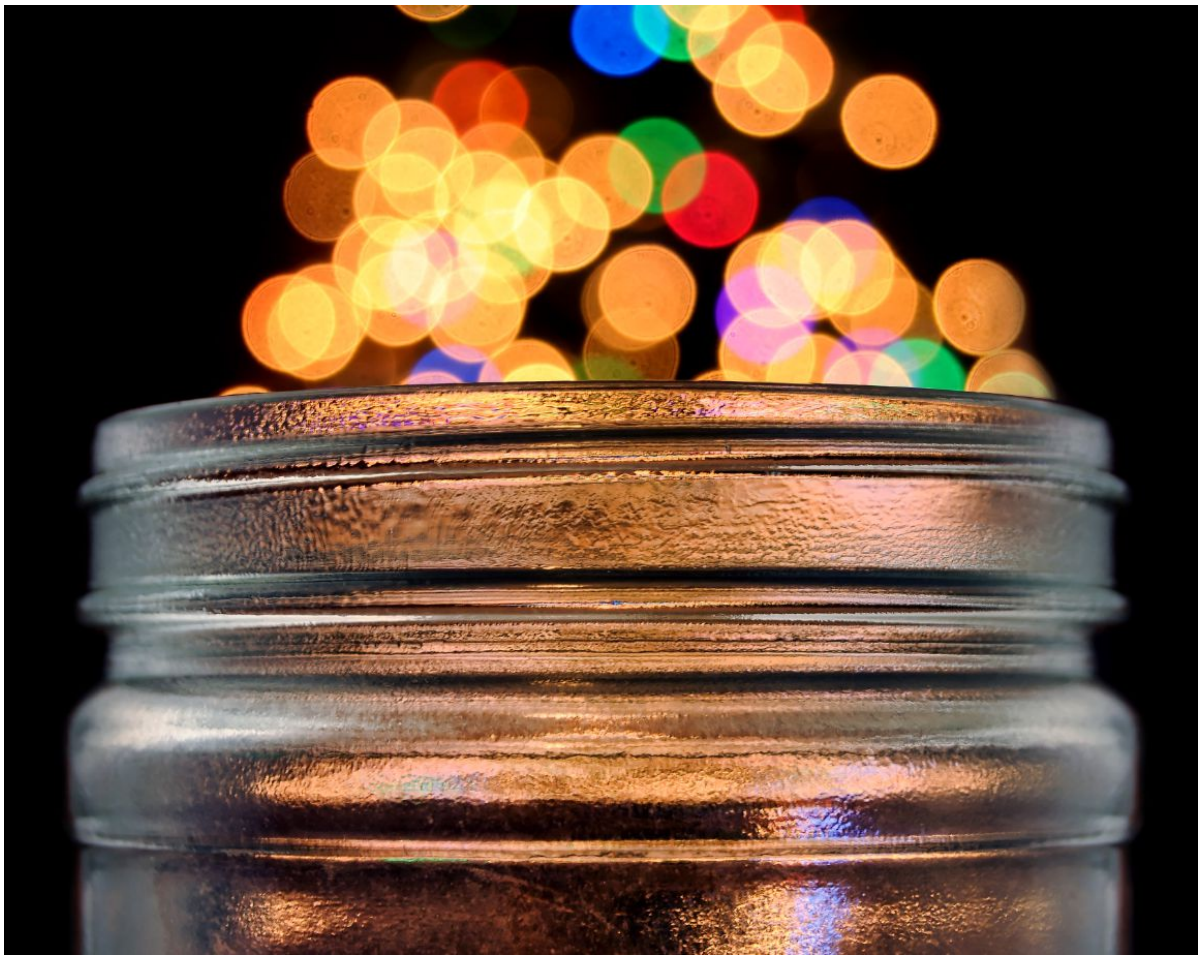


Fairy LEDs were attached to a hula hoop and were placed ~10 feet away from the subject which was lit by an external flash.
50Mm, f/1.8.

Bokeh blur outside during the day will just blur out the background completely, but when the bokeh effect is applied to a photo where there are pinpoints of light in the composition, the lights will be rendered as big blotchy blurry circles.

Photographing people at night in a city with an external flash will produce some great results, but if you want to control how the bokeh dots are arranged, you can use Christmas lights and hang them up against a wall in the arrangement that you desire.





Shaped Bokeh

Even though the classic bokeh look of big bold blotchy circles in the background of an image made with lenses with large apertures is still very appealing and pleasing to the eye, *shaped* bokeh takes it to a whole new level! If you really want to emphasize a certain theme in your photograph, this is an excellent way to do it. Not too many people take the time to do this stuff, so your photos will really stand out against the crowd.

There are two ways to create custom bokeh shapes. Here is the first method:

Cut out a small shape onto construction paper (black is technically the best because it reflects the least amount of light) and center it directly over the glass of a lens that has a large aperture. The standard bokeh lens that most people have is the [50mm f1.8](#). It's an inexpensive yet very high quality lens that is great for this application. The [1.4](#) is even a little better.



The second way to obtain custom bokeh shapes is to print out a pair of designs on transparent paper. I created my designs in Photoshop, saved the JPG on a thumb drive, and then went down to my local copy store (CopyMax, Kinkos, etc.) and printed two copies out. When you make your design just be sure that there is black around your entire shape and it is clear in the middle.

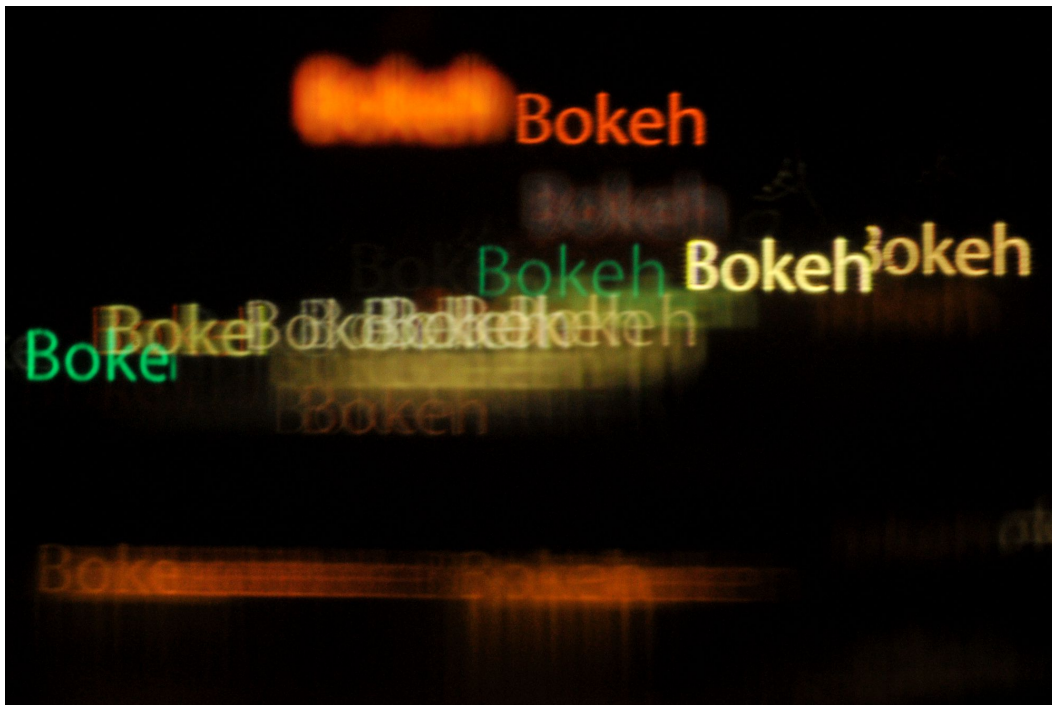
After you have it printed out, stack the two copies on top of each other and cut out the shape in a circle with the diameter slightly smaller than the ring around your lens. After it is cut out in a circle shape, tape it together.



You can now hold the transparency in front of the camera lens, embedded inside the filter ring, with or without a clear UV filter screwed over it. The UV filter will ensure the design doesn't fall out but will add more glass in front of the lens which will reduce image quality - the image quality isn't going to be the most professional anyway because you are shooting through a transparency.

If you are printing a word, make sure that the text is backwards when you look at it from the front.

Because the "optics" on transparent paper isn't ideal for photography, sometimes your custom bokeh blur will look a little hazy. Even so, this is still the only method I use because cutting fine lines into construction paper is too tedious.





A good way to emphasize a theme would be to place objects on a table and drape some Christmas lights 3 to 20 feet behind the main subject you are photographing.



Using custom bokeh shapes in regular daytime environments also gives a unique but subtle effect. In the example above you can see a faint star shape on the edges of the photograph, especially near the upper left corner. I bet you only *consciously* noticed that after I told you, didn't you? See? Using these bokeh cutouts will allow you to put subliminal messages into your photos!

Useful Links:

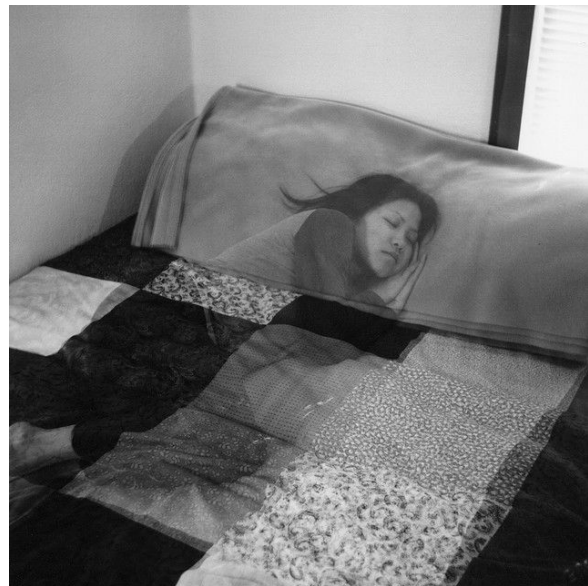
- Here is a [video tutorial](#) describing how to make a interchangeable bokeh rig for a lens.
- If you are too lazy to cut out your own shapes on construction paper or print them, you can buy the [bokeh masters kit](#), a set of pre-cut designs and shapes that go on the front of your lens.

Double Exposures

Double exposures are just that: double exposures. They are two images put together. They can be done in-camera with film SLRs and even digital SLRs if your DSLR supports it. On my Nikon D300s, there is an item in the Shooting Menu labeled "Multiple Exposure". It allows the photographer to take 2-10 different shots and combine them once the sequence of shots has been completed.

If your DSLR doesn't have a multiple exposure feature, stack the images inside of Adobe Photoshop using two separate layers, set the top layer Opacity to 50% and you're done!

In order to make people transparent, simply put your camera on a tripod and take two shots; one with you or an object in the frame and one without.



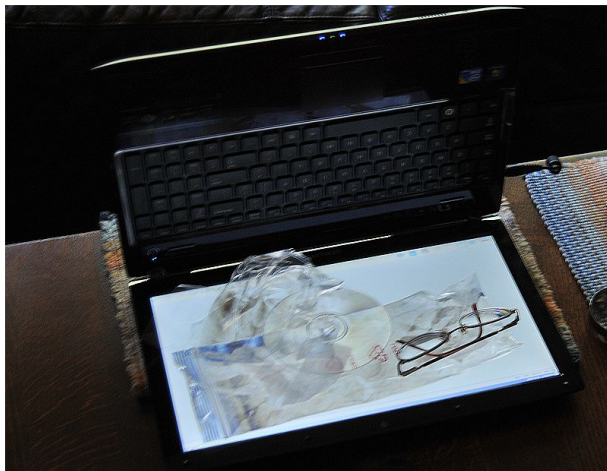
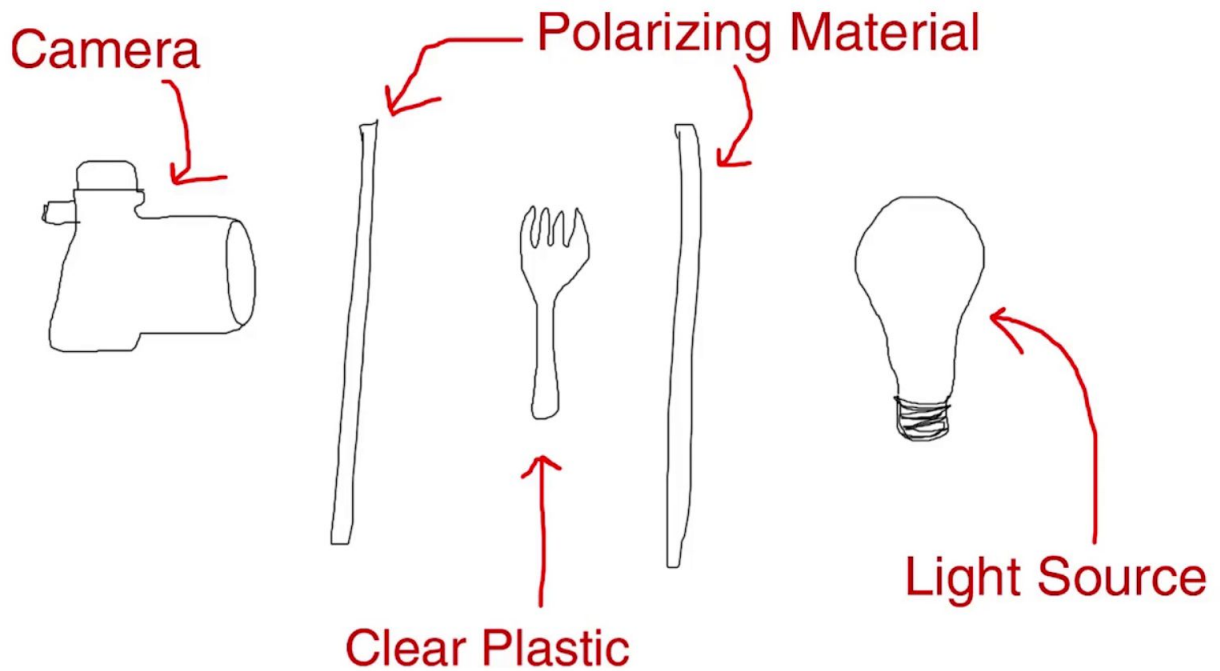
The Orton Effect

This effect gives your composition a beautiful aura of glowing light. Simply take two photos, one in focus and one out of focus, then combine them through the use of a double exposure. The series of images below shows the range of just how much the second photograph can be out of focus. I personally like the defocus amount on the third photograph the best because it seems to be the most aesthetically pleasing. This effect also works well with landscapes, especially if some of the environment is in sun and some is in shade.



Birefringence

All you need for this effect is a polarizing filter sandwiching some hard transparent plastic, and a white back-light behind it all. I use a laptop screen for both the back-light and also the polarizing material, because most laptop screens already are linearly polarized. After you have a laptop screen turned on maximum brightness with a piece of hard transparent plastic resting on top of it, screw a polarizing filter on your lens and start turning the filter to redirect the light in different directions.



As you can see, if you turn the polarizing filter into the correct position, the white back light of the laptop will turn completely black. This almost makes it look like a negative film strip!

Remember, the objects that work best are hard, transparent plastic. Nothing happens much with water or glass.



HDR Photography



HDR Photography, or “High Dynamic Range” photography is a technique that allows you to make the highlights and shadows more visible in a photograph. Digital SLR cameras can only contain so much information until the brightness and darkness levels exceed what it can record, so in order to get a wider visible range of shadows and highlights, we need to “bracket” (take multiple photos on a tripod that vary in brightness) and then combine them on the computer. Below is an example of why HDR is an absolute necessity when you want to “capture what you see”.



The image on the left has been under-exposed to capture the bright highlights, particularly to save the highlight detail in the clouds to the left side. The image in the middle is a normal, properly exposed image. It contains the mid-tones of the foreground, but the clouds on the left side are blown out. The third image will capture the detail of the shadows.



Now, *this* image is all of them put together using special software to create a high dynamic range photograph. The highlights, midtones, and shadows can all be seen at once. As you can see, HDR is particularly useful when there is an area of a photograph that is completely dark (or in shade) and another area that is really bright (sunshine and sky). More images could have been taken (-4, -3, -2, 0, +1, +2, +3, and +4) to capture even a wider range, but most of the time having a standard set -2, 0, and +2 will do just fine.

Taking the HDR Photograph



Step 1: Put your camera on a tripod. HDR images are ideal when they have been taken on a tripod. If you can hold your camera really steady, then you *could* theoretically take the bracketed set of images without a tripod, but I always advise against this because the results are less than perfect.

Step 2: Put your camera in Aperture Priority mode. Because we are taking 2 or more photographs and then combining them, the images must remain consistent in terms of focus and aperture. Also, put your ISO down to as low as it can go (ISO 200 or lower) and put your white balance to something other than Auto.



Step 3: Manual Focus. Focus as you would normally then turn off automatic focusing in order to ensure that the lens doesn't try to focus on something else when you're taking the other exposures. I've found that this usually works fine with auto-focus left on, but if you are a perfectionist, switching over to manual is ideal.

Step 3: Take the bracketed set of photos. In order to take a set of bracketed photos, please refer to your camera's manual, or Google the term "auto bracketing" and then "your camera model" (example: *auto bracketing D50*) and you will find your answer. Not all cameras are capable of bracketing photos. If this is the case for you, you will need to manually take a bracketed set of images by adjusting the shutter speed. Every camera is different, so I can't advise on this part. Some cameras have buttons that allow you to bracket your images, and some cameras only allow it through the menu.

You can take as much or as little images as you want. A standard quick HDR photo consists of one photograph that is 2 stops underexposed, one photograph that is exposed normally, and one photograph that is overexposed by 2 stops. This makes a bracketed set of (-2, 0, +2). You can even take more if you wish, like a (-4, -3, -2, -1, 0, +1, +2, +3, +4) or a (-4, -2, 0, +2, +4), but not all cameras can automatically take that many, so you may need to do it manually by adjusting the shutter speed for each individual exposure you take.



D35_0366



D35_0369



D35_0372

Note: Pushing down on the shutter button causes minor camera-shake. In order to get around this camera-shake issue and get images that are truly tack sharp, use a cable release, or better yet, a wireless remote with mirror lock-up on (if your camera has that feature).

You can, alternatively, just take a single RAW photo without taking a bracketed set of images. I would only do this when there are moving subjects (people, animals, cars, etc.) in your composition because moving subjects can't be recorded properly across three separate frames. If you *do* end up taking a bracketed set of images and there are moving subjects in it, there are ghosting removal tools available in both CS5 and Photomatix, but I don't depend on them.

Step 4: Post-Process. Now that we have taken the photos and have 1-9 shots in our camera, all we need to do now is post process them. There are several software programs that can tone-map your images, but the big two are [Photomatix](#) and Adobe Photoshop (particularly [Adobe Photoshop CS5](#) because of the recent upgrade in tone-mapping capabilities). If you would like to see a comparison of Photomatix and CS5, look at [this](#) and [this](#). I'll go over both:

Post-Processing in Photomatix ([video tutorial](#))

First, go buy Photomatix with the coupon code “**photoex**”, because you'll get a 15% discount. After you have the program, open Photomatix, click the Generate HDR button, and then select your photos. You'll then see a dialog box with some options like “Align source images”, “Reduce noise”, etc. I would recommend ticking all of them on and then click OK. Photomatix will combine the images together and then show you a preview of an unprocessed HDR photograph. This preview will look ugly because it has not been tone-mapped yet. In order to tone-map the photo, click *Process > Tone Mapping*. This is where the magic happens.



You'll see adjustment settings to the left, and a preview of your image to the right. Each image is different and requires different settings. Just adjust each slider until you get something you like. There are no rules when it comes to HDR; you can adjust your image to the extreme or go for a more modest look. I usually like to bump up the white point a little if there are bright skies present, because otherwise the whites will just come out to be a washed out gray.



Images being adjusted with extreme values have caused probably the most controversial arguments in the photography world. The image above and the image displayed before that are good examples of this. Each image probably has the Strength on 100%, The white point and black point set to 100%, the saturation set to 100%, etc.

Some people love this look and some people hate it and say it isn't even “real photography”. You can really tell if an image is an extreme HDR photo when you look at the thumbnail of the image because sometimes you can't tell what you are looking at. If the photo is enlarged it is easier to recognize, however.

