

Exciting news about a new Kickstarter project for smartphone photographers and videographers

I saw an amazing advert for a new product launched on the “Kickstarter” platform that might be of interest to those who enjoy the creativity of working with smartphones for either video or still images.

Pivo



Pivo is a Smart Interactive Pod for Your Smartphone Photography

Now what I like about this product is that it is not just another “egg-timer” modified to do time-lapse video or stills or a half-developed product like the “Turns-pro” rotator it will be a fully featured hardware product with a remote control for manual operation and an “App” which will run on the smartphone to provide a complete set of creative modes. These modes are, in my opinion, what will make this product a real worthwhile investment in your creative photography kit.

Already many times oversubscribed on the Kickstarter platform show the tremendous interest that the developers have created for this product.



One of the useful features that the “App” will bring to the unit is the facility to “active track” an object or person. So, if you are moving around during your presentation the app will control the Pivo unit to keep you in the frame. This feature has only been available on much larger gimbal devices such as the Osmo Mobile 2, so to have it in a more convenient package is tremendous.

I’ve made by pledge to back the project and hopeful for a March 2019 delivery.

You can also join the early backers by following this link [Kickstarter Page for Pivo](#) where you view the promotional video for the product.

Also of great interest is the partnership with “Restream” where you can broadcast your live stream from your smart phone;

Here’s there press release:

Pivo and Restream Partner to Bring Insanely Creative Contents to 30+ Live Streaming Platforms, Launching Exclusively on Kickstarter on November 13th.

Restream, the world’s best multistream platform has officially partnered with Pivo to bring truly dynamic interactivity to the world of multistream with features like smartcapture, face tracking and object tracking. Additionally, Pivo offers a total of 13 incredible camera features to create highly flexible and insanely creative videos, gifs and photos from a smartphone.

San Jose, California -- November 9th, 2018- Content creators today have a multitude of options when it comes to broadcasting their contents live. Platforms such as Youtube, Facebook and Twitch make it easy and available for anyone to stream online. However, until now, creators have been limited access to only one platform at a time. Restream.io not only solves this problem with multistream, which can maximize viewership reach, but also empowers creators by minimizing their bandwidth cost.

This is why a partnership with Pivo feels natural, because at its core both Restream and Pivo share the same mission; to let technology empower the worlds content creators to have no limits and be more effective at what they do.

With Pivo, it is all about unlocking the full potential of smartphone content creation, not only to create but also to share. Restream x Pivo paves new avenues of flexibility to creators with features that enable face and object tracking while multistreaming and a greater level of control with smart voice capture and gesture control.

Pivo doesn't stop there. Integrated into Pivos hardware and software are over 13 game changing features to unlock truly creative, engaging and emotional content creation on a smartphone. Restreams dedication to unlocking access to services which have typically been financially and technologically prohibitive has now reached a new milestone with a hardware partnership with Pivo.

"It's simple. You stream to us, deliver to us something like three megabits per second, and we redeliver it to a few destinations. All this bandwidth goes through our service. But we don't handle all the load of the viewership. That load goes to the streaming services. YouTube, for instance, covers it on their own side. For us, it doesn't matter how many viewers you have at the same time as a streamer because all of that is managed by the streaming services," explained Alexander Khuda, a cofounder or Restream.io. If smartphone photography superpowers is what Pivo unlocks, then Restream supercharges it for the greatest possible effect.

"What [content creators] need are gadgets that can make mobile media productions more interactive and dynamic because it isn't with the phones now...and this is really cool" said Sarah Jennings about Pivo at this year's Mobile World Congress Expo. With companies like Samsung and Apple pouring millions of dollars into smartphone camera development, it's easy to see how far smartphone hardware has come, however the methods for interacting and capturing photos and videos have largely remained the same. It is this gap which Pivo and Restream have teamed up to fill.



Close Up Methods For Canon EOS M Series Cameras

[link to the YouTube Video](#)



This new tutorial video explores some of the possible methods to achieve close-up images (and video) using the Canon EOS M series of cameras. Supplementary lenses offer a very quick and convenient way to allow the camera to focus closer, and hence get bigger image size, however they do suffer from several problems which can degrade the final image.

The use of extension tubes, whilst losing a little light in the process, gives superior results.

