

IR digital camera mod keeps autofocus intact

by [uhf](#) on September 4, 2006

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Intro: IR digital camera mod keeps autofocus intact

There are many, many instructions available about converting digital cameras and webcams into IR capable cameras. However, if you simply remove the IR filter which is often a thick piece of optical glass you will lose the auto-focus capability as the glass alters the focal length. This Instructable lets you keep the auto-focus because your not removing the glass, only removing the IR coating.

I had read about how the filter - essentially a thick piece of glass, should be replaced to maintain the autofocus ability. Finding a replacement piece of glass the correct thickness isn't easy and dealing with optical companies is difficult and expensive for such a small piece of glass. I had thought of using microscope slides, the glass from photographic glass slide mounts or even an old filter (glass or optical acrylic). This involves cutting and layering the glass to the correct thickness.

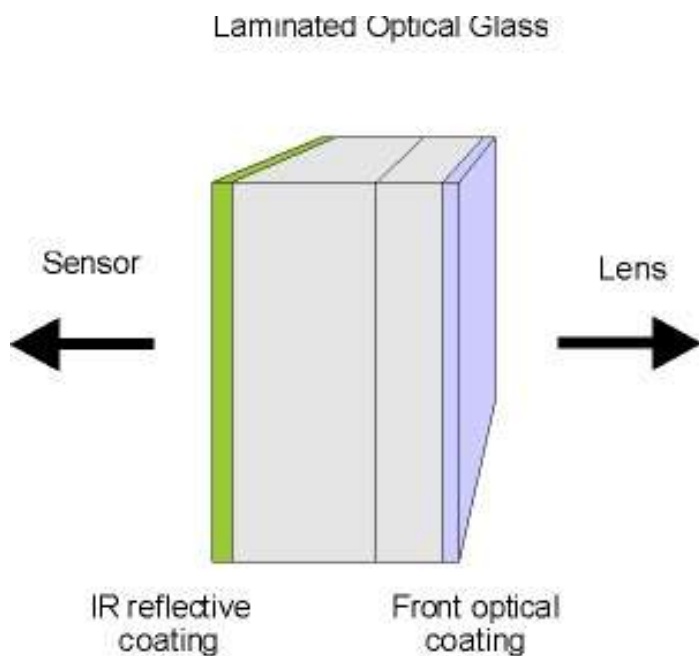
This is too much work for something that may not be successful anyway. So this is what I did instead.....

Step 1: Open up your camera

Open up your camera and find the IR filter which will probably be a thick piece of glass this is also known as a 'hot mirror' since it reflects IR radiation whilst allowing visible light through. Hot mirrors are often laminates which presumably have slightly different refractive indices, re-using it will maintain exact focus.

I modified a FujiFilm MX2700. Looking at the reflected surface on one side of the glass showed that it appeared to have a yellowy reflective coating which was optically transparent when viewed straight-on. The other side looked like a normal optical coating. So why not just remove the IR reflective coating and place the glass back into the camera with a thin piece of dark filter to cut visible light and allow IR through?

Note that this is for the MX2700, your camera may have a different arrangement. The important thing is to find and remove the IR blocking coating once you've resigned yourself to modifying the camera and otherwise having to throw away the glass filter anyway.



Step 2: Remove the IR reflective coating

Looking at the coated side of the hot mirror, it seemed to be thin and delicate, scratching if gently touched. Not so. It's an absolute pig to remove. I decided that I would use a slightly abrasive paint renovator cream made by Auto Glym to try and polish it off. This is a petroleum based cream containing fine aluminium oxide powder. It's used to remove the oxidised layer of paint from car body work prior to waxing. I chose it as I believed it would not scratch the glass surface.

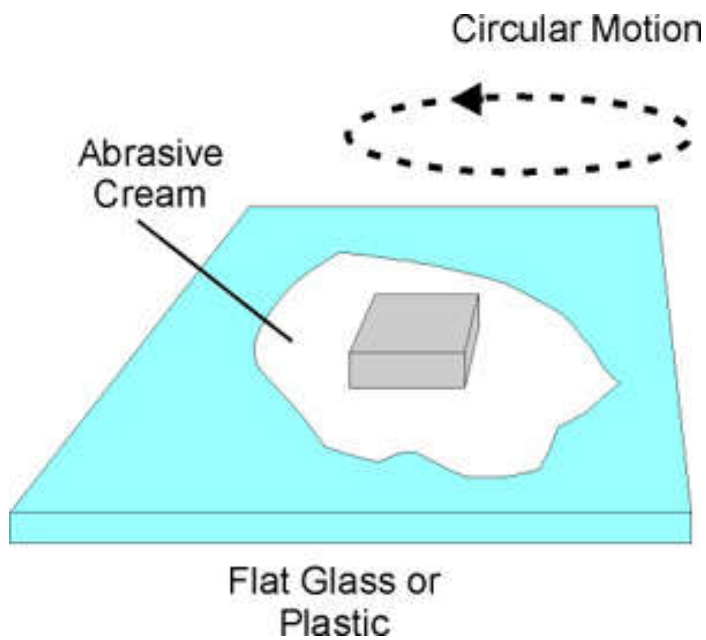
At first I used a small amount of cream on a piece of kitchen paper to gently rub the coating. I expected it to start coming off very easily. Ten minutes later the surface was beginning to look a bit scratchy and a series of concentric rings from the centre were forming. These were presumably the layers of coating from several depositions. I'm assuming it's coated using some sort of vacuum molecular beam epitaxy like process!?!?