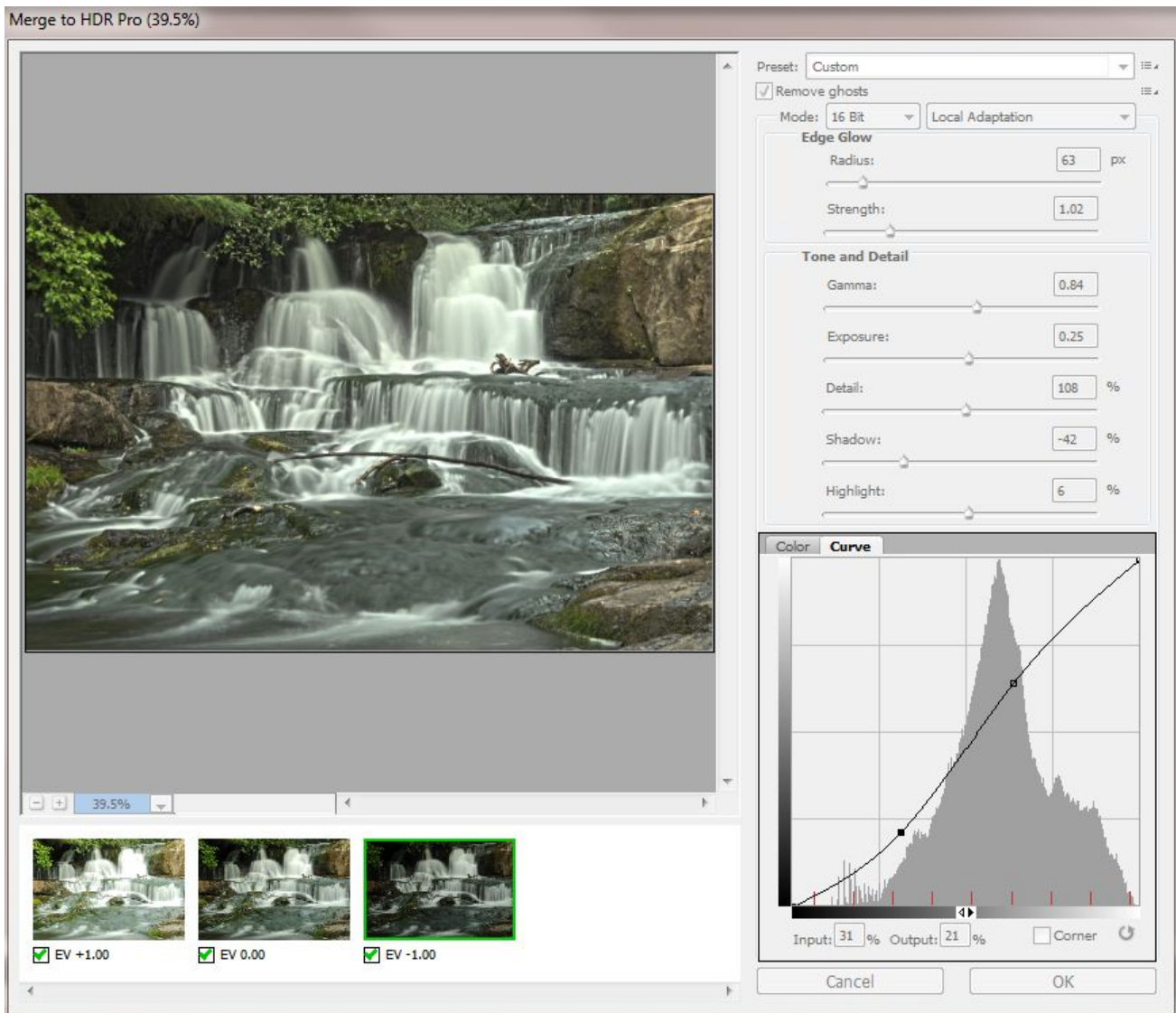


One of the values that really over-does it is the Light Smoothing option in Photomatix. The Light Smoothing option basically determines how 'spread out' the tone map is. If you set the Light Smoothing to Low (with the Strength on 100%), the images will look unnatural; if you set the light smoothing to Very High, it will look natural (like a regular, non-HDR photo) and not much of the HDR effect will as noticeable. I like to leave it at High or Medium, but the choice is yours.

Post-Processing using “Merge to HDR Pro” in CS5 [\(video\)](#)

Although HDR can be done on Photoshop CS4 and below, major improvements have been made in CS5 that offer the user more control over their final output of an HDR image. In order to merge multiple frames into a HDR image, click *File > Automate > Merge to HDR Pro*. Select your images, leave “Attempt to auto-align layers” ON (even if you took the shots with the tripod!) and click OK.

You will then be presented with an adjustment area similar to Photomatix's. Fiddle around with the sliders until you get something you like. There are also presets at the top in a drop-down box, but I would advise against using those. Again, there is no right or wrong way to do this. I usually start raise the Detail slider a little bit and then go back up to Strength and Radius.



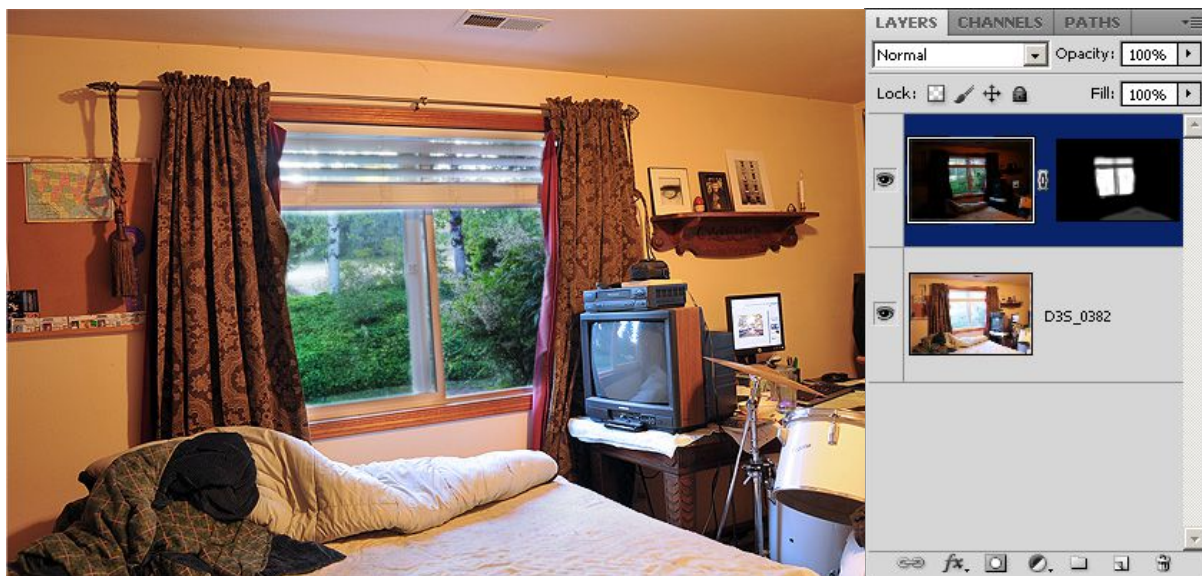
After you are satisfied with your adjustments, click OK. You will now be able to edit the image in Photoshop in 16bit mode.

Manually Tone-Mapping Images

Another technique that you can use to increase the dynamic range of a photograph is to manually tone map areas of your photo by layering them on top of one another and then applying custom layer masks in Photoshop. Let us discuss how to do this:



Here we have two images taken inside my bedroom. The image on the left is a proper exposure for the inside of my room, however everything outside the window is too bright. The image on the right has everything outside of the window exposed properly, but this, in turn, underexposes everything *inside* room. This is why we need to make our own custom tone-mapped image. Go to *Scripts > Load Images Into Stack*. Load your images up and wait for them to compile. After the process is completed you should see the bracketed set of photos in the Layers window. Create a layer mask on each layer except the bottom one, then selectively paint over the mask with the paint brush tool (white reveals the selected layer, and black conceals).



As you can see above, the viewer can now see everything *outside the window*, and everything *inside the room*. I've made a layer mask on the underexposed image to reveal the window and conceal everything else. I've also lowered the Opacity (transparency) on the paint brush just a little bit and filled in the area on my bed because it was a little bright. I could have taken both of the shots with custom white balances (one for outside the window and one for inside) to get the color perfect in each area, but this was just a quick example to show you the potential of using this technique.



Here is another example of a situation where manually tone-mapping your images comes in handy. When I tried to make a tone-mapped HDR out of these three images (as seen in the Layers window) with *Photomatix* and *Merge to HDR Pro in Photoshop*, I wasn't happy with either of the results (as seen below). So, I used the under-exposed image for the sky, the over-exposed image for the tree in the foreground, and the mid-exposure for the rest of the foreground. Doing this allowed me to get the result I personally desired.

You could also tone-map your image in *Merge To HDR Pro* or *Photomatix* and then bring that image on top of your custom tone-mapped images in Photoshop. It can get pretty messy.

Note for the top image: Notice how the tip of the tree on the left is dark. This is because I didn't accurately mask it out. Remember to check for certain areas that are not fully masked, and fix them.



Merge to HDR Pro in CS5



Photomatix 3.2

More HDR techniques can be found [here](#).



Infrared Photography

These are infrared photographs: pictures recorded with light beyond the visible spectrum. You can take infrared photos by using an infrared filter that screws on the front of the lens, or you can convert your camera to take IR photos permanently.



Why Take Infrared (IR) Photos?

- Infrared photography darkens clear blue skies but leaves the individual clouds bright. This creates a dramatic boost in contrast and leaves the photo with an interesting dynamic range.
- Infrared photography can leave foliage (grass, plants, leaves) looking pure white like snow.
- Using an IR filter on your lens gives you the potential to take photos with long shutter speeds.
- If you take photos of people in IR, their hair will look blue, *plus* their acne and freckles will appear to be dramatically reduced, making their skin silky smooth.

Can my camera take IR photos?

All cameras are able to take infrared pictures, but all cameras have an IR light Blocking filter in front of the camera's sensor. Some IR Blocking filters are extremely strong and block out *all* IR light, while others aren't very strong, and let some IR light pass through.

If you have a camera with a *weak* IR Blocking filter, you can buy an external IR filter that screws on the front of your camera lens. This will block all visible light and only let the IR light pass through. If your camera has an extremely *strong* IR Blocking filter inside, I would recommend removing the internal IR Blocking filter completely and replacing it with a filter that blocks visible light and only lets IR light through. There is a professional service that will safely do this for you called [LifePixel](#).



Nikon D50. ISO 200, 1/2 second, f4.8.

The IR light coming from this VCR remote can easily be seen, so this camera is ready for IR.

Now, you might be asking “But Evan, how do I know how strong the IR Blocking filter is inside my camera?” Well, in order to figure out how strong it is, find a remote control that goes to your TV or something similar, then take a 1 second exposure. During that exposure, click the power button on your remote, pointing it towards the camera lens. When you look at the picture on the LCD preview screen, you should hopefully see a light coming from the front of the remote. That is near infrared light!

If the TV remote light looks bright, your camera is well suited for infrared photography as-is. If the TV remote light looks very dim, that means the IR Blocking filter is pretty strong, which means you can still do IR photography but the exposure time will have to be longer when using an external IR filter. To give some comparison, a D50 camera has a weak IR Blocking filter and the exposure time is about 1 second in daylight when using an external IR filter. A D300 has an IR Blocking filter that is stronger, so the exposure time will be about 20-30 seconds in daylight.

Try doing this test with different lenses; some are better for IR photography than others. In fact, some lenses don't work that great with IR filters and create [hotspots](#). I myself haven't seen much of a problem with "hotspots" in any of my photos before.

If you still don't see *any* light coming from the remote, or it is *extremely* dim, you won't be able to take infrared photos with your camera using an external screw on IR filter. You can, however, get the IR blocking filter removed from the front of your camera's sensor by [LifePixel](#).

Conversion costs ~\$250, but this method has benefits:

- the shutter speed times will be normal
- the focusing will be normal
- you can see through the viewfinder when taking a photograph

The only potential downside to this method is that you won't be able to use the camera for regular visible light color photography anymore – only IR.

BUT, if your camera passed the TV Remote Test, then you can go the cheap route and start taking infrared pictures with the [Hoya R-72 Infrared Filter](#).

Here is a list of cameras and lenses that work well for IR:

[Good/Bad Infrared Lenses List](#)

[Good/Bad Infrared Camera List](#)

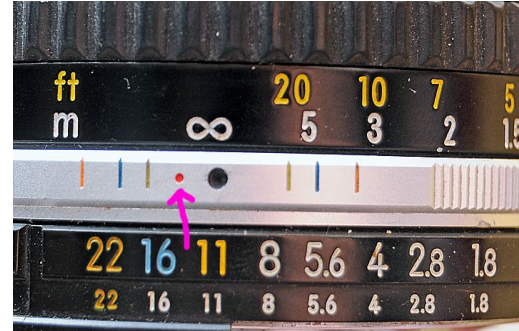


Taking Infrared Photos Using the Hoya R72 Filter

When you get your filter, you will notice it looks black, but when you put it up to the sun or a bright light, you will notice it is actually a very deep red. Because the filter is so dark, you will need to focus your scene *before* putting the filter on. Once you have your scene in focus, screw your filter on, and then switch to manual focus.

Lenses focus differently when using an infrared filter. Some lenses will have an infrared focus marking on the lens itself that shows you where you should refocus the lens.

There is an example on the right that shows a pink arrow pointing to a red dot. This red dot is the IR focus marking. Use this mark if your lens has it. If it doesn't, you'll have to guess-and-check to find the sharpest infrared focusing spot.



Usually I rotate the focus ring about 1 millimeter away from the infinite symbol, take a photo, and then preview it. If my photo comes out blurry, I'll keep readjusting (guessing-and-checking) until the preview looks sharp.

Now, you *can* theoretically use the camera's auto-focus, it will just be slightly out of focus. I've taken many photos like this regardless. Try a few test shots using the auto-focus, you may find it acceptable. Using higher F numbers to increase the depth of field will help too.

Now, like I said before, the Hoya R72 filter is **dark**. This will in turn substantially increase shutter-speeds, which is why you *need* a tripod to take something that looks professional.

You *can* take infrared pictures without using a tripod, but it is not recommended. You will need to use high ISO numbers and low F numbers, and those usually are not good for landscapes. Just avoid all of that mess by *using a tripod*. Your photographs will look a lot more professional, and a heck of a lot less blurry.



White Balance and Color Correction for Infrared Photography

After taking some photographs with your filter, you may realize that your pictures are completely red (or pink, or purple). In order to fix this, just set the White Balance with your filter on, pointing the camera at green grass. Google search "How to set white balance with [YOUR CAMERA MODEL]" for instructions if you don't know how to do this yet. If it works, your colors should look like the ones in the photo to the right. Brown skies and somewhat blue foliage.



However, some cameras cannot set extreme infrared white balances as-is in-camera and your photos will come out with weird red and purple colors no matter what. If you find that this is the case for you, you will have to take your photos in RAW format and set the white balance on the computer (this is what the majority of people do). Here's how to do it:

Step 1. Open your RAW file in Adobe Camera RAW and then in the bottom left corner of the window you will see a button that says "Save Image...". Click that and save a .DNG copy of the RAW file then close down Photoshop.

Step 2. Download the [Adobe DNG Profile Editor](#) and open the .DNG file you just saved with it. Once the file is open, click the "Color Matrices" tab and slide the Temperature value to -100.

Step 3. Save this digital camera profile by clicking File > Export [Camera] Profile. It should automatically bring up the correct directory where you need to save the profile. If it doesn't, save the file using one of the following directories:

Mac OS X	/Library/Application Support/Adobe/CameraRaw/CameraProfiles or <home>/Library/Application Support/Adobe/CameraRaw/CameraProfiles
Windows 2000 / XP	C:\Documents and Settings\All Users\Application Data\Adobe\CameraRaw\CameraProfiles
Windows Vista	C:\ProgramData\Adobe\CameraRaw\CameraProfiles
Windows 7	C:\Users\YOURUSERNAME\AppData\Roaming\Adobe\CameraRaw\CameraProfiles

Step 4. Open the RAW file again in Adobe Camera RAW and then click on the "Camera Calibration" tab on the right. Under "Profile", select the camera profile that you just saved and then go back to the "Basic" tab.

Step 5: Grab the eyedropper White Balance tool located at the top of the window and click on an area of grass. Your photograph should now look neutralized, and your skies should be brown with the foliage blue!

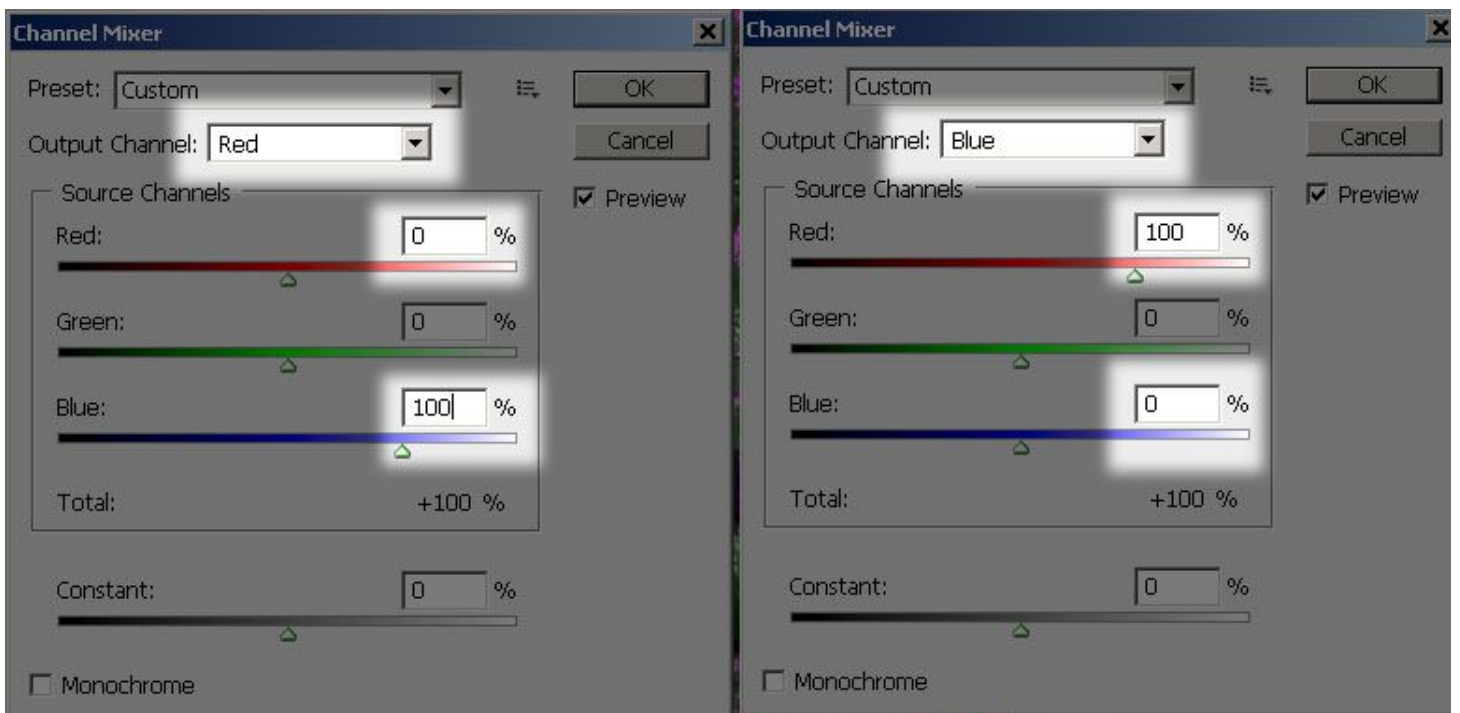
Channel-Swapping in Photoshop

The next additional step is to change the colors around using a “channel swap” or by using the hue/saturation slider. A popular look for infrared photography is to have a blue sky instead of brown:



The image on the left is before the red/blue channel swap, image on the right is after it.

It's quite easy to obtain this look. In Photoshop, go to *Image > Adjustments > Channel Mixer...* Make sure the "Output channel" is selected on Red inside of the drop-down box. Type in 0 for red, and 100 for blue. Next, select the Blue output channel but selecting it in the drop down box. Type in 100 for Red, and 0 for Blue. You've just swapped all the red colors for all the blue ones. Feel free to experiment with other variations; I've seen pink and yellow foliage before.



IR Examples Chart



Normal color picture.

NIKON D50
F8
1/500th sec.



IR photo with AUTO WB



IR photo with adjusted
white balance, straight
from camera



IR with white RED/BLUE
Channels swapped



Red channel from IR photo
replaced with the Red
Channel in color photo

Remember, not all cameras have the ability to create neutralized IR images in-camera. This Nikon D50 DSLR can in JPEG mode, but most of the time you will have to fix the White Balance on the computer as previously discussed.

To fully understand how this last image was created, watch [this video](#).



Remember that channel-swapping isn't limited to red and green. There are so many different variations of color swapping left out in the open ready to explore. The image above has four simple variations, all done using the Channel Swapper and Hue/Saturation adjustments inside of Photoshop.

If you want your foliage to look white like snow, you can easily desaturate the areas by using *Image > Adjustments > Hue/Saturation*. Select Red (or whatever the color of your foliage is) and then slide the saturation slider all the way down to -100. You can also use the Sponge tool in Adobe Photoshop's tool palette to selectively desaturate certain areas.

If you have your camera on a tripod (which you should anyhow), I would take a normal color image first, and then take an IR photo right after, without moving the camera at all. You'll now have the regular color version and the Infrared version of the exact same scene. You can combine these two photos together using different blending modes in Photoshop and by also swapping different channels in each layer. There are so many variations available, my head would explode if I had to list all of them, so it all comes down to experimentation!