Out of focus images with Canon Powershot SX series cameras

Whilst using the Powershot SX720 and SX740 cameras quite extensively for an upcoming review I noticed quite a few of my images were clearly out of focus. Now I did experience this on a previous Powershot model and assumed that the camera focussing system had failed.

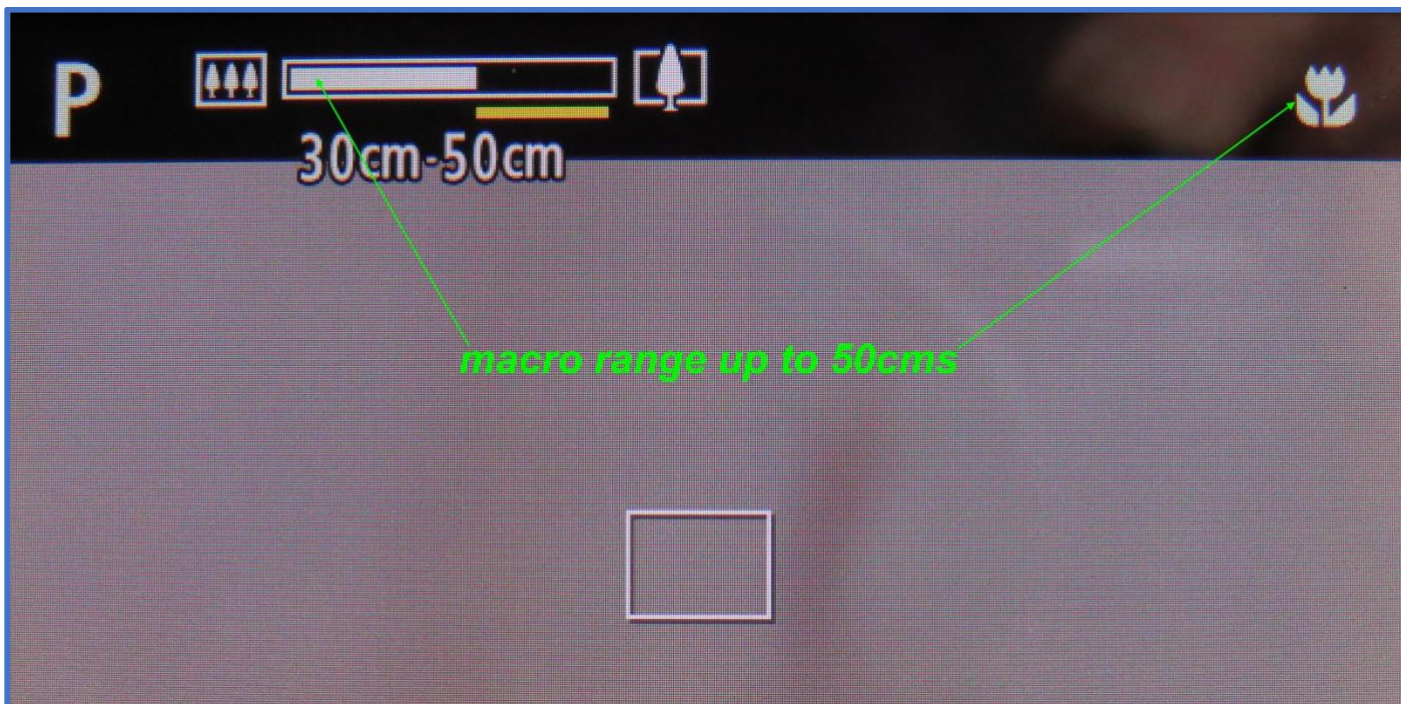
It was only after I started to look at how the camera was giving a clear indication of “focus lock” yet the images were out of focus.



A capture from the back of the camera showing the image that is clearly out of focus yet the camera is confirming a focus lock with the green rectangle being displayed. What should happen is shown below.