The coating was holding out very well so I decided that a plastic based kitchen scourer might be a bit more persuasive. After another half an hour, I wasn't getting far and began to start thinking that a replacement piece of glass might be necessary. I decided that a change in technique might help. I used an old Cokin type A acrylic filter as a flat surface and rubbed the hot mirror over it in a circular motion adding more paint renovator cream every couple of minutes. This seemed to work very well and after a few minutes the coating gave way to a nice shiny glass surface. It should look like window glass. I think shiny flat plastic sheet like acrylic is probably the most ideal surface to rub on. Rub in a circular motion and add more cream every few minutes. Any scratches you see should be the coating and not the glass. Clean the finished filter with window cleaner. Try not to scratch the optical surface on the other side of the filter - if it has one. Otherwise, you may as well remove this as well.

So don't be afraid, the glass won't scratch as long as you stick to using the aluminium oxide based renovator cream that I used. It's far cheaper and easier than trying to get optical glass of the correct thickness cut.

You will also need to get a visible light blocking filter that allows IR through. These are the Wratten 25, 87 and 89 filters often talked about. These can often be obtained from eBay. I wanted the filter inside the camera, so it had to be very thin. If your in the UK try SRB Film services (they do ship abroad) who sell a thin Lee polyester sheet filter for infra-red photography. Cut the filter to size and place on the front of the hot mirror. Attach it using whatever you need to, but try and keep it flat. On a FujiFilm MX2700, the hot mirror fits into a plastic holder and the IR filter can sit in this, with the modified hot mirror on top.

If you can only obtain a normal filter that screws onto the front of a lens, then you'll need to attach it in some way to the front of your reassembled camera. There are various systems available for using filters and things for digital cameras with non-removable lenses, so have a look around.



Step 3: Finished product

Here is a picture taken with my newly converted FujiFilm MX2700. I bought it in 1999 and now use a Nikon D70 instead as my normal digital camera. The IR filter I use is a piece of old Kodak Ektachrome slide film. This is simply a dark frame of processed film that has the same properties as IR filters. Perhaps I'll buy a proper IR filter one day, but as you can see the results are fine except for a bit of colour-cast.

So why not give this a go with an old digital camera? If you have to throw the hot mirror away anyway then there's nothing to lose.



Related Instructables



infrared digital camera - the real way by talbotron22



Making a Night-Vision Webcam by leevonk



How to build a Multi-Touch surface by jck112



Infrared night vision digital camera/camcorde by electric_piano_5k



Nightvision Headset (video) by MoritzB



Cell Phone Night Vision - Under \$10 by iSteam

Comments

7 comments [Add Comment](#)



ozdagicams says:

Jul 1, 2008. 3:53 AM [REPLY](#)

Hi, Great idea! You may want to use the Manual White Balance of the camera to remove the colour cast. Just do a manual white balance on a white piece of paper, or even the green grass/foilage. Regards, ozdagicams



Whatnot says:

Jun 13, 2008. 6:47 AM [REPLY](#)

If the lens is glass would some cotton with acetone not work perfectly fine to remove the coating without needing abrasives? It dissolves a lot of materials/plastics after all. Just an idea.



Oreyeon says:

May 22, 2008. 8:18 PM [REPLY](#)

Hello, I was wondering. Anyone done this with a Canon Powershot G1? I'm soon to receive one in the mail and want to convert it to a complete IR camera. The mod now is to remove the IR Cut filter and replace it with a piece of clear glass in similar dimensions, or glue appropriately cut microscope slides together and drop them in. However, if the coating on the existing IR Cut filter glass can be removed, it would save a lot of headache. I'd be interested in knowing if anyone knows. :)



dharmabum says:

Apr 18, 2008. 8:49 PM [REPLY](#)

Can't speak for other models, but my Nikon uses an IR absorbing glass layer in the glass hot-mirror 'sandwich' that blocks the infrared spectrum... removing the coating sadly has no effect on IR transmission for mine.



gomiboy says:

Sep 6, 2006. 2:35 PM [REPLY](#)

I followed these (had modded my Sony DSC-P71 by removing the IR filter earlier), but this didn't work for me. I used a different product (petroleum based, but silica abrasive) which very slightly scratched the glass, but even after the IR coating was apparently removed (no reddish film left) the glass still blocks IR. Tested by blocking my TV remote with it - no IR signal gets through. Any thoughts?



uhf says:

Sep 10, 2006. 5:20 AM [REPLY](#)

Hello, both sides of the glass filter are possibly coated. On my MX2700 one side was a normal optical coating and the other was the IR coating. Different manufacturers probably go about it in different ways. Make sure the coating is completely removed, it is quite tough. The glass shouldn't really scratch unless you're using some kind of industrial abrasive cream (which shouldn't be the case if it's just a car paint renovator). Perhaps it's the coating that's scratched? In which case more work is needed. It took me about 15 minutes of rubbing on a flat piece of acrylic to remove the coating and there weren't any significant scratches afterwards. You can test the filter by putting it in front of the camera lens and doing the IR remote control test.



trebuchet03 says:

Sep 4, 2006. 3:31 PM [REPLY](#)

many, if not most, webcams have a way to manually set the base focus... I never had any problems with focus when I used a logitech messenger cam...