More resources on Infrared Photography:

<http://www.wrotniak.net/photo/infrared/>

Using Two Infrared Filters May Get Better Results

I have access to two Hoya R72 filters. I stacked them on top of each other and used both of them on my lens simultaneously. The results seem to have more color and depth. People seem to debate about this. What do you think? The images on the left were taken with two IR filters stacked on top of each other, and the images on the right were taken with one. These pictures have been channel swapped.



More IR photographs for inspiration:



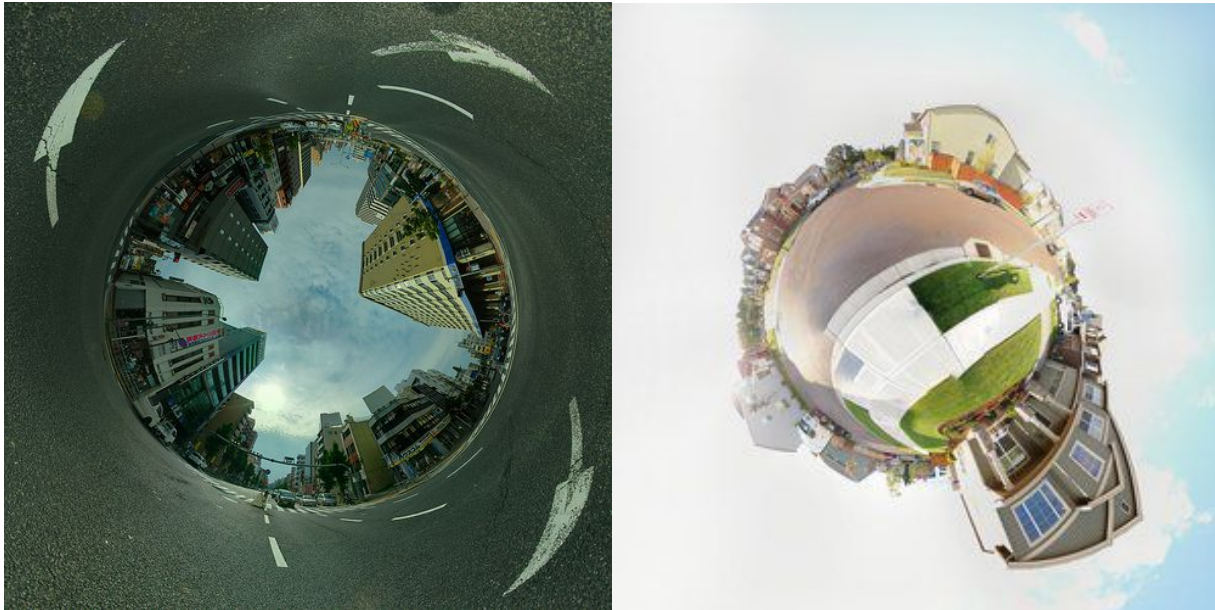




360X180 Planet Panoramas

These are complete immersive panoramic images (A complete spherical field of view... It's like a 0mm lens!) You can use a software program called Hugin to stitch the images, and Flexify to manipulate them even further. If you want to learn more about what a 360x180 panorama exactly *is*, head [here](#) and read the column on the left.

This chapter is pretty long, so if you only want the big-picture-basic-gist of things, watch my very brief [video](#). If you are serious and want to actually execute taking fantastic 360x180 panoramas, then watch the video and read this chapter. This chapter goes into much more required detail than the video.



This advanced technique requires some patience at first because it takes some time to just learn how to do it, but it is definitely worth it. People will be asking you "How did you do that?" every time you show them a 360 stereographic stitch. If you really want to tell them you would have to respond by saying "I took 65 images with my camera and a wide angle lens on a tripod with a special panoramic-head to capture a complete immersive view of the entire environment around me. After that, I stitched the photos in Hugin to make an equirectangular projection, then put that equirectangular image into Flexify and remapped it into a stereographic projection."



equirectangular



stereographic

You will need a digital SLR (or even a point and shoot camera), and a free program called [Hugin](#). It is also recommended that you have a tripod with a 360x180 panoramic tripod head, and the Flexify Plug-in for Photoshop, but it isn't required. I will talk about all of these things in this chapter, but first let's look at some awesome examples:





Taking Hand-Held 360 Degree Panoramas

First, set your camera to take *SMALL JPEGs*. You can take larger JPEGs, but I wouldn't recommend it until you are successful with your first completed panorama. The reason why is that the resolution (image size) builds up fast when you are stitching dozens of images together, and can take a long time for your CPU to process it all.

Take your digital SLR and use the widest angle lens you have. Mine is an 18-55mm kit lens, set on 18mm. Next, point the camera to the ground and start taking pictures around you. Try to keep your camera lens as the center point, and rotate/spin your body around it, shooting in vertical orientation. If you are having a hard time visualizing what I am describing, go to the 1:17 mark on [this video](#).

Traditionally speaking, it is best to use manual mode on your camera with manual focus (and this is the method I recommend using), but I've discovered that using Aperture Priority mode with automatic focus works too because Hugin has the ability to blend each picture together, even if the exposure level and focus point do not match up perfectly. If you are using full Aperture Priority Mode, I would suggest putting your camera to be set on matrix metering (most cameras using matrix metering by default.)

Once you have taken the bottom row of photos, tilt your camera up and take the next row of pictures, making sure that the field of view will overlap by about 30% or more. On my camera/lens, I have to take 4 or 5 rows of pictures, with about 12 pictures in each row. This comes out to be about 65 total pictures (But that is using my specific lens and camera, it might be different for yours). If you're using a super wide angle fish eye lens, you can get the job done by only taking *five* pictures. The resolution won't be as large, but hey, it takes a heck of a lot less time to shoot, plus it is easier on your CPU.



Zenith and Nadirs

Once you're done taking the pictures you need to take another picture while pointing the camera straight up at a 90 degree angle. This is called the Zenith. Take another picture straight down at 90 degrees (try to move your feet out of the way, if possible) this is called the Nadir. I usually mess up on the zeniths and nadirs, which is usually okay, but the image won't come out looking perfect: there will be a black spot where the zeniths and nadirs are supposed to be. You will see what I mean if you didn't take these correctly, it happens to me frequently. I use Content-Aware Fill to fix it in Photoshop.

Now we are ready to stitch them all together on the computer!

Download a program called [Hugin](#), install it, then open it up.

Using Hugin to Stitch 360x180 Panoramas

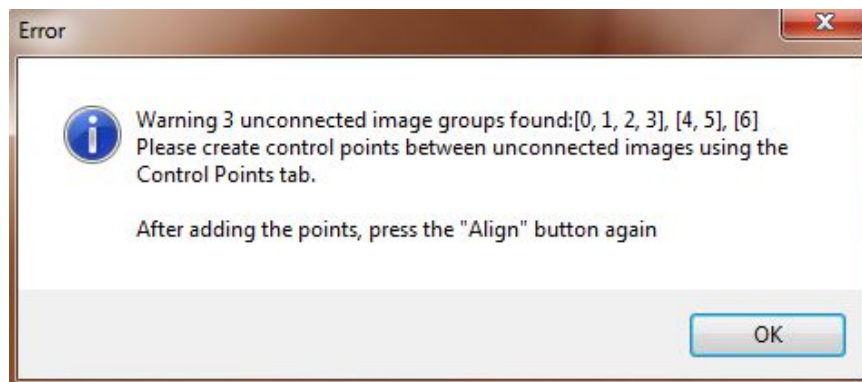
[Hugin](#) is a free open source panorama software. [PTGui](#) is another one very similar to Hugin - it's not free, but it has some additional features: It's much faster at stitching the images, has an HDR Tone Mapping feature built right into it, etc.

For this demonstration, we will be using Hugin.

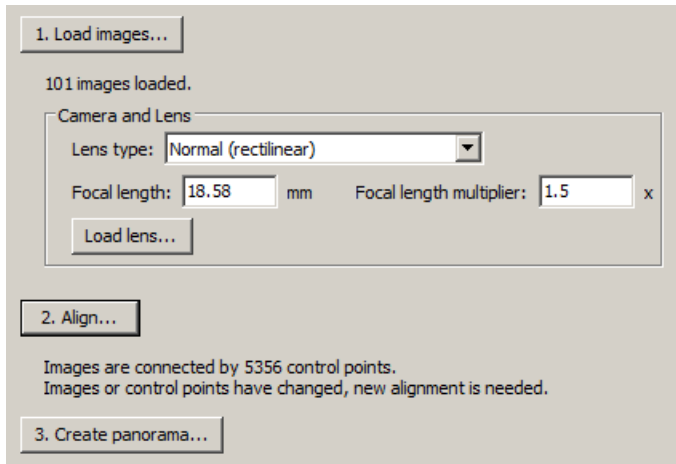
The very first thing you want to do when you open up Hugin is to click *File > Preferences > Control Point Detectors* and change the default to *Autopano-SIFT-C*.

Next, load all of your images into the program and then click the Align button. Depending on your computer speed, it will take a while to process all of the images, this is why I recommend taking small JPEGs first. Try to close all applications you aren't using - this will free up some memory which Hugin needs. If you have too many programs running, [Hugin](#) can potentially run out of memory and not do its job.

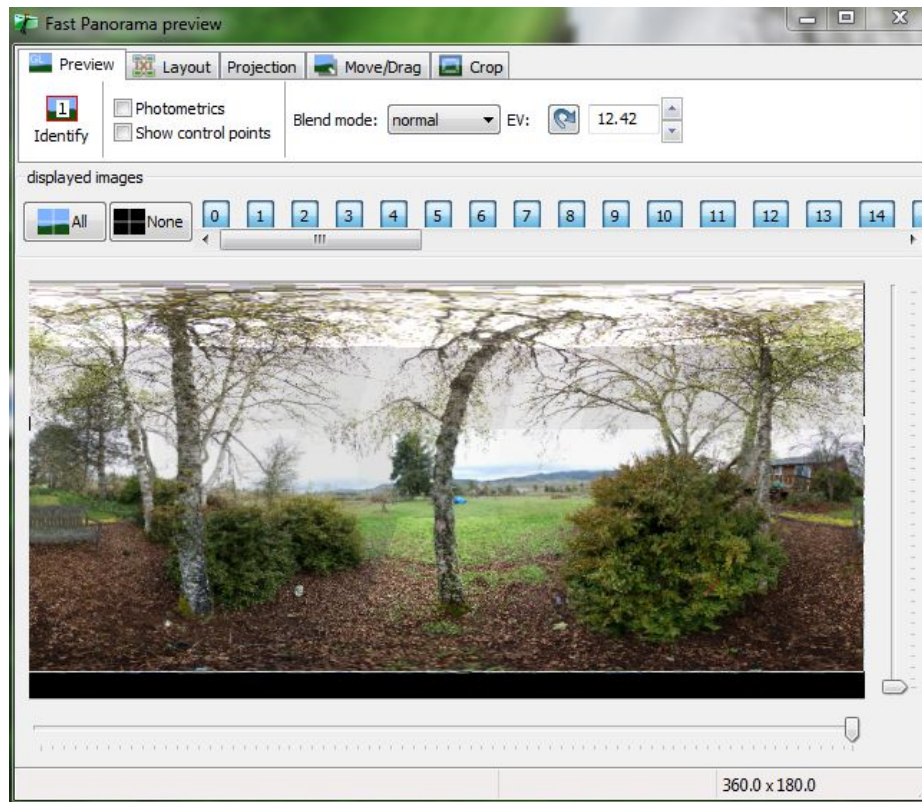
Once the images are done being processed, one of two things will happen: Either **1)** a dialog box will appear saying that it couldn't stitch some images together, and you need to manually fix them (as shown in the screen shot below), or **2)** a preview window will pop up, showing your panorama. If the former happens, you will need to add control points on matching features of each image pair, or just delete the images. Hugin will tell you what images need control points by showing you a broken string of numbers. For example: **[0, 1, 2, 3], [4, 5], [6]**.



The images that need control points are the ones not in the first string of brackets. For example, image **3&4** need manually added control points in order for them to stitch together because Hugin couldn't figure it out. Image **5&6** also need control points added. If it isn't possible to add points, just delete the images then re-align the panorama. This frequently happens with photos of things that don't have a lot of complex detail, such as like clear blue skies or a blank wall, which aren't too important anyway. Once you re-align the panorama, you can then go to the top and click *View > Fast Preview Window*.



Inside the Preview window



Here is your image. You'll notice that the image is in a 2:1 ratio, which is the nature of 360x180's. If you see any harsh lines (like in the example above), these will usually disappear after the final stitch or if you view the normal (non-fast) preview, by clicking *View > Preview*.

If you want it to look like a planet, click the *Projection* tab and then select "stereographic" from the drop down box. Then, click the *Move/Drag* tab, and click and hold your cursor inside the picture and move it around to adjust the orientation.

If you are making a stereographic projection, you may notice that the image will look extremely distorted. If you want to fix that, simply slide the bottom slider to the left about 3 centimeters. If you are making an equirectangular projection, just leave the sliders all the way to right and bottom corners.

After you like how your panorama looks, follow these steps to save it as a high resolution image on your computer:

- Close the Preview window (it won't exit the program, don't worry)
- Click on the *Stitcher* tab.
- Click the *Calculate Optimal Size* button. This makes the image have more resolution.
- Optionally, under *File formats*, change the *Normal Output* from TIFF to JPEG. If you leave the output at TIFF, the file size will be massive.
- Click *Stitch now!*

After clicking *Stitch now!* you'll see the script start to crunch a bunch of numbers. It takes a long time for it to stitch it all together, so I would recommend doing something else away from your computer while it is processing. When it is done, you can open up the directory to where you saved it, and then see its glory and zoom in on it and all that.

Note: You can also "optimize" your stitch before looking at it in the preview window. Click the Optimizer tab and select which parameters you want optimized. This supposedly makes everything more perfect, but sometimes you won't be able to see any difference after using it. I personally use this feature most of the time, but have found that sometimes it can make the final result worse. Remember to preview your image again if you use this feature to make sure it didn't mess up the panorama.

Stitching HDR Images (optional)

HDR is especially useful for 360x180 panoramas because of how large of a space you are photographing. Think about it. There are luminosity values all over the place, especially outside. Some areas of your picture will be in the dark shade, while other areas will be blasting white because of the sun.

In order to get a properly exposed picture in such a wide angle of view, we need to increase the dynamic range. You can do this by taking photos in Aperture Priority mode so that each individual shot's exposure changes, or you can take several bracketed shots in Manual Mode. Make sure you are using a panoramic tripod head if you do an HDR 360x180. Taking hand held HDR shots isn't worth it in my opinion, especially for 360x180s, because there is too much possibility for error.

There are lots of different ways to increase the dynamic range in a 360x180 panorama, or for any type of photo for that matter... Do a Google search for "[HDR Hugin Workflow](#)". Also visit the [HDR Panoramas](#) group on Flickr.

Regardless of the tutorials out there, here are some different methods you can try out:

Tone-mapping Before the Stitch

Sounds simple enough, and it is. This is my favorite method to creating an HDR panorama. The program [Photomatix](#) has a batch processor feature that will chug through all of your images and spit out the HDR tone-mapped versions. You can then import those tone-mapped images into Hugin just like you would with normal JPEG files, then export the stitch like normal.. If you need more instruction, [Google search the phrase "Photomatix batch processing"](#).

Tone-mapping the Entire Panorama

This method has an advantage over the first method because instead of applying the tone-map settings to each individual image before you stitch them together, you are applying the tonemap settings to the entire full 360x180 completed panorama *after* it has been stitched.

Here is how it works:

Lets say that you have a bracketed set of images (say, -2, 0, +2 EV), first load all the (0) exposures into Hugin and align the images, then click *File > Save as...* to save a .pto

template that you'll use for the (-2) and (+2) images. Also remember to stitch your (0) images into a JPEG file and then mark down the dimensions of the image size (in Hugin, this should be inside the Stitcher tab, under "Panorama Canvas Size").

Now click *File > New*, load all of your (-2) images in, and then click *File > Apply Template* and then select the .pto file you saved earlier. This will align all of your images together exactly how it did for the (0) set. Now all you have to do is go to the Stitcher tab, make sure the dimensions under Panorama Canvas Size match those of the previous set of images, and then export it as a JPEG (or TIFF..). Then do it for your (+2) set.

By now you should have three equirectangular panoramas saved in a folder.

Tone-map them as you would normally, in Photoshop or on Photomatix. If you are using Photomatix, make sure you have "360 image" ticked on. This makes the lighting even around the edges.

Creating Interactive Panoramas

An interactive panorama is a Quicktime/Flash file where you can use your mouse to scroll around the 360x180 environment as if you were physically there. Here are some [examples](#).

You can create interactive panoramas by downloading Pano2VR or Pano2QTVR from the [Garden Gnome Software](#) website.

Hugin Tutorials

Before I go on to the next section, one last thing I wanted to mention was that there are a bunch of [Hugin tutorials](#) available on their website, just in case you want to learn about more of the features Hugin has to offer.

Perfecting The Stitch using Panoramic Tripod Heads

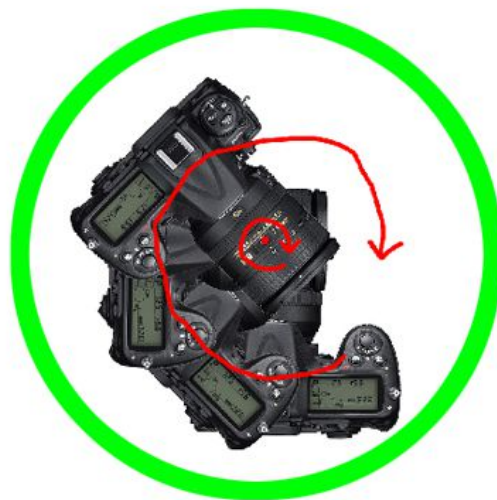
(optional but highly recommended)

Yes, you *can* take hand-held 360x180 panoramas, but when you do this there will be "parallax errors". An example of this phenomenon is shown on the right. Objects further away tend to shift off-alignment with objects closer to the camera when the camera pans from left to right. Hugin can't deal with this very well, so your panorama will be less than perfect.

Parallax errors are caused by rotating the body of your DSLR (seen lower left) instead of rotating it by the lens (seen lower right). This rotation point (or pivot point, if you will) needs to be shifted to the no-parallax point (otherwise known as entrance pupil) on your lens (seen lower right). Once we find the no-parallax point of the lens, we can then build a custom panoramic tripod head that spins around that point for a few dollars, or purchase one for a few hundred.



These two photographs were taken with the DSLR attached to a regular tripod, which as the pivot point under the camera's body (not good). The camera is pointing towards the left in the first shot, and pointing to the right in the second shot. The tree that was originally behind the window column has shifted in the second photo. This is a parallax error.



Finding The No-Parallax Point

To find the no-parallax point of your lens, go inside and find a window somewhere, just like you saw in the example. If your window doesn't have a column, use some masking tape for the reference point.

Get a tripod and put the handle about 110 degrees straight up in the air and then rest your lens on the tip of the handle (as shown on right). Go wide-angle and look through the viewfinder, having the window column to the right of the frame, aligned with something outside. Rotate your camera to the right so the column is now to the left of the frame. You should notice hardly any more shifting occur.



To fine-tune your point, move your lens forward and backward so that the lens rests on the tripod handle in a different spot. When you find the sweet spot, the tree should be aligned with the window column no matter what direction you point the lens. Once you have found this point, take a pen and mark the spot on your lens. You have found the no-parallax point for that specific lens and focal length.

Do another test using the point, only this time move your camera as closer to the window column and find a tree that is as far away as possible. This will test the accuracy. If it still doesn't appear to shift at all, you're golden.

Note: If you are using long zoom lenses like 70-300mm, the no-parallax point can fall behind the camera's sensor. You shouldn't be using telephoto lenses for 360x180 panoramas anyway... Use widest-angle lens you have.

More Resource on No-Parallax Points:

[Entrance Pupil Database](#), [Entrance Pupil Alignment](#), [Eliminate Parallax](#), [fine-tuning pano-heads](#)

Panoramic Tripod Heads

If you have money, you can buy a panoramic tripod head anywhere from \$80-\$400, or you can just build one yourself for a few dollars.

The one I made was specifically designed for my camera, and can only be used with my specific lens, camera, and focal length. The tutorial I used can be found here: [How to build a panoramic tripod head](#). This is probably the easiest, quickest design. Just make sure that when you build it, the vertical side arm that is attached to the base is long enough for your camera to be pointed completely upward, enabling you to take proper Zenith shots. The first time I made mine, the side arm was too short, and I couldn't take a zenith shot.

Taking nadir shots will be a challenge. You won't be able to capture them with a big wooden platform underneath your lens (as you can see on the right). If you don't make the base smaller than tripod platform, you will have to take your camera off the pano-head and throw your tripod to the side, reach your arm out, and point your lens straight down to take the picture while still trying to keep your camera in the same place. It is difficult, but if you get it right and Hugin can stitch it correctly, then yahoo! If not, then you will have to fill in the missing spot in Photoshop by using the Clone-Stamp Tool.