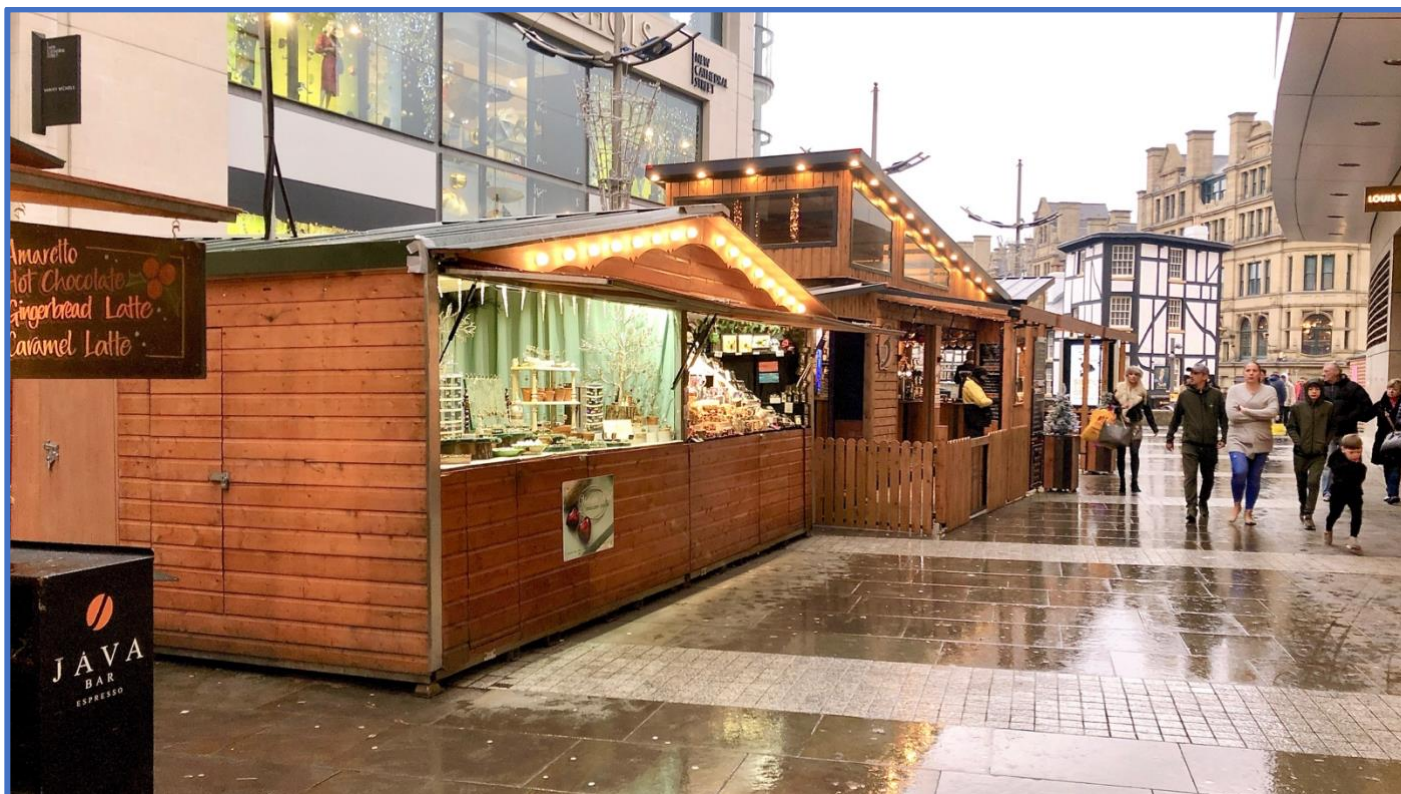


After quite a bit of investigation I found that this happened only when the AF macro mode was selected and when the camera focus was in the zone of 30 cms to 50 cms, maybe from a previous shot



Under these circumstances the camera would not focus in the most times that the shutter button was half depressed however the camera “beeped” and the focus rectangle turned green!
If the focus point was in the 50 cms to infinity zone the camera would always focus.
So, to prevent this happening to you, select only AF macro when shooting close-ups!

Manchester Christmas Markets iPhone X



Once again the Manchester Christmas markets are in full swing and as usual, it’s raining.

This year I decided to take a few images with my iPhone X ahead of going back there to shoot some video with the Canon EOS M50 with the 32mm F1.4 lens.



Using the smartphone certainly didn't raise too many stares as you do get some strange looks with something like the FZ2500. The next visit will be late afternoon and embrace some of the twilight shots.

Focal Length Equivalence and crop factor – still confusion?

The arguments around crop factor and equivalent focal length and depth of field have been around since digital cameras made their early debut. Early ccd sensors were not the same size as the size of film in the cameras that they were intending to replace so the lenses needed to be smaller to produce the correct imaging circle to cover the sensor diagonal. This resulted in lenses which had shorter focal lengths.