In order to capture good nadir shots, make the base of your panoramic tripod head take up as little space as reasonably possible. There is also a little trick which can be done in post processing. Watch [this video](#) at 6:23, and then to learn how to post-process your nadir shot, watch [part 2](#).

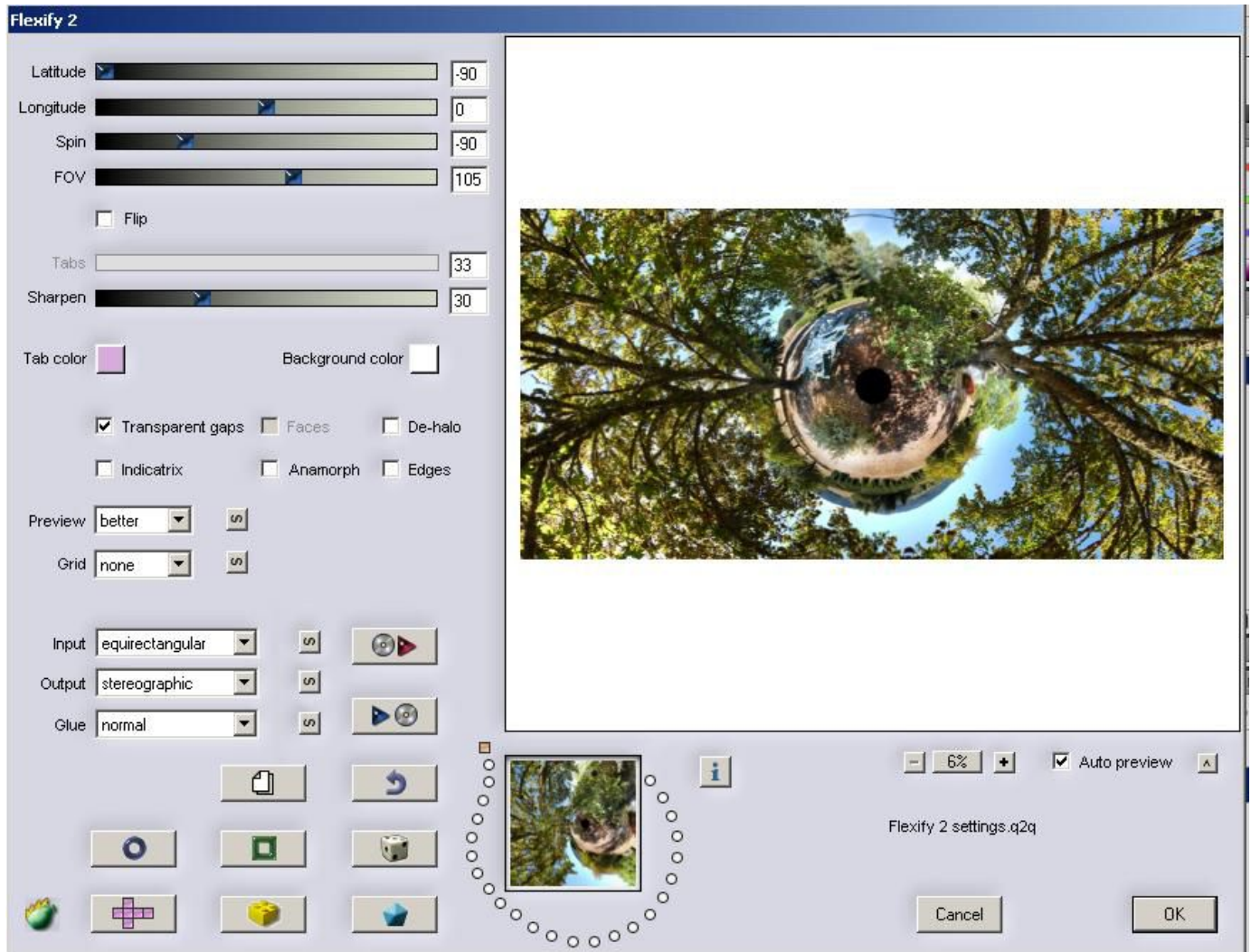
There are other panoramic heads where you can adjust the head for any lens/camera combination, but I couldn't find any useful DIY tutorials of these online. It would probably be better just to buy one of those anyway. The build quality is better, and it will have accurate markings on the tripod head to help guide you in finding the no-parallax point with no error. They also include [bubble levels](#) to make sure your tripod is perpendicular to the ground.

If you want to purchase a panoramic tripod head I recommend the [Nodal Ninja](#). It's not cheap, but if you are dedicated to this kind of photography or money isn't too much of an issue for you, then the Nodal Ninja is pretty much the way to go.



Manipulating Panoramas in Flexify (optional but recommended)

[Flexify 2](#) is an excellent Photoshop plug-in. It is specifically designed for manipulating 360x180 panoramas and it's what I use all the time. In order to use Flexify properly, you need to stitch your images using Hugin first. Make sure you stitch them in **Equirectangular** mode (not stereographic). Once you've saved your equirectangular panorama, open your image in Photoshop and click on *Filter > Flamingpear > Flexify*, assuming you already purchased the Flexify plug-in and put it in your plug-ins folder. This is what Flexify will look like:



Next, select the input to be Equirectangular, and the output can be anything you want. If you want it to look like a planet, select Stereographic or Hyperbolic as the Output. Then, set the Latitude to -90, or 90 if you want it to be a tunnel. If you want to adjust the field of view (zoom), mess around with the FOV slider. Keep in mind that if you slide the FOV slider it too much one way or the other, your image will look very pixilated and distorted. Also, keep in mind that if you want this to be a square image, you will have to resize it in Photoshop (*Image > Image Size*)(example: change 1000x2000 to 1000x1000) before you open it up in Flexify. I didn't do that in this example, which is why the image has a 2:1 ratio and not a 1:1 ratio.

As you have probably noticed, there are lots of output options in Flexify. A lot of them are cut outs, meaning that the image isn't projected to fill an entire rectangular frame. Here is a list of some of the ones that *do* fill up the entire frame.

- Rectilinear
- Hyperbolic
- Stereographic
- Cylindrical
- Wetch (this is very wide)
- Square
- Swoop
- Oculus (Apparently this is like Stereographic, but the distortion is near the center instead of the edges)
- Triptych
- Tetraptych
- Shift Lens
- Mercator (you can make little lumps)
- Tetra Tile
- Hyperdouble (Two 360's side by side morphed into each other!)
- Hypertriple
- Mercator Cross
- Mercator star
- 4 Views, 12 Views, 24 Views, 60 Views, 72 Views
- Equi Tall
- Semistereo
- Squoculus
- unFish
- Lagrange Plus
- Stereo Twice (this is like two mirrored Stereographics merged together)
- Stereo Thrice
- Equal-Area Cylinder
- Equal Squarea (who comes up with these names, anyway?)
- Square Fish 1
- Square Fish 2

I've made some examples of these different types so you can see what they look like on the next page. Additionally, you can see some [graphical representations of different 'projection mappings'](#).



equirectangular,



square,



peirce,



mercator cross,



stereographic,



hyperdouble,



hyperdouble,



equirectangular



stereographic with latitude at -90,



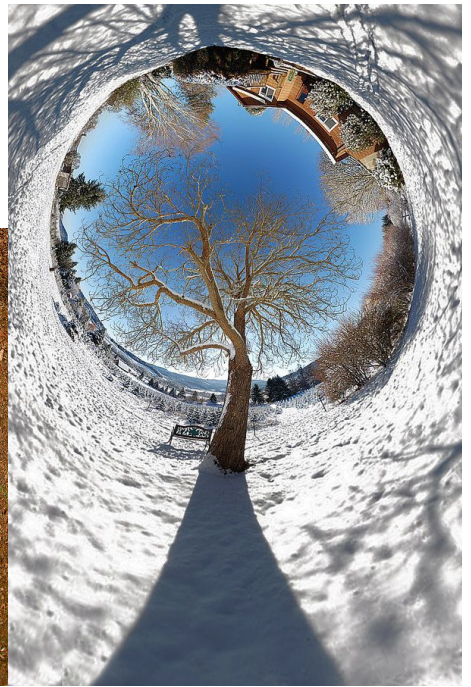
stereographic with latitude at +90.

Creative 360x180 Compositions

360x180 panoramas are extravagant by themselves, but when you have an eye that looks for composition, you can get even better results. A lot of it comes down to experimentation, but there are some compositions that will guarantee spectacular results.

Working with Trees

A beautiful technique to use is to stand about 1-20 feet from large tree (preferably with no other trees around the horizon or anywhere else) and then take a 360x180 panorama. Once you project it to stereographic form and move some sliders around in Flexify to make it a tunnel, the composition can come out beautiful.



Positioning the camera down near the ground can add interesting perspective to the image. It will appear like the tree is shooting straight up. This image was shot with a [Manfrotto 055XPROB](#) tripod. This tripod has legs on it that can collapse all the way down to the ground, so the camera was about 4-6 inches above the ground and about 1-2 feet away from the tree. This was pretty difficult considering I'm 6' 3" and the camera I was using didn't have live-view. Strenuous.

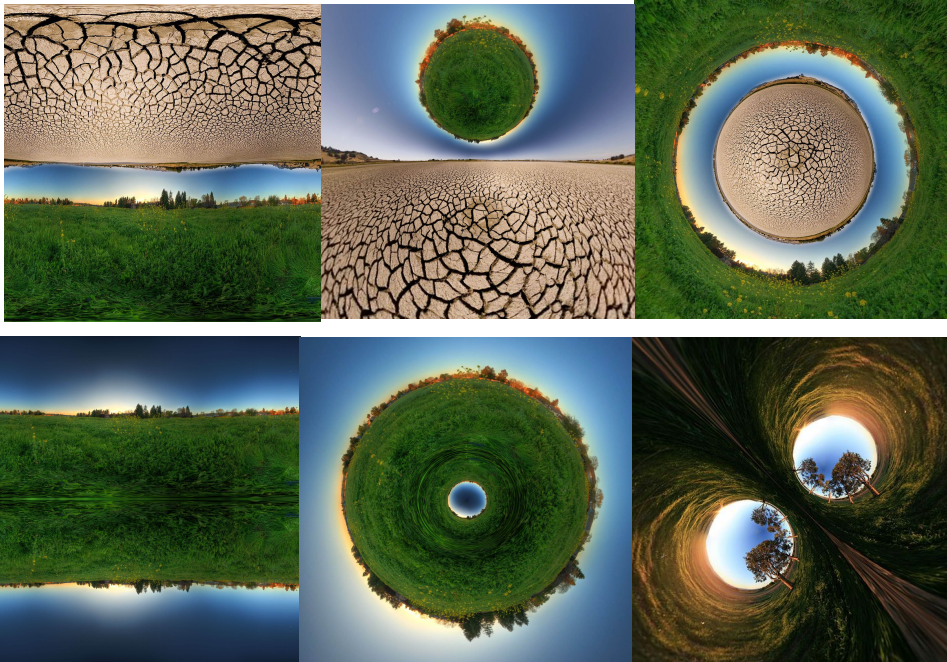
I had to clone out the tripod lens in Photoshop later on, but this wasn't too much of a problem because the only thing around the tripod legs was grass.

Another interesting composition technique you can use with trees is to stand about 3-10 feet close to a tree that has many overhead branches. This blocks out the boring view of the boring bland sky and fills it in with something much more interesting: the branches from the tree.



It's best when the tree has really widespread branches. I happen to have two areas like this on my property. The orange image below was taken in October while I was standing between two trees with widespread branches. The green image above was taken in my backyard during summer. The branches were somewhat low to the ground but also widespread, making the entire frame filled in with leaves.



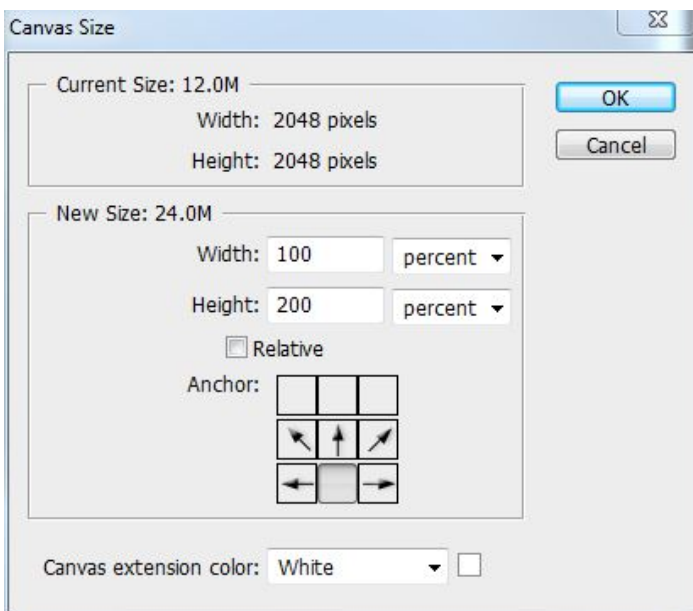


Doubling Up

You can also double-up your panoramas by either mirroring them (bottom left) or putting two different ones on top of one another (top left). After that, simply play around with the longitude, latitude, spin, and FOV sliders in Flexify to adjust the image to your liking (middle images). Please note that it is okay to stretch the land out more to fill up the frame with something more interesting than blank sky. That is what I did with the top left image. If I didn't do that, there would be a lot of more

sky.

Original Equirectangulars above are created by [Josh Sommers](#).



In order to mirror the image, download a free Photoshop plug-in called [QuickMirror](#) and put it in your additional Photoshop Plug-ins folder (you can assign this folder in *Edit > Preferences > Plug-ins*). After you have done that, restart Photoshop and open an equirectangular image in Photoshop and then go to *Image > Canvas Size*. Make sure "Percent" is selected in the drop down box and then type in "200" for the Height value. Leave the Width value at 100. Click the middle bottom tile or the middle upper tile. This makes it so there is blank space above or below your image. Click OK. You should now see a bunch of blank space above or below your image. Now go to *Filter > Mehdi > Quick Mirror*. The plug-in will instantly mirror your image. Now play around with it in Flexify!

If you want to put two *different* equirectangulars in one frame, do the exact thing as described above except after you increase the canvas size, instead going to the QuickMirror plug-in, simply drag and drop (or copy and paste) another equirectangular image of your choice onto the empty space. In order to flip it, make sure the layer is selected, then push CTRL+T and rotate it by grabbing onto the corners of the selection. You can also just right click inside of the selection and click "flip vertically" or "rotate 180 degrees".

People and 360x180 Panoramas

Including a large group of people in a 360x180 panorama makes a very interesting composition. The best compositions I've seen is where there are about 10-40 people all standing in a circle around the photographer (the more the merrier!). The models can either be holding hands, or have their hands up in the air, it is up to you to direct them. Make sure that you tell them to hold still so you can stitch the images together with minimal error.



Multiplicity and 360x180 Panoramas

The basic multiplicity technique is described in a separate chapter. Please read it in order to understand what 'multiplicity' means.

The quick-and-easy way of combining multiplicity and 360x180 panoramas is to simply stand in the middle of each frame when you are taking the photos one-by-one. That is what I did in the example on the right. There were some errors, though: Hugin cut off my legs and replaced it with just grass (click the image for hi-res version). In order to prevent this 'error' from occurring, make sure that you are standing in the middle of the frame and that you are not included in the area where the photos overlap, both vertically and horizontally.



If you want to do the actual multiplicity technique where you use layer masks to fit more clones in the same frame, you will have to take multiple exposures (I would use a remote for this) and then combine all your frames in Photoshop as you would normally (see the Multiplicity chapter in this ebook). When all your frames are re-saved with all the clones in the right place, you can then load them into Hugin and stitch them together like you would a normal panorama.

The 2010.2.0+ version of Hugin has a new feature that enables polygon masking right inside of Hugin. This allows you to fix any stitching errors where the model is on the edge of the frame. PTGui is slightly better in this regard because you can use a brush rather than a polygonal selection. Regardless, I just use Photoshop.

[Tutorial on masking inside of Hugin](#)

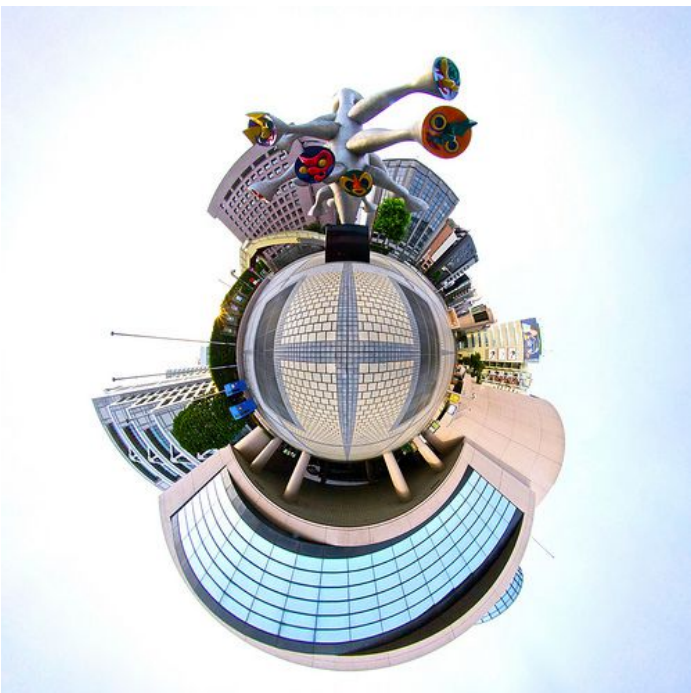




Ahh, the possibilities with 360x180 panoramas are endless! They offer so much creative potential.

The example on the left of this text is a play structure. The original equirectangular is right below it.

This concludes the 360x180 chapter. Here are some more examples for inspiration!



Pseudo Planets

Okay... I was kidding about concluding the chapter. There is still one more thing I wanted to include: Pseudo 360x180 Planets. These aren't the real deal, but they are easier and faster to create. The reason why they "aren't the real deal" is because the original image you are making the planet from is not a complete 360x180 equirectangular panorama. Usually the panorama is made up of 5-10 images... sometimes only 1 image. You will see a lot of distortion around the edges and near the center and edges of the frame when using this method, which is why I consider this to be the *alternative*.



The advantage of pseudo planets over real 360x180's is that you don't need any panoramic tripod heads, Hugin, or Flexify. All you need is Photoshop and you are set to go. My tutorial is below, but you can also read this [blog post](#) which has illustrations.

Step 1: Either take a single row 360 degree panorama, or take a single picture. It really doesn't matter. If you take a full 360, the image will wrap around seamlessly. If you take a single picture, you will have to improvise a little and either mirror the image horizontally or use the clone stamp tool to make it wrap around seamlessly. Make sure to straighten the horizon as much as possible. You can go to *Filter > Other > Offset*, and then offset the image horizontally a bit to check to see how it will look wrapped around. I suggest offsetting the image and then use the clone stamp tool with a big, soft brush, and then just ALT+Click about an inch away from the harsh line you see, then simply draw over the line to blend it out and get rid of it.

Step 2: Once you have your image loaded into Photoshop and it is straightened out -- whether it be a single row 360 panorama, or a single picture -- change the aspect ratio to 1:1. You can do this by going to *Image > Adjustments > Image Size*. Uncheck "Constrain Proportions" and change the dimensions to a 1:1 ratio. (example: change 9000x3000 into 3000x3000 pixels).

Step 3: Turn the image upside down by going to *Image > Image Rotation > 180*.

Step 4: Apply the filter: *Filter > Distort > Polar Coordinates*. Select *Rectangular to Polar* and click OK. There you go! Here is your pseudo planet.

Note: If you don't rotate the image 180 degrees before you apply the filter, it will be a tunnel/tube, not a planet.



Time-Displacement Photography via Scanner



Normal DSLR cameras record the light all at once as soon as it hits the sensor. With scanners, however, the light is recorded by having a strip of light go up and down the frame very slowly to light up your subject. You can use this to your advantage to create some really weird warped objects.



In order to twist and morph your face as you see in these images, you need to move your face up and down along the strip of light as it moves. Remember that the light is only being recorded where the strip of light is.

The image above had the cathode light in a vertical position (as seen in the reflection of the glasses) that moved from left to right. For the first few seconds that the light was moving from left to right, my face was held still so the scanner could scan my face like normal, but right when it hit the middle of the chin, I started to slowly lift my head upward, making sure to keep it in line with the cathode as it moved, then stopped to let the light finish recording the other half of my face.



There are many different combinations of shifting, tilting, and rotating you can implement when using any object on your scanner.

There is also a rare DIY project where you can create a box in front of your DSLR that has a very fine slit that runs up and down it to “scan” the environment you are photographing, just like a scanner would.

Slit-Scan Links:

- [Slit-Scan Photography](#) (Article describes how you can create a slit-scan camera box with a DSLR)
- [An Informal Catalogue of Slit-Scan Video Artworks and Research](#) (Tons of examples here)
- [How to Turn a Flatbed Scanner into a Handheld Camera](#)
- [Time Displacement Experimental Video](#)





Module 3

PHOTOSHOP PROJECTS

Layer Masks

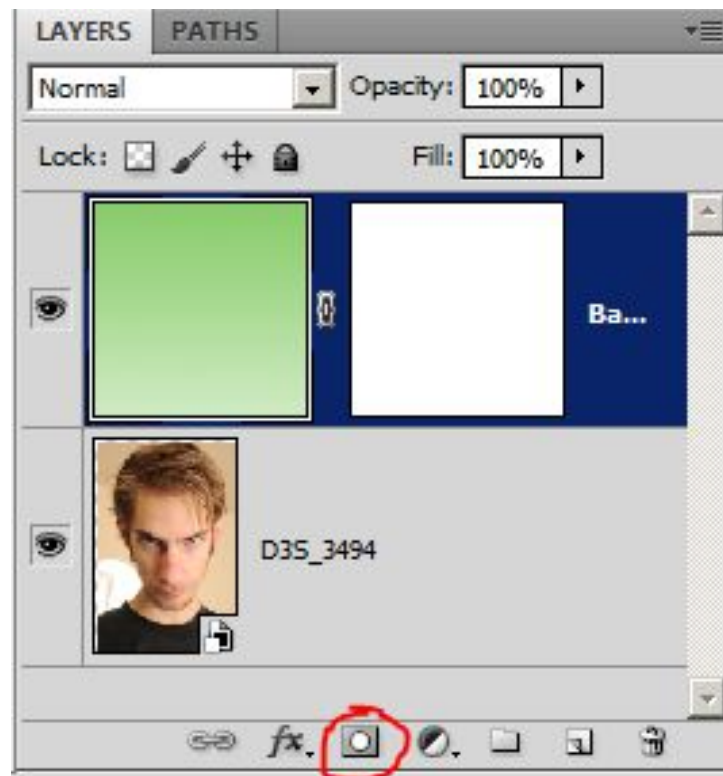
What the heck is a “layer mask” any way? It is called a “mask” because it is similar to a mask that you wear. The mask hides certain areas and reveals certain areas of your face (or in this case, your layer inside of Photoshop). If you are new to layer masks, watch [this youtube video](#) to get a further understanding of them.

Even though there is a way to [cheat and simulate layer masks in older versions of Photoshop Elements](#), layer masks are best used in Adobe Photoshop CS2 or above. [GIMP also works](#).

On this page I am going to tell you how to make a layer mask; on the following pages I'll show you example of how to apply them creatively.

Layer masks are used when you have multiple layers inside of a Photoshop document. You can get multiple layers inside a Photoshop document by dragging and dropping the files into Photoshop, copying and pasting them in, or by clicking *File > Scripts > Load Files into Stack*.

Once you have two or more layers in your document, you are ready to make a layer mask on one of those layers. Click the button that has been circled in red in the picture below. A new white layer mask will be created to the right of your layer.



Click that white empty layer mask to select it, and then grab a black paintbrush and paint over it (not on the thumbnails, but on the main big image in the middle of the screen). You will discover that once you do this, the black *reveals* everything that is below the selected layer, and the white *conceals* everything below the layer mask.

A layer mask is just like using the eraser tool, except you can erase part of the layer and *bring it back in later* in case you messed up.

In the example below you can see that I have *literally* created a *mask* on my face, by using a *layer mask*! Ha!



It is also worth pointing out that the 'Opacity' simply means how transparent the layer is.

When you click the drop down box that says "Normal" it will reveal all of your blending modes. **Blending Modes** are how the colors and tones blend into the layer that are underneath the current selected layer.

For example, If I choose Lighten or Screen as my blending mode, it will take only the lighter tones of my layer and make them visible on top of the layer beneath it. If I choose Darken or Multiply, it will only take the dark tones and make those visible, automatically erasing the light ones.

Experiment with the blending modes and watch [this video](#) to learn more about them.

Head in the Pot

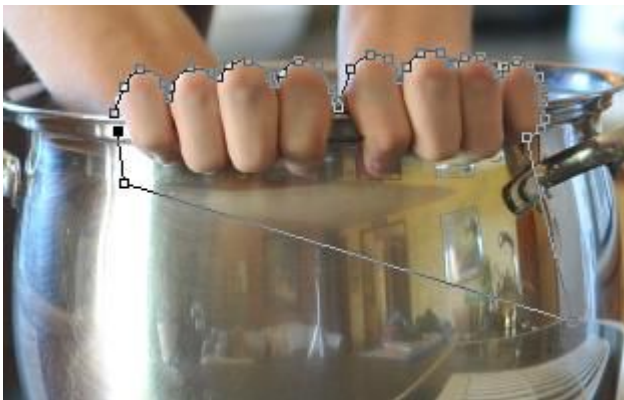
Let us get used to using layer masks. In this trick we will get a person's head to appear to be inside of a cooking pot on the stove. First, take three pictures (all in **manual mode** with manual white balance and manual focus to maintain consistency between all three photos), one of just the pot in the frame (this is really just an optional backup background layer), one with your hands grabbing onto the edge of the pot, and one of your head above the stove in the same position where the pot was.

Here are the three photos that I took:




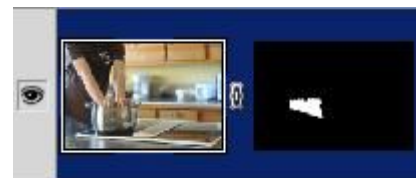
the third photo in this strip should really have the pot removed completely

After you have taken your photographs, load them up as layers into a new Photoshop document. You can do this by dragging and dropping them, copying and pasting them, or by going to *File > Scripts > Load Images Into Stack*.



Once they are in the same document as layers, grab the Pen Tool and make a selection around the hands (If you need help with the Pen Tool, watch this [video](#). If you zoom in to 400% or so you can get a more accurate selection.) Your path should look like the screen shot on the left. After you have closed your path, right click inside of it and click *Make Selection...* and feather it by .3 pixels and click Okay. You should now have the “marching ants” around the hands.

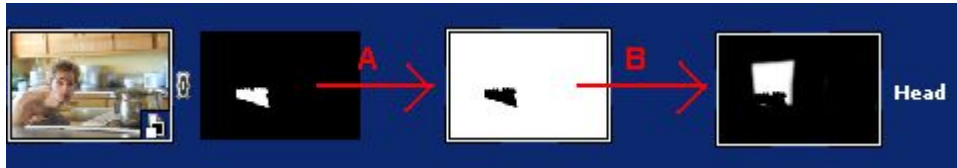
Make a layer mask specifically for the selection we just made by clicking on the  button in the Layers window. Simply make a layer mask on the layer with the hands as you would normally. It should look like the image on the right.



Now we need to duplicate the layer mask onto the layer with the head. This is a little tricky so read carefully. Click **once** on the layer mask only to make sure it is selected. Hold [Alt + Ctrl] and then drag and drop the layer mask onto the layer with the head. The mask is now duplicated.

A. Invert the newly duplicated mask by making sure it is selected and then hitting [Ctrl + I]. The blacks and whites are now reversed.

B. Grab a black brush and paint over everything except the head. This will hide everything but the head.



Our final image should look like this:



As you can see, the top layer reveals the head, and middle layer reveals only the hands and some of the pot below it, which blends into the bottom “Pot” background layer. Once you are satisfied with your masking, flatten all the layers together by going to *Layer > Flatten Image*. You can then adjust the curves, colors, etc. to the overall image. I actually missed a spot on the top right corner of the pot, can you see it?

*Extra: If you wanted to add steam coming up from the pot, simply create a new layer and then draw some thick lines coming up from the pot with a white brush, then blur them by going to *Filter > Blur > Gaussian Blur*. Lower the Opacity on the layer to 2%-50%.*





This was pretty much the exact same thing as the head on the pot, except this time I was in a wheel barrow. The first image is the layer of the wheel barrow only is on the very bottom. The second image is the middle layer, with a layer mask applied to reveal the hands only. The third image is on the top of the stack with a layer mask applied so that only the head and shoulders are revealed.

Shadow Illusion



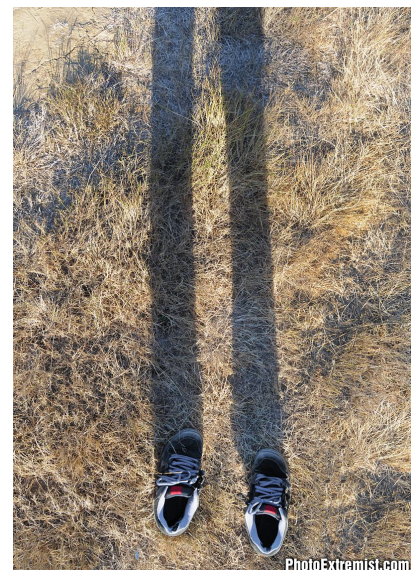
D3S_4756



D3S_4757

Here is a fun photo trick that can be done when the sun is out. Simply take one shot of a model standing in your shoes and then another shot with the model out of the shoes and out of the frame. Then put them together in Photoshop with the person layer as the top layer and mask-out the person. Wha-la!

Make sure the model keeps the shoes as stationary as possible. You will need to have your camera on a tripod for best results when doing this. If you don't have a tripod, you can sometimes get away without using one by aligning the layers in Photoshop. This can be done by unlocking all the layers, selecting all the layers, and then clicking *Edit* > *Auto-Align Layers*.



PhotoExtremist.com

Bug-Eyed

Here is a trick that is fast and easy.

Take two photos, one where both of your eyes are looking up and one where both of your eyes are looking down.

Make sure that your camera is on a tripod and your head remains stationary for each shot.

Put the two photographs into a Photoshop document as two layers and use a layer mask on the top layer to reveal one eyeball from either side.

Bam! You are done. Fast and easy.



Escaping the TV



Shot #1 only had the TV in the frame with nothing else.

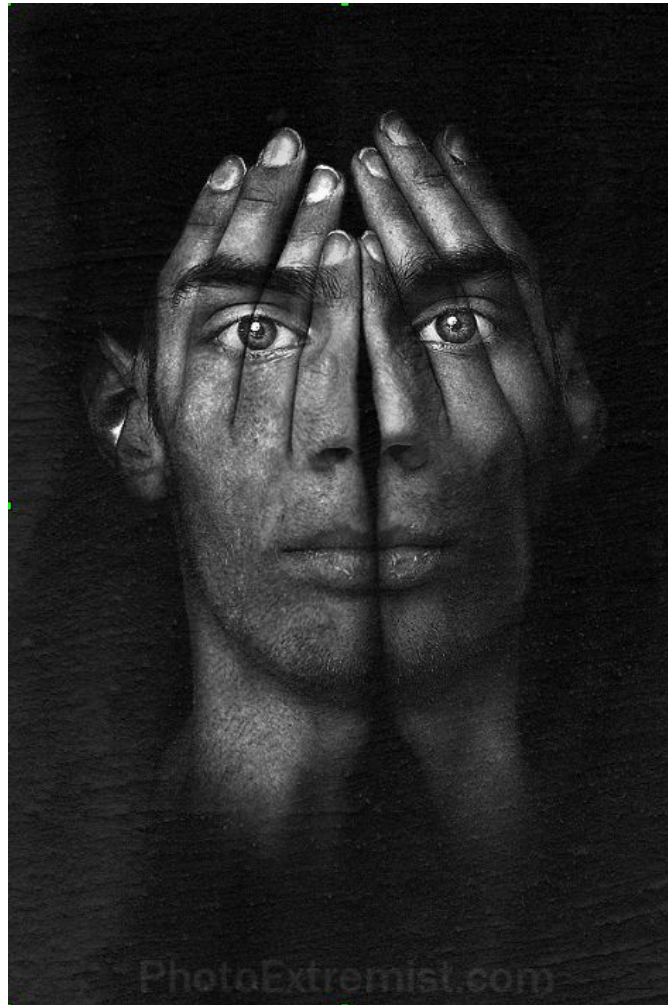
Shot #2 had the TV removed from the frame, and myself laying on the floor, reaching my head up. Both images were taken on a tripod to keep the camera in the same position.

I put both of the files into a Photoshop document as two separate layers. The picture of myself was the top layer, so all I had to do was erase everything past my neck down using a soft brush on the layer mask and the photo was done.



Here is another similar photo using an almost identical composition... only this is of a skull instead of a TV.

“Insomnia”



I took a photograph of myself with the camera on a tripod and my head in front of a black t-shirt that was pinned to the wall with an external flash pointing towards the wall I was facing so the light bounced off the wall and came back at me more spread out and diffused.

I took another photo with my head in the same position, only this time I put my hands over my face.

After that, I took the two images and put them in the same Photoshop document as layers, and set one of the layers to either the Multiply blending mode, Overlay, or something else (just try different ones until you like the way it looks).

Flatten the image (*Layer > Flatten Image*) and burn the blacks entirely to 255,255,255 black (this is optional) by going to *Image > Adjust > Selective Color*, select the blacks and then slide the slider to make it more black, then burn other areas if necessary to make everything but the face completely black.

Next, I grabbed a texture and darkened it with curves, then put it on as a new layer on top of the original image with Lighten or Screen as the blending mode. Adjusted the opacity, flattened the image, downsized, sharpened, added URL to the bottom and Save As..

I also erased the very top of my head/hair so it was just the finger tips showing.

Layer Masks with Different Images

In addition to taking two photos one after using manual settings on a tripod and combining them using layer masks in Photoshop, we can also use layer masks to combine two or more *completely different* photos together.

Here is an example of a guy with grass as hair.

Ca-wayzie, right? I think so :)

This was pretty simple to create. All I had to do was go to the store and buy some wheat grass and photograph it on a white background. Watch [this tutorial](#) if you need help photographing stuff on white backgrounds. If you don't have any lighting equipment but still want a 100% white background, you will need to use the Dodge tool, or the selection/delete tools in Photoshop.

After that, I took another photo of myself and made sure the angles of each photo were similar. In this example, each photo was taken with the camera slightly above, pointing down at the main subject.

Next, put both photos in the same Photoshop document as layers. Re-position and re-size the plant (CTRL+T) until it fits nicely over the head, then push [Enter] to put it in place.

To remove the unneeded white background pixels of the plant, just select them and delete them. Make a layer mask or grab the eraser tool to erase the bottom of the plant. Use a soft edge to get a nice transition.

Here is a [free Trick Photography and Special Effects video on youtube](#) that shows how to make something extremely similar to the photo on the right.



Building Window

The shot of the building was taken right across from a hotel room I was staying in. The person that appears to be inside of the building is my friend inside of my room. I took the picture outside of my house at night, and then superimposed him in the building later.

These are two completely different photos shot in two completely different areas, but they because of layer masks, they have been combined to the point where no one would be able to tell. It's all about using the layer masks!



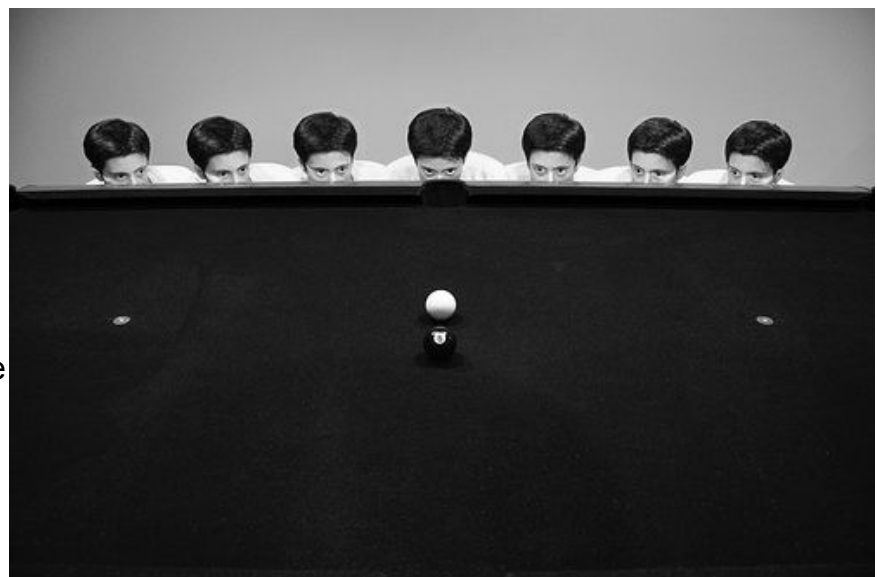
_DSC7365

Multiplicity Photography

In this article I'll explain how you can easily clone yourself with a camera and Photoshop. People call these "multiplicity photographs". It's also known as Sequence Photography.



I had a friend take the sequence of shots above; every time I got into a new position I told her to take a new shot. It went by quick and easy. I selectively replaced the sky with a more dramatic one (by using layer masks) and added birds. I also did some dodging and burning on the play structure.



Taking the Shots

Put your camera on a tripod and tighten it so it won't move. Focus your scene and then switch to Manual focus so that your camera won't constantly be trying to re-focus the scene. Switch to manual mode on your camera so you can manually adjust the shutter speed and aperture, this ensures that each photo has a consistent exposure. After everything is in focus and you have your shutter speed and aperture set, take a picture of the scene with the model to the left of the frame. Then, take another picture of the model closer to the right of the frame. Keep taking pictures until the model works their way all the way to the right of the frame.



You can get a friend, use a remote, or set your camera on a timer to help you take each picture. If your friend is pushing down the shutter button on the camera, make sure they are careful on keeping the camera perfectly in place and not accidentally bumping into it or something.

Inside of Photoshop

Once you have all your photos taken, you need to import them into Photoshop. Click *File > Scripts > Load Files into Stack...* Then just select your images and wait a minute for them to compile. *Note: if your version of Photoshop does not have the 'Load Files into Stack' option, you're going to have to manually copy and paste the pictures into the same document to stack the layers on top of one another.*

Once it is done processing, you should see all your pictures in the Layers window. Select the top layer and click the New Layer Mask icon (it's located at the bottom of the layers window). Next, take a black brush and brush over the entire person in that frame. The person will seem to be erased at first, but to un-erase it, hit CTRL+I, (cmd+I if you are on a Mac). You can now see the person in the first frame, as well as the one in the second frame! Make a layer mask like that for all the frames and then you're done! You can also do this with objects, animals, skateboarders, etc.



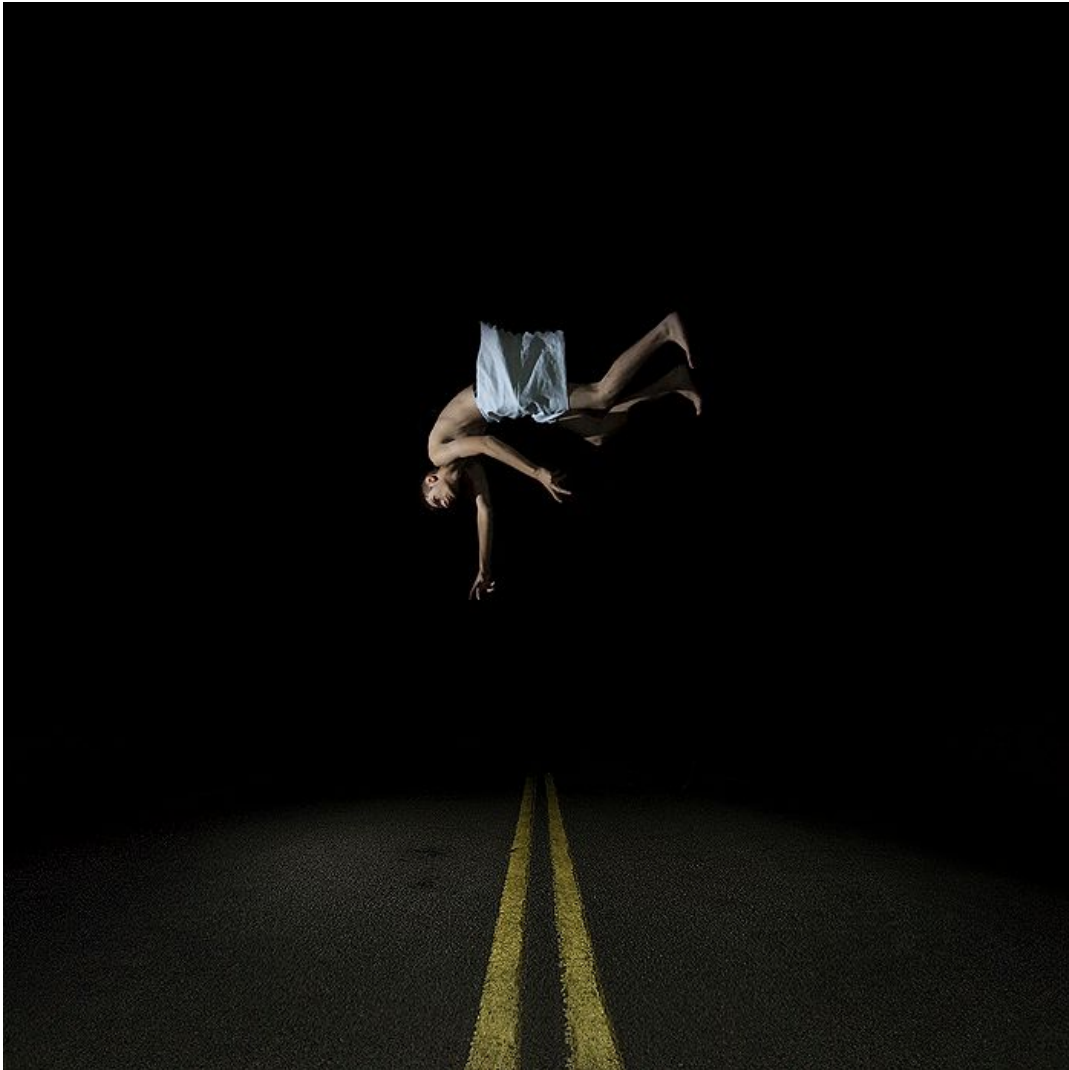
None of the clones were overlapping each other in this photo, this made it very easy to mask the model without tediously going into fine detail with the brush tool.