Had the industry introduced the digital cameras and compared them to cameras with a similar negative size as the ccd sensor inside them there may have not been this early confusion.

For example, Kodak introduced the 110 film format in 1972 with a negative area of 13mm x 17mm (based upon 16mm movie film) and when the "specialist cameras" (like the Pentax Auto 110) which had interchangeable lenses the lenses were engraved with the 35mm equivalent field of view. So, whilst the lens might have had a native 12mm focal length it was decided to translate this into terms that the 35mm film photographers already understood and hence 28mm was engraved on it.

So, when digital sensors came into being in small consumer cameras why did we switch to engraving the native focal lengths onto the lenses and then have the problem of trying to explain why we had to apply a "crop factor" to get the 35mm equivalent field of view?

The industry now needed to have a consistent benchmark to explain the reason that the shorter focal length lens produced results that were comparable to the field of view and depth of field as 35mm film cameras.

This benchmark was the "crop factor". Crop factor was derived from the ratio of the size of the two diagonals of each sensor.

For example, the 1/2.3 inch sensor employed in the majority of small compacts and bridge cameras like the FZ200/300/330 has a crop factor of 5.6.

This is derived from the fact that the diagonal of the sensor is 7.66mm from the sensor size of 6.17 x 4.55mm

The full frame 35mm sensor has a diagonal of 43.3 (from 24 x 36mm)

The “crop factor” or focal length multiplier is therefore 43.3/7.66

So, this gives a convenient way of relating the field of view of different sensor sizes compared to full frame cameras.

For example, the FZ1000/2000/2500 has a type 1 inch sensor giving a crop factor of 2.72

The micro four thirds system has a crop factor of 2, and the Canon APS-C (EF-s) a factor of 1.61

I think, generally, people have got to grips with this “focal length equivalence” however there is still a lot of misinformation – and hence misunderstanding of aperture equivalence, ISO equivalence and the total light gathered equations.

Whether you mount a full-frame lens on a full-frame, APS-C, Micro Four Thirds or 1/2.3inch sensor camera, the physical properties of that lens never change – its focal length and aperture always stay constant.

This makes sense, as the only variable that is changing here is the sensor.

So, those that say that “a 50mm f/1.4 lens is a 50mm f/1.4 lens no matter what camera body it is attached to” are right, but with one condition – it must be the same lens!

The only thing that can change the physical properties of a lens is another lens, such as a tele converter or close-up dioptré.

Remember, focal length is the distance from the optical centre of the lens focused at infinity to the camera sensor, measured in millimetres.

If you were to try a quick experiment by taking a full-frame lens and mounting it on a full-frame camera, then mounting the same lens on different camera bodies with smaller sensors using adapters (without moving or changing any variables) then looking at the resulting images aside from differences in resolution everything else would be the same, including perspective and depth of field (DoF can be different between sensor sizes!)

So, the background and foreground objects would not appear any closer or further away, or look more or less in focus. What you would see is in-camera cropping taking place, nothing more.

Whilst I admit that the above statement is a rather simplified case, where we are taking a full-frame lens with a large image circle and mounting it on different cameras with smaller sensors using adapters.

Without a doubt, the results will always be the same except for field of view.

However, that’s not a practical case today, since smaller sensor cameras now have smaller lenses proprietary to their camera systems and mounts.

Few people use large lenses with smaller formats than APS-C, because mount sizes are different and they must rely on various “smart” or “dummy” adapters, which unnecessarily complicate everything and potentially introduce optical problems.

Again, there is no point in making large lenses which will cover all formats when the larger part of the image circle is unused on smaller sensors.

An exception to this is those people who use “adapted” lenses for some aesthetic quality for either still or video production.

Some companies have tried to offer adaptor solutions to allow the use of full frame lenses on crop factor bodies like micro four thirds and optically reduce the full frame imaging circle to fit the sensor diagonal of the micro four thirds sensor.

Some are referred to as “speed boosters” or focal length reducers as they concentrate the wider image circle onto the sensor thus modifying the image intensity. Gains of over 1.5 stops can be achieved.

This means that the effective focal length is nearer the engraved focal length of the full frame lens and the field of view and depth of field are similarly affected.

ISO and ISO equivalence

In very basic terms, ISO is simply a camera setting that will brighten or darken an image. As you increase your ISO number, your images will grow progressively brighter.

For that reason, ISO is a good option to help you capture images in dark environments or be more flexible about your aperture and shutter speed settings.