Check out my [multiplicity video walkthrough](#) if you need more help.



Levitation Photography

Levitation photography is a great photography trick that has always made me smile. The best thing about levitation photography is that it looks real.



This is somewhat of an unusual example of levitation photography because the model is very high in the air, and is also upside down. To be more accurate it would probably be better to call this falling photography! Regardless, let me explain the physical setup of how I got this shot. It was at night time, so I used an external flash that was mounted on a tripod located to the right of my body. My Digital SLR was on a tripod as well, directly in the middle of the road. My tripod was as low as it could get (about 3 feet).

A stool was placed in the middle of the road, and in order to help the camera 'see' the stool in the darkness, I placed an LED light on top of it and adjusted the focus until the LED looked sharp, then turned off auto-focus because it is unnecessary to use auto-focus after you have the stool in focus. I put the self-timer on 10 seconds, ran to the stool, sat on it, pulled up my shorts, put the pillowcase over them, got into a pose, and waited for the camera to take the picture.



This is the main trick behind levitation photography: Get one shot of a person either standing or sitting on a stool, and another shot with no person or stool in the frame. Using a tripod is necessary.

That's a white pillow case I'm "wearing" by the way; I thought it looked more aesthetic and less contemporary than green shorts. Heh... Maybe not the coolest idea, but whatever. I actually took about 20 different shots of myself in different poses, but this was my favorite.

Now that we have the 2 essential shots we need, lets open them up into Photoshop. Put both of the images into the same document by dragging and dropping or copying and pasting them in. Have the image with the stool be the top layer, and the image with no stool be the bottom layer. Select the top layer and then erase the stool by using an eraser tool or by using a layer mask. Ta-da! The stool is gone, and it looks like you are floating in mid-air.

To flip myself upside down I selected my body using the *Rectangle Marquee Tool*, right-clicked and selected *Free Transform*. I rotated my body 180 degrees and also moved it upward a little higher from the road. This is very easy to do in a night-time situation like this because the background is completely black. If you are in an environment that has a background that isn't a solid color, you will have to either carefully erase everything around your body and then flip it upside down, or somehow suspend yourself upside down by either hanging your feet from a rope or by leaning your legs up against something and then erasing the object.

Probably the most well known image that showcases the "upside-down levitation trick" is "[The Smothering](#)" by Miss Aniela. It's been rumored that someone was holding her by her ankles and the hands were later taken out in Photoshop. [This](#) "standing on head upside down" photo was created by using the same technique.

[Denis Darzacq](#) (that link leads to his levitation portfolio) also creates very interesting levitation photographs, and he does it with no Photoshop. He uses break dancers for models and captures them when they are in mid-air at just the right moment. Here is a [YouTube video](#) that shows him taking pictures in action.

I would highly recommend watching [this video](#) too! Some of Denis' work is included in the video, as well as a bunch of different photographic optical illusions that are not covered in this book.



I simply stood on the stool and touched a wall with this one; couldn't be easier. Interacting with objects around the environment like walls, trees, or other floating objects will make the photo more interesting.



This image on the left was created with four layers. The camera was on a tripod and was on manual mode to make sure each exposure was identical in terms of brightness, focus, and white balance.

One photo was taken of only me sitting on the couch, and the other three photos were of me holding the pillow, chair, and knife. I then layered the images on top of one another and erased the arms and hands that were holding the objects. After that, I made it black and white, added a texture, and put some skulls on the couch.



I simply laid my back on the stool in this one and had some of my sweatshirt dangle down in front of the stool to make it look more realistic and to avoid the “flat back”. There was another person to the left of me standing on another stool shooting a flash unit through a small shoot-through white umbrella, aimed directly down at me. He and the stool were masked out later in post-production.

This photo was taken in total darkness; the only thing lighting up the scene was the flash with the white umbrella in front of it. The white balance on the camera was set to “flash”, which is why the color is 100% correct and everything looks vibrant.



Here is the same technique, just a different subject and composition. The person was laying on a stool and kicking their feet up into the air. A slow shutter speed causes the motion blur of the feet and hair to occur. If you need more support don't shy away from using multiple stools, especially if you are in really awkward poses.

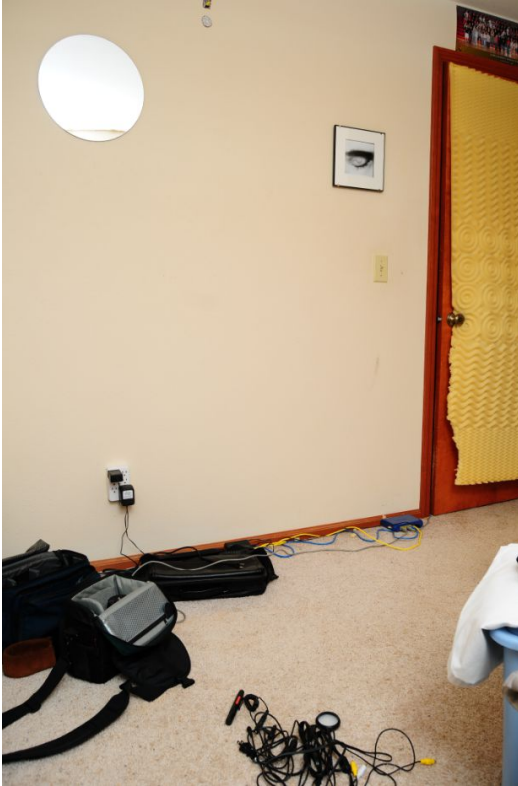


Talking about multiple stools, in this photo my hands were on two basketballs and my feet were on a little stool. This is actually harder than it looks because there is a lot of balancing weight on the basketballs that must be under control. The masking between the fingers in Photoshop takes a bit longer as well.

Perfecting Shadows

If you ever photograph yourself against a wall, you will most likely run into problems because the shadows of your body *and the stool* will show up on the wall. The background layer will be about twice as bright as the body layer. At first glance it might appear to be a tricky situation, but I have a solution to fix it.

Here are two example photographs:



Layer 1 (bottom layer)



Layer 0 (top layer)

Here is what makes this seem like a difficult image to deal with: My arm is in front of the stool and the shadows of the stool are on layer 0 but not on layer 1. If we started to mask out the stool as we would normally, it would look unrealistic. We need to take some extra steps for this image to look realistic.

In order to remove the stool and maintain the shadows of your body, follow these steps:

1. Create a layer mask on the top layer as you normally would.
2. Select the top layer (not the layer mask) and then carefully make a selection of the arm and hand. You can use the Quick Select Tool (this is what I used on this image) and/or the Pen Tool. Use Refine Edge located at the top to further adjust your selection if it isn't accurate enough. In this particular case, I am going to select everything but my hand, arm, back, and bottom. The selection will act as a "wall" when we create the layer mask.

3. After you have made your selection, select the layer mask and start painting black with a very large brush (400-1400 pixels) with the hardness set to 0. The stool is gone, but we need to bring the shadows back.



4. With your selection still active showing the marching ants, select the Burn tool then go to the top and set the brush size about to about the same size of the leg shadow (in this particular case it is roughly 700pixels) and set the brush hardness to 0%. Select Midtones for the range and lower the exposure to about 50% or so.

If you took the photograph using harsh lighting you will need to select a harder brush. Soft lighting is easier to deal with.

5. Make sure the bottom layer is selected and burn your shadows in. The stool is now removed, and artificial shadows have been added.



If you want *real* shadows, you will have to tie a rope around your ankle, body, and/or wrists and then somehow hoist yourself up in mid air (without sitting on a stool) and then clone out the rope later in Adobe Photoshop. This isn't worth it in most cases - Using artificial shadows is easier.



There is a popular composition that many female self-portraitists seem to use on Flickr, and that is to wear a dress that hangs down underneath their body (this adds realism), with their toes pointed (this is aesthetic). [Search "levitation" on Flickr](#) to see more.

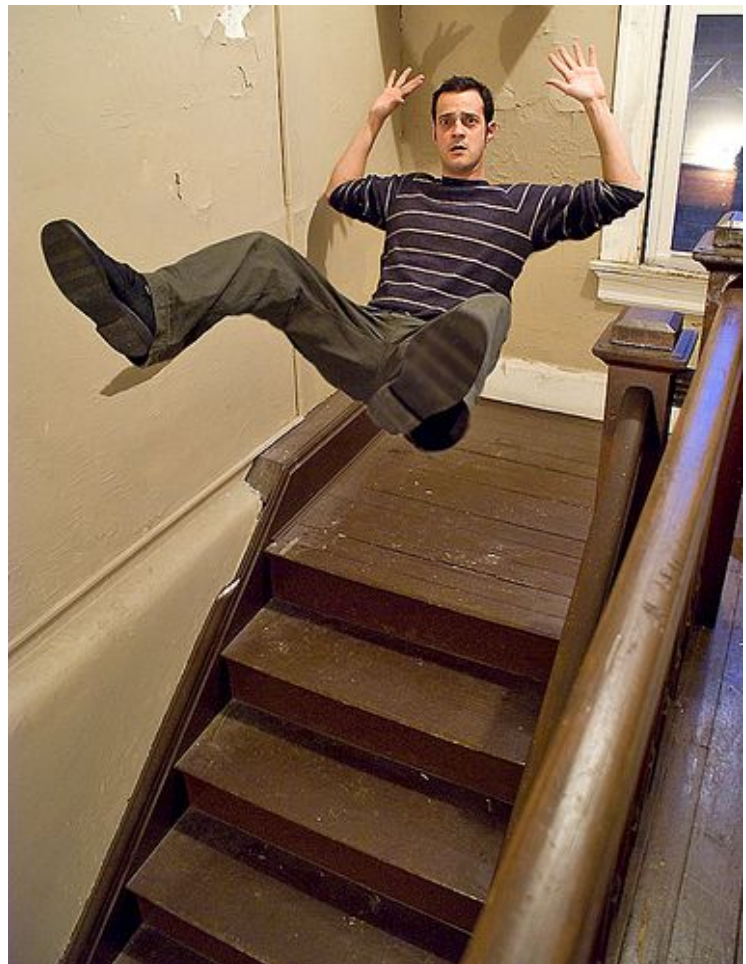


Although levitation photography is most popular with people, it can also be applied to objects (and animals) as well.



You can also incorporate multiple people into the composition and have them grab each others ankles, wrists, arms, legs, etc.

The boy in this photo above was originally sitting on top of a wheelie bin, and the girl is pulling on his ankle which gives the illusion that she is throwing him around. Using ladders is another option for the floater.

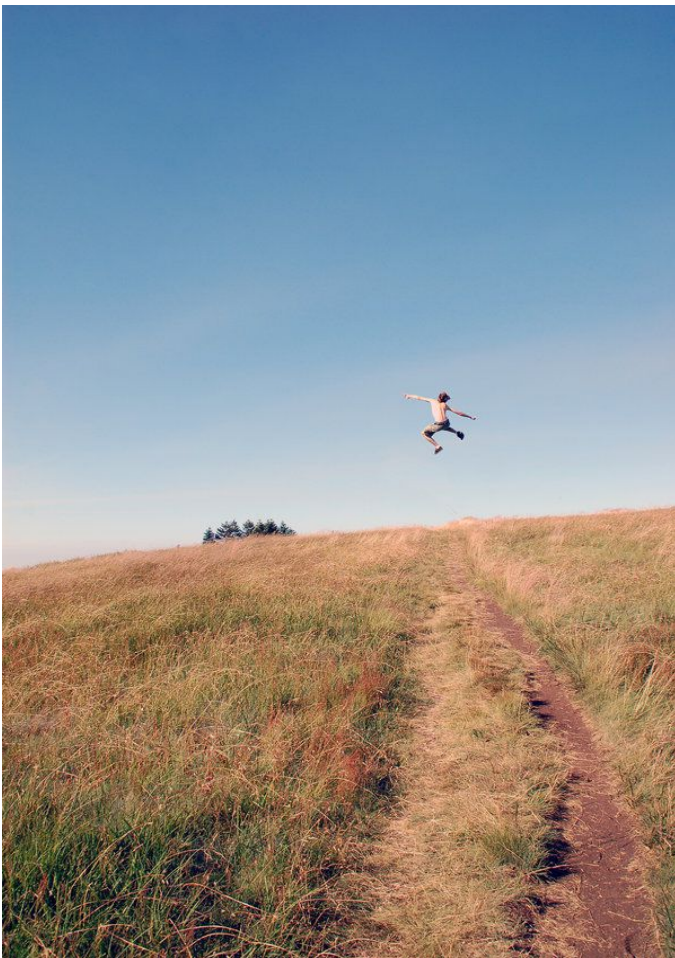


Levitation Photography over Horizons

Another easy way to do a levitation trick is to simply get a person jumping over the horizon. If the background is simple and they can jump high enough to get *just* over the horizon, all you have to do in Photoshop is duplicate the layer, select the person with the Rectangular Marquee Tool (this does not have to be accurate. In fact, leave about an inch of padding between your model and the selection), press CTRL+T and move the person higher up into the sky and then press Enter to place the selection.

You can use a soft eraser or layer mask to remove the rectangle shape around the body and Content-Aware Fill or the Clone Stamp Tool to fill in the 'old' model on the bottom layer.

If you want to create more space around the subject, all you have to do is expand the canvas size (*Image > Canvas Size*) select a portion of one side of the photo using the rectangular marquee tool, and stretch it out the edge of the canvas. This is exactly what I did to the picture on the right. The little image in the top right corner is the original, and the big image is the expanded one. The simple background was made possible because it was really, really foggy that day.



Floating Fruit

This can be done with a blank background which will only require one shot, or you can have a complex background which will require one shot of the fruit plus another shot of just the background. This is the same technique used in the invisible man.



Setting up the Shot

I don't have the original photographs for this image but I can still explain how I created it in [my studio](#). I had a white sheet hanging down from the ceiling about 1 foot in front of the wall with an external flash resting on the floor behind it, facing upward with an optical slave attached to the flash and another light (the main light) to light up the front of the subject. Then the main light bounced off the wall and back onto the banana to light it up (click the “my studio” link above to visually see what I am describing) which also triggered the optical slave to fire off the flash behind the bed sheet. The plate was resting on a separate white sheet on a stool.

Taking the Shot

But how did I make the banana pieces float in mid air? I cut the banana into separate pieces and then slid a shish kabob stick in the middle of the banana (be careful because the banana pieces can and will break apart). In order to make the entire thing float in mid air, I had an assistant carefully hold the base of the banana on its edges and the top of the shish kabob stick. We went through 2-3 bananas until we got it right. We had to experiment with different kinds of sticks until one worked. Pencils, pens, small sticks, and toothpicks to not work with bananas.

In Photoshop

I made everything a little bit brighter by using the Dodge tool (I wanted everything to blasting white) and then simply took a white paint brush and painted over the shish kabob stick to get rid of it. I used the Clone Stamp tool to remove any shish kabob stick that was remaining on the actual banana pieces.

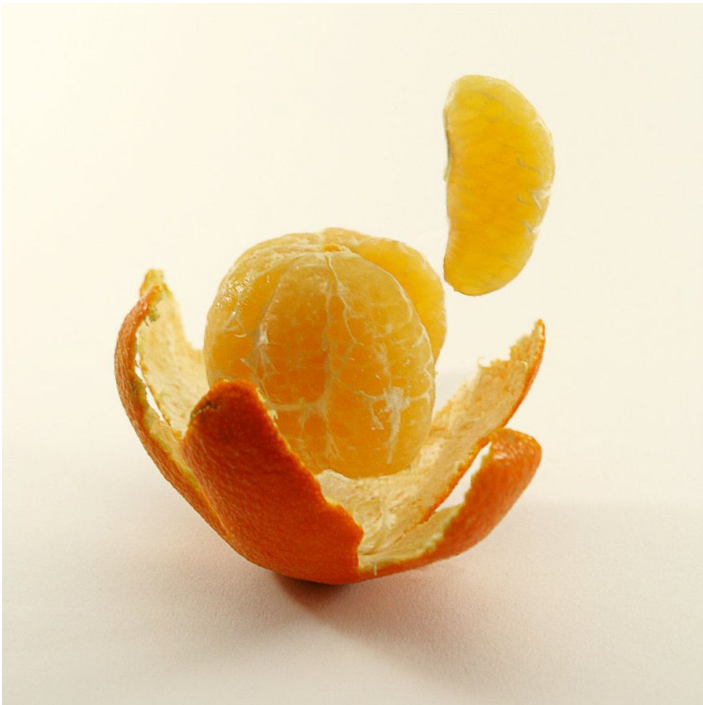
This second image of the banana (on the right) was made by simply selecting the individual slices and moving them downward (To be exact, I used a marquee tool, selected the slice I wanted to move by pressing CTRL+T, and then dragged and dropped the slice lower, and rotated it a little bit by grabbing the corners). I added the hand holding the knife later; it was a completely different photo that I took at a different time. It's so easy to add it into the frame because 1) it isn't touching anything, and 2) the white background makes everything consistent and really easy to pop different items in and out.



You can do this with any other fruit or vegetable, don't just limit yourself to bananas!

Try using toothpicks to hold the pieces together for round fruits.





The Invisible Man #1



D3S_8416



D3S_8417

When using this technique, you can have objects look like they are floating in mid-air under the same lightening conditions. It looks more realistic than those poorly done, fake-looking compositions where people take a bunch of different pictures and make a photo collage out of them. Don't get me wrong, some of those pieces look excellent, but when you just go to Google Images, steal some pictures of some shoes and a skateboard and then slap it on to a photo you took of the street, it lacks realism, which is what we're going for. When you get everything done *in-camera*, the lighting conditions are all the same.

The only thing I had to add to this photo was a faint shadow underneath the skateboard because after erasing the red container, the original shadow wasn't really there. I duplicated the layer, went around the skateboard with the pen tool and then slightly darkened the cement underneath it with the Burn tool. I also added some mild HDR Toning in CS5 to make the photo more crisp.

The last example was done with shoes, but you can also do this with a hat, glasses, and cigarettes.



You can either carefully hold the hat from behind (being careful not to wrinkle it too much), poke a string through the top and suspend it, or stick your hand up inside of the hat where your head would normally be and hold it that way and just use the Clone Stamp Tool to erase your hand in the hat. I used the latter method in this photo, but probably the best method is using a string to suspend the hat.

How do you suspend the glasses and the cigarette? Hold them carefully without getting your finger inside the reflection of the glass. Then simply use the Clone Stamp Tool to repair any areas where your finger was holding onto the glasses, and the layer mask to 'erase' the rest of your hand and arm.

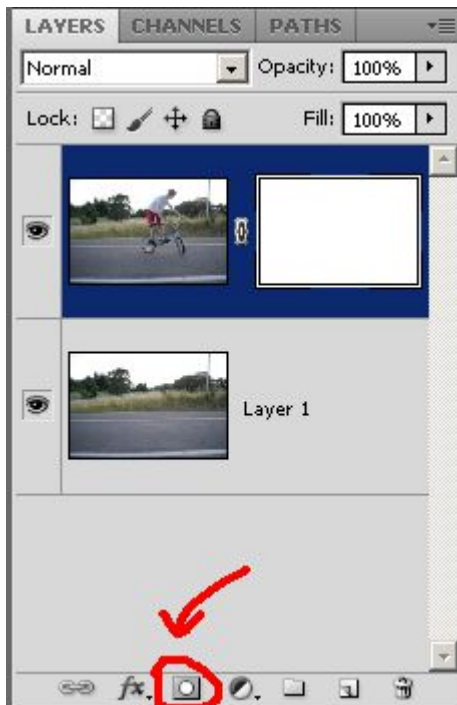
The Invisible Man #2

Put your camera on a tripod and set it to manual mode, set your white balance to something other than Auto, and turn off your auto-focus. We are going to be taking two pictures that will we later layer on top of one another in Photoshop, so they need to be identical with each other in terms of aperture, shutter speed, focus, white balance, and composition. Below are two images I took after locking my camera down on a tripod and using the self-timer:



As you can tell, the end result of this is going to be somewhat unique, because I haven't seen many "Invisible Bicyclist" pictures laying around the internet, have you? :)

After you have taken your two photos, load them up into a single Photoshop document by either clicking *File > Scripts > Load Files into Stack...* or by simply dragging and dropping both of the images into the same document.



Make sure that the layer with the person in the frame is on the top layer. If you have to reorder the layers, do so.

Next, create a layer mask on the top layer by clicking the button that is circled in red. Then, with the layer mask selected, take a black brush and start painting over the arms and legs of the human. The body parts will be erased and the background will be intact. Do this for the entire body.

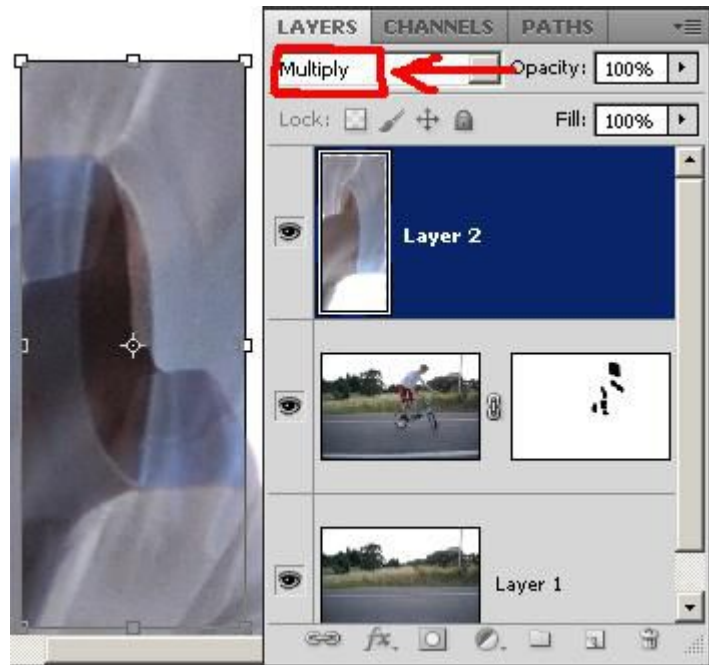
Note: You could also reduce the Opacity of the brush to 50% so you could still see him a little bit but also be able to see through him, if that's the look that you're going for.

Now that we have carefully erased the head, arms, and legs, how do we fix the areas around his sleeve and neckline? Simply follow these steps:



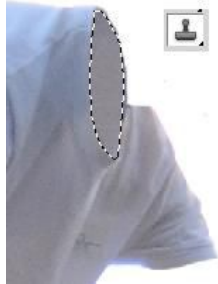
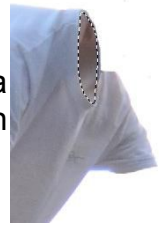
1. Select the top layer (not the layer mask) and then make a selection around the collar line.
2. Copy the selected area by hitting CTRL+C on your keyboard.
3. Paste it by hitting CTRL+V. This will make a new layer of the neck only.
4. Hit CTRL+T on your keyboard and then right click inside of your selection and click Rotate 180 degrees.

5. Place the upside collar right over the existing collar below it to create an oval shape. You can change the blending mode to Multiply so you can see what you are doing. Hit the Enter or Return key to set it in place. You can set the blending mode back to Normal now, if you wish.



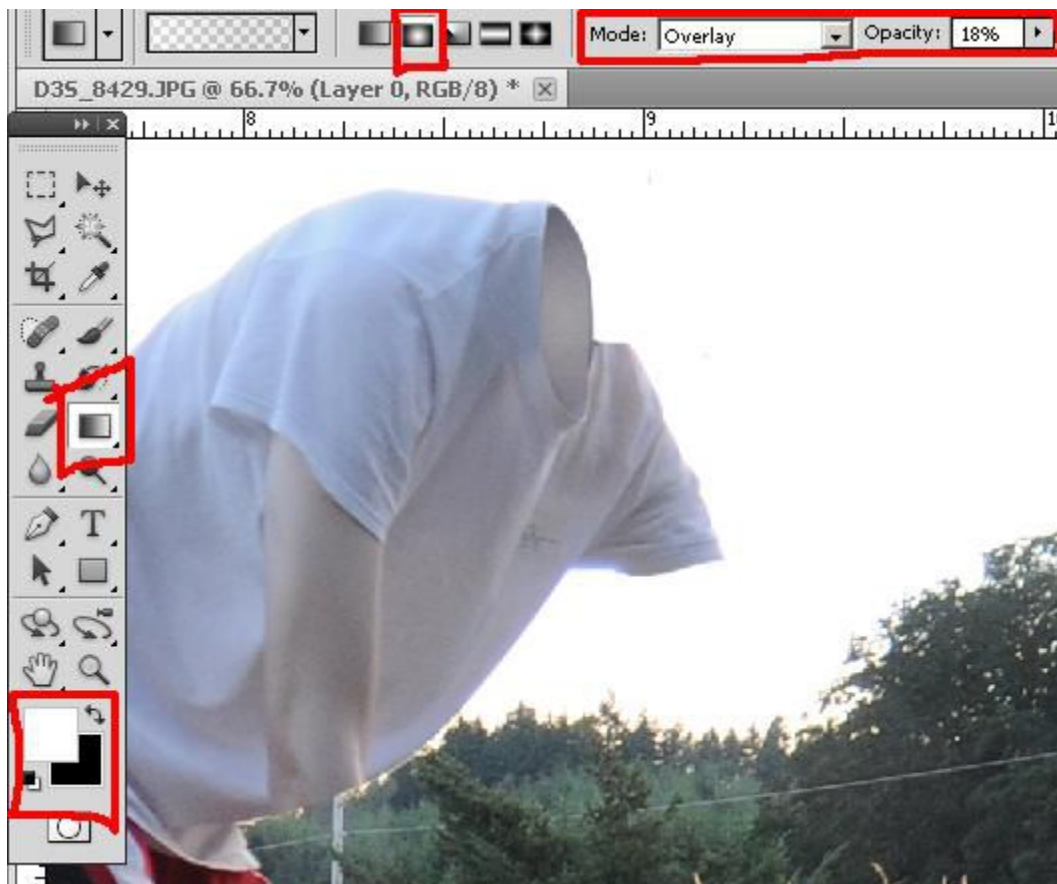
6. Create a layer mask on the new layer and mask out most of everything until you get something that looks similar to the image below.
7. Hit CTRL+E to merge the two top layers together.

- To get rid of the neck inside of the shirt, grab the Pen tool and make a selection around the hole with a feather radius of .3, hit OK, then push the delete key.



- Grab the Clone Stamp Tool and ALT+Click on an area on his shirt, then click inside of the area inside of the selection and fill it in.

- If you want to add some shading to make it look more realistic, grab the Gradient tool (click and hold your mouse over the paint bucket icon and it will appear), then go to the top and select the Radial Gradient icon. Set the Mode to either Overlay or Multiply and reduce the Opacity to 5%-20%, then click and hold your mouse in the center of the selection and drag your cursor to the edge of the selection, you will now see some shadow. Deselect the selection by right clicking inside of it and then clicking Deselect.



And that's all there is to it. Use the same method on the end of the sleeves and the shorts. Remember to use the Clone Stamp Tool to fill in any areas where the leg/arm is in front of the body.

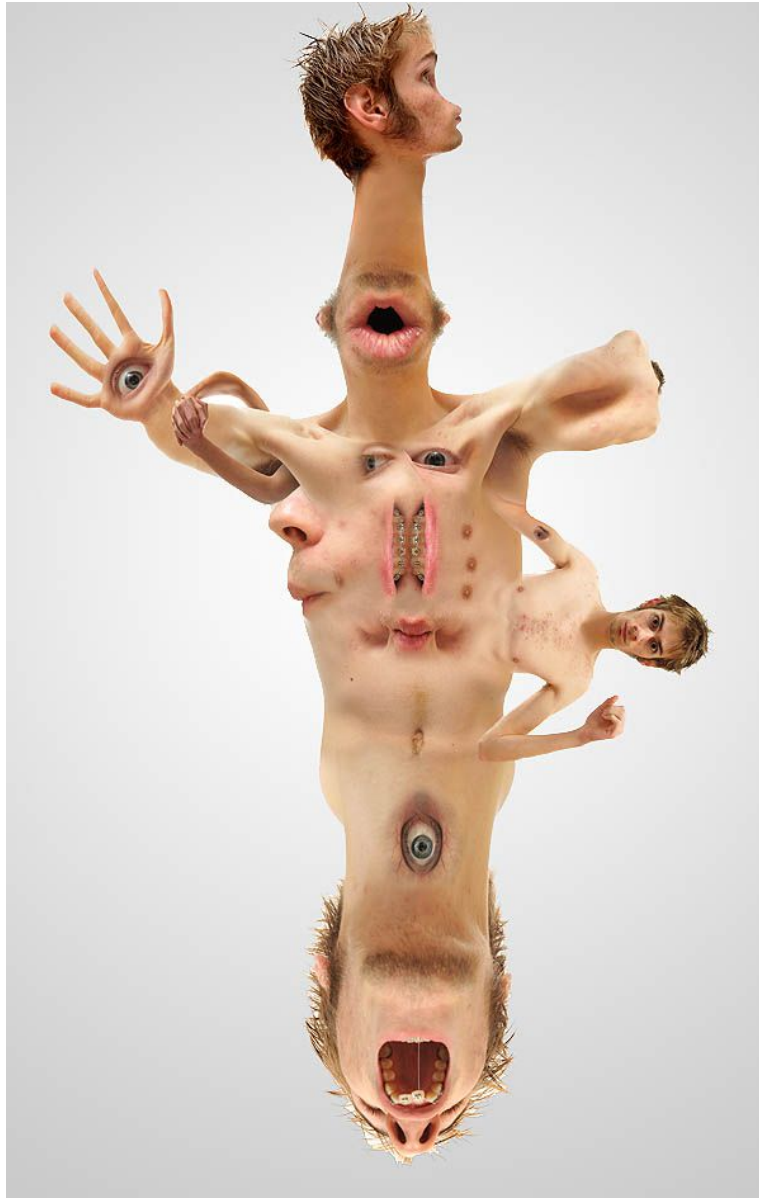


Here is the final result. I replaced the sky using a layer mask, and also propped his torso up using the Puppet Warp feature in CS5. In order to remove the part where his leg was covering the tire, I simply copied part of the tire, pasted it, rotated it so it fit into place over his leg, and then masked out everything except the tire. For the handle bars, I painted over them with a dark brush.





Flesh Manipulations



Flesh manipulations are shocking images because we as humans are used to seeing normal faces every day. We never stop and think twice when we see them. But, if you displace an eye, turn a mouth upside down, or rotate an eyebrow 90 degrees, it can have a powerful impact on your viewer. The image above is a collage of several separate images that can be seen on the right. A white background was used to make the isolation of the body parts easy in Photoshop, and a flash was used for bright, *consistent* lighting conditions, which is key.

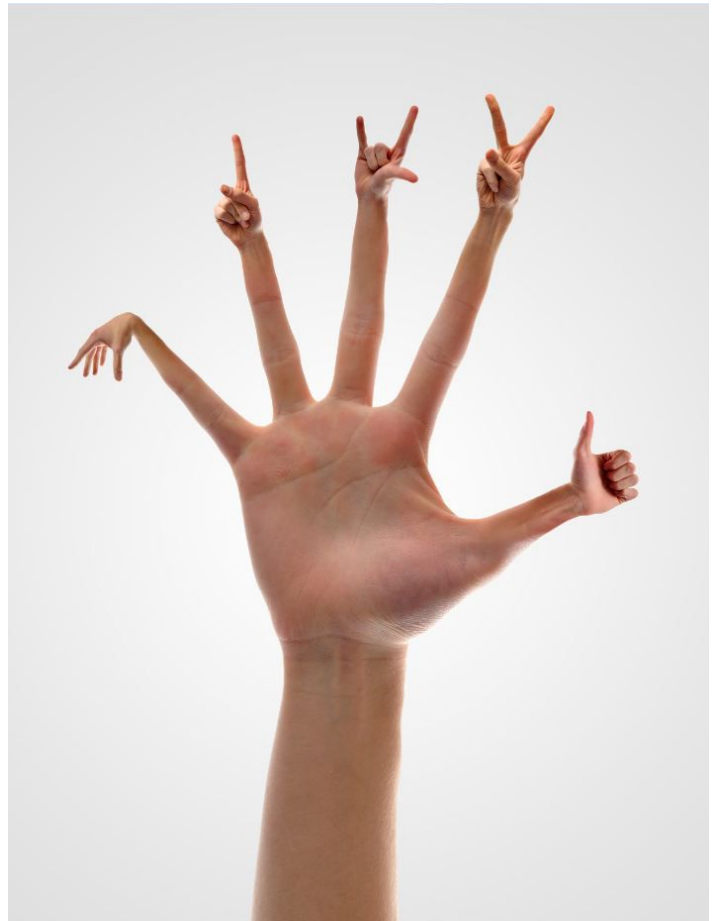
In order to isolate the body parts, mask-out everything but the body part itself. Once you have all the body parts isolated, you can mix-and-match body parts to create your own creature! Create a layer mask on each of the layers and use big, soft paint brushes to fade out the body part so it smoothly transitions into the next one. With a layer selected, you can also type CTRL+T, right click inside of the selection and select Warp to warp/stretch the body part according to your standards.

Handsome Hands

Here is an example where I took six different photos of my hand over a white background posing in different orientations. You can watch a time-lapse of me creating this image [here](#).

Place all the images inside of a Photoshop document as layers. Use the Quick Select tool to quickly make a selection of the hand. After that, right click inside of the selection, click Select Inverse (this will select everything *except* the hand) and push the delete key on your keyboard to delete the white background pixels. If you need a more accurate selection in any given area, use the Pen tool.

After you have deleted the background pixels on all your layers, re-size and reposition each hand layer by Pressing CTRL+T on your keyboard (or CMD+T if you are using a Mac).



Now it's time to make the wrists/arms of the small hand smoothly transition into the fingers of the large hand. Select any mini-hand layer and lower the opacity to 50%. You will see where the wrist of the small hand out-sizes the fingertip. Delete that extra stuff falling outside of the fingertip by using the pen tool.

You can also type CTRL+T when any layer is selected, right click inside of the selection, and select *Warp* to warp/stretch the body part according to your standards. This is useful if the wrist/arm isn't large enough to fully cover the finger area.

After that, put the Opacity up to 100% and create a layer mask on each of the layers and use a large, soft paint brush on the layer mask to fade out the wrist so it smoothly transitions into the finger. It should look pretty good now. Use Hue/Saturation, Levels, Curves, or Brightness/Contrast to further fix problems with color and brightness.

Finally, if you want to, you can add your own background to the image. On this image, I just applied a light gray radial gradient to a blank empty layer at the bottom of the layer stack.

Oh yeah, you can also do this with feet, too. Pretty much any body-part, actually. Use your imagination.



Screaming Head

A quick and easy example of a good flesh manipulation would be to take a picture of yourself screaming and then make your mouth cover your entire face.



Step 1: Take a picture of yourself screaming. You can also take an additional photo of a *closeup* of your mouth and use that if you don't want to lose any resolution.

Step 2: Make a selection around the mouth with the Rectangular Marquee Tool.

Step 3: Copy the selection (CTRL+C) and then Paste the selection (CTRL+V) It will make a new layer with the mouth only.

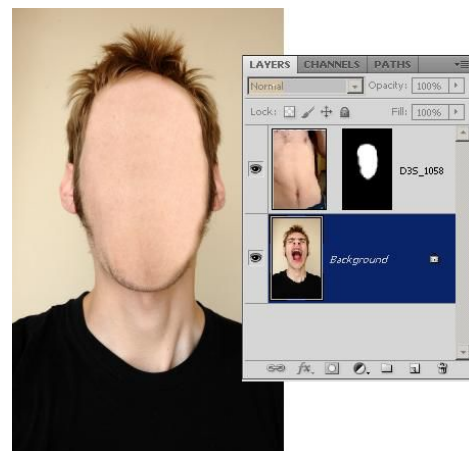
Step 4: Hit CTRL+T to enter Free-Transform mode and re-size the mouth over your the head so it covers most of it up. Push enter to apply.

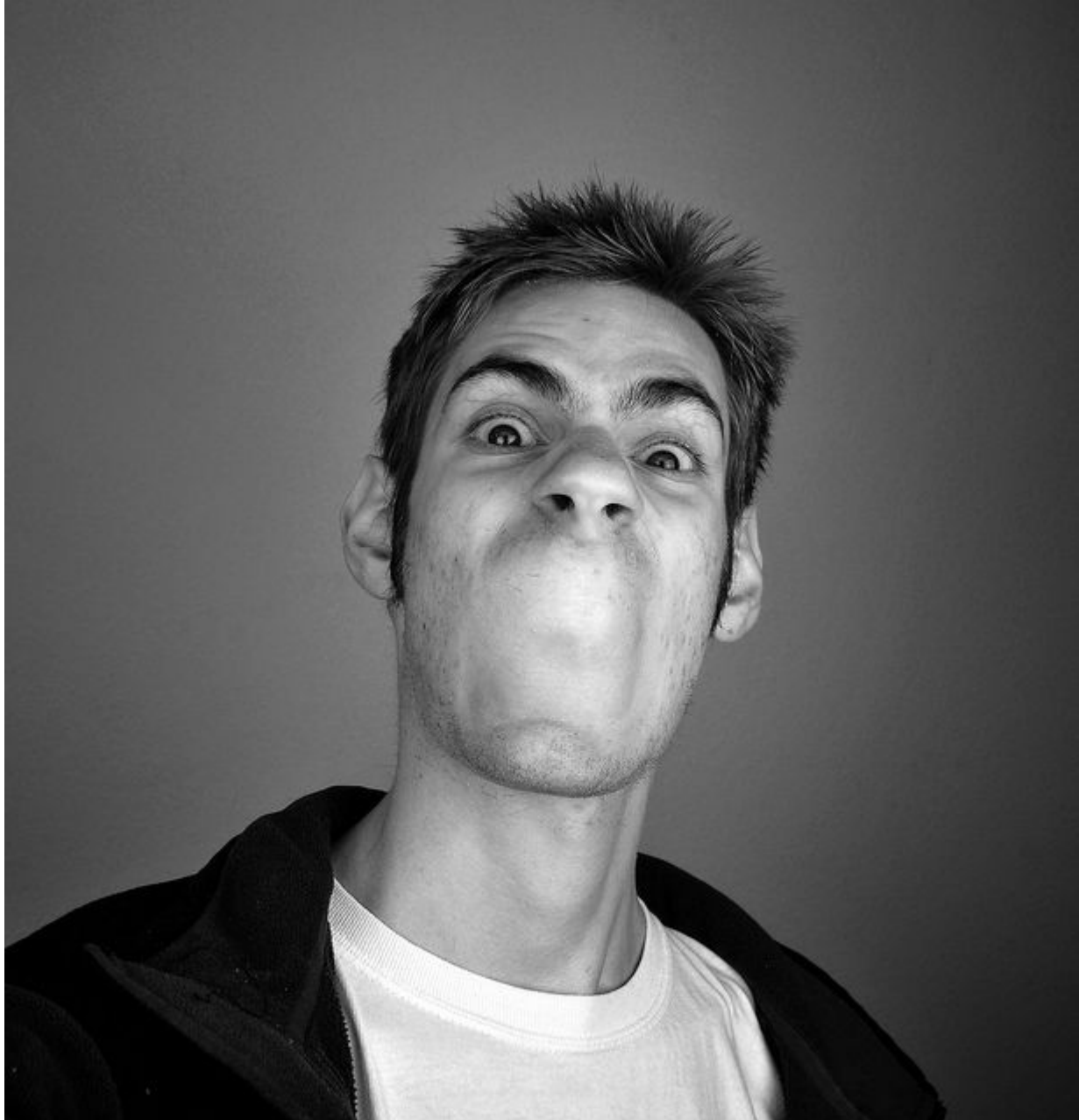
Step 5: Create a layer mask on the top layer and grab a soft black brush using the Paint Brush tool, and then paint around the edges of the mouth on the layer mask to erase the hard edges. This guy looks pretty loud and in-your-face, doesn't he?



Blank Head Trick

Take a picture of a plain part of your body, such as your stomach or back. Put the layer on top of the head layer and create a layer mask and erase the edges. You can use the Clone Stamp Tool to fix certain areas of skin by ALT+Clicking on a plain area of skin and then by clicking and painting in the area that you want to get rid of, such as a bump or pimple. I didn't have to use the clone stamp tool that much in this example. Remember to take the images with the same camera settings and under the same lighting conditions so the skin-tones match up.





Instead of using my stomach to replace my mouth with flesh, I just filled it in with another shot I took of my neck because it was more bumpy and three dimensional.

Using Content-Aware Scaling

This technique of flesh manipulation requires CS4 or higher. I love using this method because it is fast, dead-simple, fun, and of course hilarious.

Step 1: Import a regular head-shot photo into Photoshop.

Step 2: Type CTRL+A or CMD+A to select the entire photo.

Step 3: Go up to *Edit > Content-Aware Scale*. You can then grab one of the corners of the selection and either shrink it or expand it. That's all there is to it! This is way funner than using the Liquify tool in my opinion.