However, there are consequences to doing this. An image taken at too high of an ISO will show a lot of grain, also known as noise, and might not be usable. So, brightening an image via ISO is always a trade-off. You should only raise your ISO when you are unable to brighten the image by changing the shutter speed or aperture instead (for example, if using a longer shutter speed would cause your subject to be blurry).

When you double your ISO speed, you are doubling the brightness of the image. So, an image at ISO 400 will be twice brighter than one captured at ISO 200, which will be twice brighter than one captured at ISO 100.

What is Base ISO?

The lowest native ISO on your camera is your “base ISO”. This is a very important setting, because it gives you the potential to produce the highest image quality, minimizing the visibility of noise as much as possible. Some older DSLRs and several modern cameras, have a base ISO of 200, whereas most modern digital cameras have a base ISO of 100.

Optimally, you should always try to stick to the base ISO to get the highest image quality. However, it is not always possible to do so, especially when working in low-light conditions.

Some cameras have extended “HI” and “LO” values for ISO that might stretch beyond their native range. However, these are completely simulated and lower your image quality (reduced dynamic range and possible clipped highlights). I recommend avoiding them.

Is ISO related to sensor sensitivity? This is the most common myth related to ISO.

It is something you will see all over the web (and in print). However, although it may help you to think of ISO as “acting like” a camera sensor sensitivity, that’s not what it does.

Instead, digital sensors only have a single (base) sensitivity, regardless of your ISO. It is more accurate to say that ISO is like a system gain control allowing a known output for a given light intensity input to be established. In this way, you can be sure that setting ISO on any camera will result in the same exposure when coupled to the aperture and shutter speed – the famous exposure triangle.

Aperture and Depth of Field

The f number (let’s say, for example, it is a lens of a full frame 50mm f/2.8) represents the ratio between the focal length of the lens and the physical diameter of the entrance pupil. It is easy to calculate the size of the aperture diameter on the 50mm f/2.8. We simply take the focal length (50mm) and divide it by its maximum aperture of f/2.8. The resulting number is roughly 17.8mm, which is the physical size of the aperture diameter, or the entrance pupil. Now if we look at a micro four thirds 25mm f/2.8 lens and apply the same math, the aperture diameter turns out to be only 8.92mm, exactly twice less!

So, even though the two lenses have the same f-number and cover similar fields of view, their aperture sizes are drastically different – one (the full frame lens) transmits four times more light than the other! (caveat – it also projects this over the larger image circle giving a lower image light level at the pixel surface)

Let’s take this a step back and understand why we are comparing the 50mm to a 25mm lens in the first place. Well what if we were to mount the full frame 50mm f/2.8 lens on a Micro Four Thirds camera with an adapter – would the light transmission of the lens be the same? Yes, of course it would!

Again, sensor size has no impact on light transmission capabilities of a lens. In this case, the 50mm f/2.8 lens remains a 50mm f/2.8 lens whether it is used on a full-frame camera or a Micro Four Thirds camera. However, what would the image look like? With a drastic “crop”, thanks to the much smaller Micro Four Thirds camera that has a 2.0x crop factor, the field of view of the 50mm lens would make the subject appear twice closer, as if we were using a 100mm lens.

The depth of field and the perspective we get from such a shot would be identical on both cameras, given that the distance to our subject remains the same. However, the resulting images look drastically different in terms of field of view – the Micro Four Thirds image appears “closer” (although it is not) as it is just a crop of the full-frame image (a quick note here: there may also be a difference in aspect ratio where full frame is 3/2 vs 4/3 of the Micro Four Thirds system).

Did you ever wonder why at 200mm the background in an image appears more enlarged compared to one shot at say 70mm?

No, it is not depth of field that is to blame for this, not if you frame the subject the same way!

If you stand 10 feet away from your subject and shoot at 100mm @ f/2.8, the aperture diameter equals 35.7mm (100mm / 2.8). Now if you double the distance from your subject by moving back 20 feet and shoot at 200mm @ f/2.8, your aperture diameter / entrance pupil is now significantly bigger, it is 71.4mm (200mm / 2.8).

Because of this, the larger aperture diameter at 200mm will enlarge the background more, although depth of field remains the same. That’s why shooting with a 70-200mm f/2.8 lens yields aesthetically more pleasing images at 200mm than at 70mm! Some people refer to this as telephoto compression.

Let’s talk about compression and perspective: it seems people confuse the two terms quite often.

In the above example, we are changing the focal length of the lens from 70mm to 200mm, while keeping the framing the same and the f-stop the same (f/2.8). When we do this, we are moving away from the subject that we are focusing on, **which triggers a change in perspective**. Perspective defines how a foreground element appears in relation to other elements in the scene.

Perspective changes not because of a change in focal length, but because of a change of camera to subject distance. If you do not move away from your subject and simply zoom in more, **you are not changing the perspective at all!**

And what about compression? The term “compression” has been historically wrongly associated with focal length.

There is no such thing as “telephoto compression” which implies that shooting with a longer lens will somehow magically make your subject appear more isolated from the background. When one changes the focal length of a lens without moving, all they are doing is changing the field of view – the perspective will remain identical.

In my example, above, how closely background objects appear relative to our subject has nothing to do with how blurry they appear.

Here, image blur is the attribute of the aperture diameter.

If you are shooting a subject at 200mm f/2.8 and then stop the lens down to f/5.6, the background elements will appear smaller, because you have changed the physical size of the aperture diameter. So, going back to our previous example where we are moving from 70mm f/2.8 to 200mm f/2.8, by keeping the framing identical and moving away from the subject, we are changing the perspective of the scene. However, that’s not the reason why the background is blurred more!

The objects in the background appear larger due to change in perspective, however, how blurry they appear is because I am shooting with a large aperture diameter.

Now the quality of blur, specifically of highlights (a.k.a. “Bokeh”) is a whole different subject and that one hugely depends on the design of the lens.

Aperture Equivalence

As we have seen previously a 25mm f/2.8 Micro Four Thirds lens is equivalent to an 50mm f/5.6 full-frame lens in terms of light transmission capabilities.

Well, this makes sense if one is to look at the aperture diameter / entrance pupil of both lenses, which roughly measure between 8.9 mm in both case.

Because such lenses would transmit roughly the same amount of light, yield similar depth of field and have similar field of view, some would consider them to be “equivalent”.

As a result of the above, we now we have people that are saying that we should be computing equivalence in terms of f-stops between different systems, just like we compute equivalence in field of view.

Some even argue that manufacturers should be specifying equivalent aperture figures in their product manuals and marketing materials, since giving the native aperture ranges is lying to customers.

What they do not seem to get, is that the manufacturers are providing the actual physical properties of lenses – the equivalent focal lengths are there only as a reference for the same old reasons that existed since film days, basically to guide potential 35mm / full-frame converts.

Another key fact, is that altering the f-stop results in differences in exposure / brightness. The same 25mm lens at f/2.8 will yield a brighter exposure when compared to an 50mm f/5.6 full-frame lens, because we are changing one of the three exposure variables (APERTURE!).

So, let’s establish another fact: smaller format lenses have the same light gathering capabilities as larger format lenses at the same f-stop, when paired with their native sensor sizes.

Yes, larger aperture diameter lenses do transmit more light, but more light is needed for the larger sensor, because the volume and the spread of light must also be large enough to cover the bigger sensor area.

The 25mm f2.8 may behave similarly to an 50mm f5.6 lens in terms of aperture diameter / total light transmission, field of view and depth of field, but the intensity of light that reaches the Micro Four Thirds sensor at f/2.8 is very different than it is for an f/5.6 lens on a full-frame camera – the image from the latter will be underexposed by two full stops. In other words, the intensity of light that reaches a sensor for one format is identical to the intensity of light that reaches a sensor of a different format at the same aperture.

It makes no sense to make a Micro Four Thirds lens that covers as big of an image circle as a full-frame lens, if all that extra light is wasted!

Total Light Gathered

“Equivalence” created another awkward comparison in my opinion: **total light gathered**.

Basically, the idea of total light gathered is that smaller sensors get less total light than larger sensors just because they are physically smaller, which translates to worse noise performance and overall image quality.

For example, a full-frame sensor looks two stops cleaner at higher ISOs than say Micro Four Thirds, just because its sensor area is four times larger.