Fake Tilt-Shift Photography



Regular tilt-shift photography is where you use a special lens that can tilt the depth of field plane in order to get more (or less) of a subject in focus. It's particularly used in macro photography because the depth of field is so shallow that it is hard to get your subject in focus using regular lenses. This 'fake tilt-shift' photography trick is best applied when you are at a slight aerial position, but it also works when you're not. The effect makes everything look like miniature figurine models.



Let's start out with a photograph of some skyscraper buildings.



Step 1: Duplicate the layer.

Step 2: Add a Lens Blur to the duplicated layer by going to *Filter > Blur > Lens Blur*. Make sure "Source" is set to none in the drop-down box (it should be anyway), and then set the radius to something around 20-40 if you are on a 12-21 megapixel camera. This varies from image to image, so if you don't like the result of the first attempt, restart and try it again with a different radius amount.

Step 3: Create a layer mask on the duplicated layer.

Step 4: Grab the Gradient Tool and then select the Reflection Gradient at the top.

Step 5: Hold down the shift key and draw a line out from where you want your focus plane to be. If the effect is reversed, simply hit the X key to swap the foreground color with the background color and try it again. Your photograph now looks like everything in it is miniature!



The Droste Effect

The [Droste Effect](#) basically takes a part of the image and repeats the image as a whole into that part. To quote Wikipedia: *“The Droste effect is a specific kind of recursive picture.... An image exhibiting the Droste effect depicts a smaller version of itself in a place where a similar picture would realistically be expected to appear. This smaller version then depicts an even smaller version of itself in the same place, and so on.”*

The droste effect can be applied to any image, but ones that work well usually have some sort of shape or hole in the picture where you can apply the effect. This is done by using a droste effect filter.



This is Josh Sommers, a major contributor for making the droste effect known on Flickr.



Using the Filter Plug-In

To apply the droste effect to an image, you will need either **GIMP+Mathmap filter+The droste code**, or **Pixel Bender+Droste.pbk**. Both methods work pretty much the same with only minor differences. Pixel Bender is better for people who use Adobe Photoshop CS4 or CS5, however *PixelBender has been discontinued for CS6*, so you will need to use the GIMP method if you have CS6.

The biggest difference I found was that the Pixel Bender method can only have a maximum image size of 4000x4000 pixels (at least, on my computer anyway), but the Mathmap method can handle any image size.

Pixel Bender is able to process the information by GPU, so if you have a graphics card it will be much faster than relying on your CPU. The preview window is also larger in Pixel Bender. Below are instructions for installing and opening up the filter for both methods:

The “GIMP+Mathmap filter+The Droste Code” Method

Step 1: Download and install [GIMP](#). (At the time of this writing, I use version 2.6.11)

Step 2: Download and install [Mathmap](#) (this is a plug-in/filter for GIMP) (ver. 1.3.5)

Step 3: To apply the droste effect to an image inside of GIMP, open an image and then click *Filters > Generic > Mathmap > Mathmap*.

Step 4: Copy this [droste effect code](#) and then paste it inside of the mathmap plug-in in the Expressions tab.

Step 5: Push the preview button, and then click the User Values tab. Your controls/sliders are here.

If you are having trouble getting it working, take a look at the comment section of the link in step 4.



The “ Pixel Bender+Droste.pbk” Method

Step 1: Go to [this web page](#) and scroll down to where it says “Pixel Bender Plug-in for Photoshop CS4” in bold text and follow the instructions. There is a link right underneath for CS5 instructions.

Step 2: Download this [Droste Effect Filter](#) and put the Droste.pbk file inside of your “Pixel Bender Files” folder. This should be in *C:\Program Files\Adobe\Adobe Photoshop CS5*

Step 3: Now we are ready to open up the image and convert it to a droste pattern. There are two ways of doing this: you can either use the Pixel Bender as a Photoshop Plug-In, or you can use it inside a standalone application. If you want to use it as a plug-in, it should be listed under *Filter > Pixel Bender > Pixel Bender Gallery*. After you click that, you should see “Droste” listed in the dropdown box. Click that and start messing around with the sliders.

Note: I find that, for me, using it as a Photoshop Plug-In never works. It can work at times, but it usually crashes Photoshop. I don't know if it is just my computer (Windows 7 64bit) or if it is like that for all computers. You can try it out inside of Photoshop as a Plug-In, but if it crashes... the result for why that is, is unknown. If it works for you though, then great! It will make things much more convenient.

If you want to use the droste filter inside of the standalone application, Pixel Bender Toolkit 2, then simply go to your start menu, go to your program list, find Pixel Bender Toolkit 2 and open it up. The actual program should be installed inside of *C:\Program Files (x86)\Adobe\Adobe Utilities - CS5\Pixel Bender Toolkit 2\Pixel Bender Toolkit.exe* just in case you can't find it. Once it is open, click *File > Load Image 1* and select your image. Then, click *File > Open Filter* and then select the Droste.pbk file we downloaded in step 2.

Now, in the bottom right corner of the window, click 'Build and Run'. You should now see a bunch of sliders on the right side of the window, these are your controls. I'll go over how to use them in the next step. But before I do, there is one more thing you should do before you continue to mess around with your picture. At the top of the window, click *Zoom > Fit to Screen*. Always remember to do this when you open a new image. Every time.

Step 4: Lets make a droste spiral with all the sliders on the right side. This may look intimidating but don't worry, just take a look at this [web page](#). It tells you what the sliders do and which ones are important.

Choosing The Right Image and Creative Compositions

A common composition people use for their first droste picture is to take a picture of themselves holding up a picture frame. I'm going to go over how to do this so you can get a basic understanding of the droste effect.



Step 1: Here is the photo that I am going to apply the droste effect to. What I need to do is erase everything that is in the picture frame. To do this in Photoshop you will need to make sure your layer is unlocked. In order to do that, simply go to your layers window and then drag and drop the lock icon into the trash bin, as shown on the right.

Note: If you are using GIMP, right click on the image and click Layer > Transparency > Add Alpha Channel.



Step 2: Now you will need to erase everything that is inside the picture frame. You can use the Eraser tool if you want to, but I like to grab the Polygonal Lasso tool to select the basic interior of the frame, then use the eraser tool (or the pen tool) to erase the part around the finger tips:

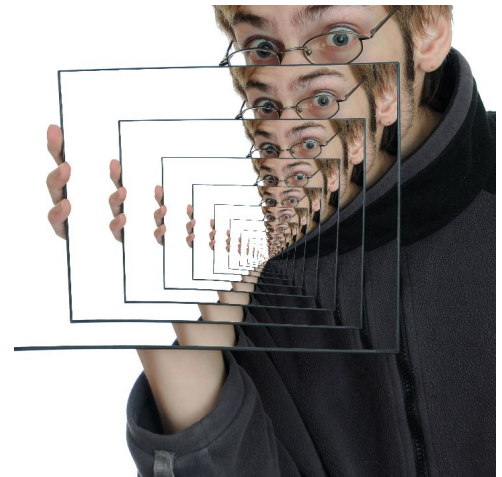


If you are using GIMP or the Pixel Bender Plug-In for Photoshop, you can immediately start messing around with the Droste filter. However, if you are using Pixel Bender as a standalone application, you'll need to first save the image as a .PNG file (to save transparency) and THEN import it into Pixel Bender.

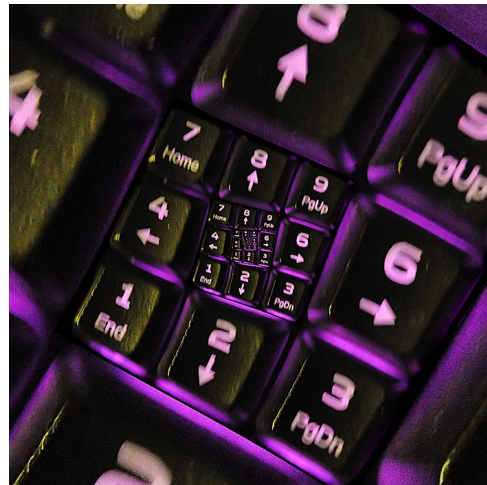
Step 3: If you are using Pixel Bender, the first two sliders should say "size". Put the dimensions of your photos on these sliders. For example, if my image was 200x300, I would put 200 for value of the first slider, and then 300 for the value of the second slider. In this example I'm using 4000x4000. Also, don't forget to click Zoom > Fit to screen. You won't have to worry about either of these things if you are using Mathmap.

Step 4: Adjust the inner radius, outer radius, and levels until you find something that works. Experiment! For this example, I simply made the inner radius 100, the outer radius 72, and the levels to 20. That was it. If the picture frame wasn't in the center of the image, I would probably have to adjust the centerShift or the size.

Try experimenting with different amounts of space outside and inside of your picture frame (or whatever object you are holding), it is usually best to have more space around the object than less. If you have too little, blank black bars will start to appear because there is nothing there to fill in the empty space.



The transparency cut-out of your photo can be as simple or as complex as you want to make it. In fact, you don't even have to use transparency at all if you don't want to. Take a look at these examples below. None of them used transparency. This is possible by cropping specifically what you want to have spiral down. The phone looked cool but the lighting was not 100% even across the whole frame, this is why you can see the edges of the rectangular spiral. The keyboard image on the right is a little better when it comes to not being able to see the harsh lines, but it is still noticeable.



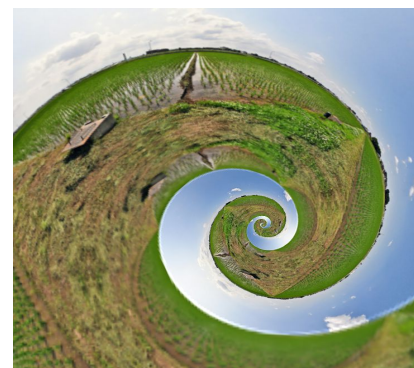
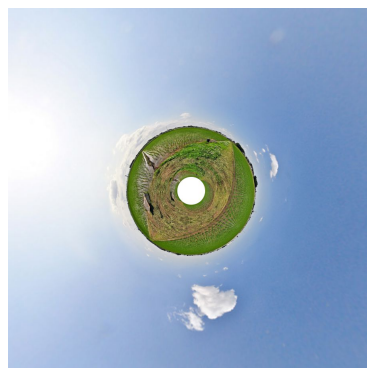
If you want to use this non-transparency method on circular shapes, you will have to UN-tick the “transparentInside” check box in Pixel Bender. If you are using Mathmap, TICK the “NoTransparency” check box.





I like to call them spiral planets because that is just what they are. Feel free to get fancy with layer masks and adding additional elements like clouds, suns, etc. like Tom Kiel did in the photo above. Make it a work of art and not just a some by-product from a mathematical process. I love this hole-in-one-like concept he did, don't you?

You will have to mirror your original equirectangular, make it into a planet with plenty of sky, and erase the middle hole. Then you'll have to bring it into Pixel Bender and mess around with the values until something looks good. That's what I did anyway (see the sequence of the three images below that shows each step). There are better ways to do it that give higher image quality but they are complicated and go outside the range of this book. If you would like to learn more on how to create high quality spiral planets, please take a look at [this discussion thread](#).



More Creative Applications



You can also use two or more different images when using the droste effect. The results will be stunning.

“I took two images using a tripod. I found the suitable droste parameters on the first pic, saved them, and used the same on the second one. By doing that they are 100% aligned.

After that I added them as two layers, and simply used a layer mask to mask away the top layer (the rubber tool can be used as well, but less flexible).” - [Oyvindi](#)



These three photos are by Photos by [Michael LaPalme](#).

Even though the effect produces a never-ending spiral, this is the end of the droste effect chapter. If you are confused or just want more resources on it, head on over to the [Droste Effect Print Gallery group on Flickr](#). They have droste images there and can answer any questions you have. You can also head on over to the [Mathmap](#) group if you are only using Mathmap for your droste images.



The Harris Shutter Effect

This effect [can be done in DSLRs](#) as is, but it can also be done in Photoshop.

Step 1: Put your camera on a tripod. Don't move it.

Step 2: Take three photographs of a person, animal, or object in a different position around the frame.

Step 3: Place all three photos into one Photoshop document as three separate layers.

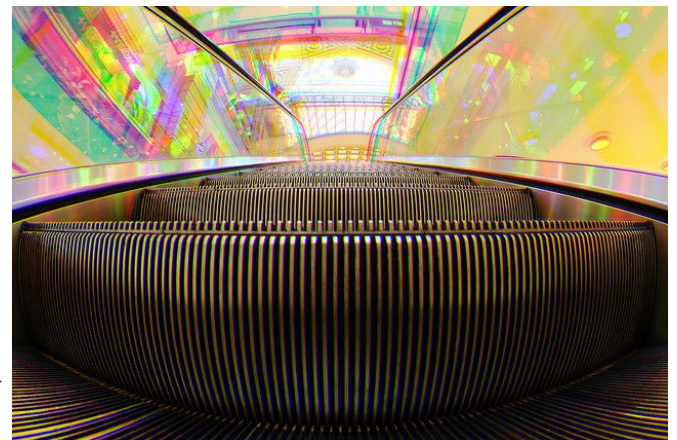
Step 4: Copy either the entire RGB layer or a single, red, green, or blue channel by clicking on the channels tab, and then replace one of the red, green, or blue channels onto the bottom layer. You'll need to do this twice if you want three color variations of your subject. After you have pasted the layers into a channel, your channels pallet should look like the *one below*.

Note: If you can't find the Channels pallet, just click Window > Channels.



The photograph will render normal color in areas that remain stationary throughout each of the three photos. The example on the right is an elevator. The camera was placed on one of the steps so that the steps are in the same position but the environment around the steps are in motion. Pretty funky huh?

More resources on this effect can be found here:
http://en.wikipedia.org/wiki/Harris_Shutter
<http://content.photojojo.com/diy/make-a-color-photo-using-black-and-white-photos/>
<http://www.flickr.com/groups/harrishuttereffect/>



Mixing Day with Night

Sadly but surely, we are now at the very last trick in this ebook. As far as I know, this technique has been done only a few times in history, so more content on this subject is needed. Please email me if you make anything as a result of reading this so I can feature your content in this chapter (or any of the other chapters for that matter).

Here is the technique: Take two photos outside, one during the day and one during the night. Take both photos in the exact same location using a tripod. Next, layer them on top of one another inside of Photoshop and then selectively mask out half of the top layer so it blends into the bottom one. This will create an effect like this:



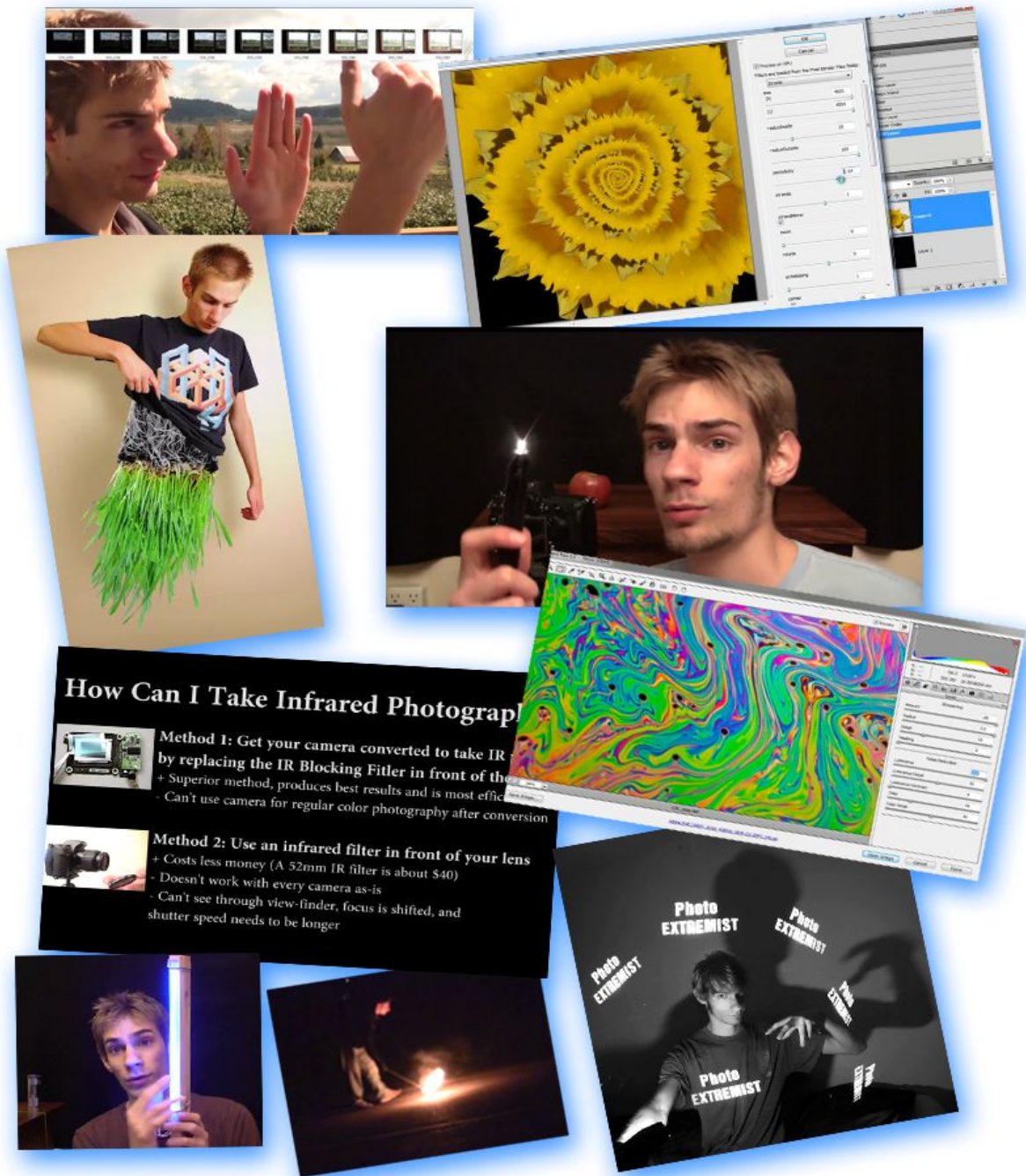
As you can see I've made the tree remain in daylight and then masked in the sky to reveal the night photo. You can see the stars because not a lot of clouds were present during that night.

I've seen this technique being done with equirectangular panoramas in the city before and it was fabulous. This effect works very well in the city because the lights coming from the skyscraper buildings adds a whole new dynamic to the scene.

This technique obviously requires your camera to be outside for a long period of time on a tripod. If you are not in a situation where you can do this, take one shot of the scene during the day and then come back to the same location during the night and try to match the composition as best as you can remember it through your viewfinder. Have Photoshop re-align the two layers on top of each other by selecting both of the layers and then hitting *Edit > Auto-Align Layers*. This will lock up the layers and match up their features to the best of Photoshop's ability. Dom Bower has created a [video tutorial](#) that describes how to do this process inside of GIMP.

Thank you for reading my ebook!
Remember that the video-version is available [here](#). It is a great compliment to this e-book because you can learn from watching me implement the techniques visually, in real-time, step-by-step.

>> [Check It Out Here](#) <<



How Can I Take Infrared Photograph

Method 1: Get your camera converted to take IR
by replacing the IR Blocking Filter in front of the sensor.
+ Superior method, produces best results and is most efficient.
- Can't use camera for regular color photography after conversion

Method 2: Use an infrared filter in front of your lens
+ Costs less money (A 52mm IR filter is about \$40)
- Doesn't work with every camera as-is
- Can't see through view-finder, focus is shifted, and shutter speed needs to be longer

You can connect with me on the following sites:

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[Facebook](#)

[YouTube](#)

[Flickr](#)

[Google+](#)

[DeviantART](#)

[Twitter](#)

[PhotoExtremist.com Flickr Group](#)

[Trick Photography and Special Effects Facebook Page](#)

How did you like my ebook?
Feel free to send me some feedback:
trickphotographybook@gmail.com

Also feel free to send in any images that you have created as a result from this ebook, or any suggestions for additional content that you would like to see in future editions of this title.

All the best,

Evan

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Recommended Reading

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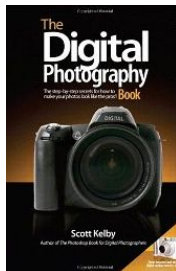
[Photographic Amusements](#) by Walter E. Woodbury

This is a free online ebook available on books.google.com. It is an old book (back in the film days, before Photoshop) but has *tons* of trick photography examples and is probably the best resource on trick photography. There is even an entire [Flickr group](#) dedicated to this book.



[Night Photography & Light Painting](#) by Brent Pearson

This is the one and only ebook on not only capturing night images, but also how to paint them with light. It's a pretty good find.



[Digital Photography Book](#) by Scott Kelby

This three part series is great for beginner and moderate photographers. It's not a crazy idea and techniques book like this one is, but it talks about the essential things like getting tack-sharp images, composition, tripods and other gear, photography terms, how to use lighting, off-camera flash, etc.

[Photo Fun](#) by Webster Watts

An old book that has a chapter on trick photography.

[Special Effects Photography](#) article by Andrew Davidhazy

This article defines “Trick Photography and Special Effects” as a term and gives various of examples different tricks and effects.

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