I personally find the idea of “Total Light Gathered” and its relevance to ISO is totally flawed. Explaining why one sensor has a cleaner output when compared to a smaller one just because it is physically larger has one major problem – it is not entirely true once you factor in a few variables like: sensor technology, the image processing pipeline and the sensor generation. While I cannot argue that larger sensors do physically receive more light than their smaller counterparts, how the camera reads and transforms the light into an image is extremely important. If we assume that the physical size of a sensor is the only important factor in cameras, because it receives more total light, then every full-frame sensor made to date would beat every APS-C sensor, including the latest and greatest. Consequently, every medium format sensor would beat every full-frame sensor made to date.

And we know it is not true – just compare the output of the first generation full-frame camera at ISO 800 to a modern APS-C sensor and you will see that the latter looks better. Newer sensor technologies, better image processing pipelines and other factors make modern sensors shine when compared to old ones. Simply put, newer is better when it comes to sensor technology. APS-C has come far along in terms of noise performance, easily beating first generation full-frame sensors in terms of colours, dynamic range and high ISO performance. CMOS is cleaner at high ISO than old generation CCD that struggled even at ISO 400! Until recently, medium format cameras used to be terrible at high ISOs due to use of CCD sensors (which have other strengths). But if we look at “total light gathered” only from the perspective of “bigger is better”, then medium format sensors are supposed to be much better than full-frame just because their sensor sizes are bigger. Looking at high ISO performance and dynamic range of medium format CCD sensors, it turns out that it is not the case. Only the latest CMOS sensors from Sony made it possible for medium format to finally catch up with modern cameras in handling noise at high ISOs.

My problem with the “total light gathered” argument is that it assumes that one is comparing sensors of the same technology, generation, analogue to digital conversion (ADC), pixel size / pitch / resolution, RAW file output, print size, etc.

And if we look at the state of the camera industry today, that’s almost never the case – sensors differ quite a bit, with varying levels of pixel size and resolution.

Smaller sensors are getting more efficient than larger sensors and bigger is not always better when you factor in size, weight, cost and other factors.

In my opinion, it is better to skip such concepts when comparing systems, as they can potentially create a lot of confusion, especially among beginners.

The Huawei P20 Pro – A Photographer’s Smartphone?



Outside of the USA (where I understand it is still banned) the Huawei P20 Pro has been receiving lots of good press for its performance of the triple back camera system developed with the help of Leica.

So, I’ve never been one for taking any review of any product ever at face value. You can never tell if the product has been supplied for free with the promotion for an “impartial” view. Amazon tried to ban this but there are many ways to beat their system!

A few reviews that I did read which had focussed on the camera performance were done without the reviewers knowing very much about the image capture process and hence their view of a “good image” could not be taken seriously, by me at least.

I did look at this camera several months ago when I wanted a 4K portable device but when I discovered that the camera did not have image stabilisation apart from at 1080 30p I quickly dismissed it and finally purchased the iPhone X.

I decided to revisit the camera performance after I saw one for sale in perfect condition at a local exchange shop at a very attractive price.

After spending some time in a local coffee shop, to use the free wi-fi to do some further online investigation, I had made mind up to go back home pick up an old iPhone 5S that I hadn't used for over a year and return to trade it in against the Huawei model.

After giving the iPhone a quick boost charge, a wipe over with cleaning solution and then factory resetting it to wipe any personal data I headed back to the shop and made the trade after giving the phone a very good eyeballing for scuffs and marks – particularly around the camera lenses.

The one that I acquired was the piano black version and it even had a soft clear plastic case supplied – I guess that's why it was in so good condition. The earpiece had not even been unpacked.



A Full 41M image from the rear colour camera RAW to JPEG in Photoshop

Now the camera is marketed with great hype about the AI (artificial intelligence) that has been built into the software. I guess this is only a play of the iA mode found in DSLR's, compacts and point and shoot cameras.

No matter how good this facility is it can never be relied on 100% to capture a scene correctly.

So, I found the option to turn this off and used the camera effectively in the manual mode (well as far as you can as the aperture is fixed at f1.8 and so you can only adjust ISO and shutter speed).

I set up a quick table top scene to do a quick evaluation of the lens sharpness, image noise and colour fidelity.

The camera can shoot in RAW (DNG) mode but is only available when you do switch to the PRO mode. Using pixel binning (4 to 1) the camera second resolution is 10M which is supposed to result in lower noise but because of the larger pixel size may introduce more aliasing and moiré – but I have yet to really test this out.

The Huawei P20 Pro is the first smartphone on the market to offer a triple camera setup: a whopping 40-megapixel primary 'Light Fusion' RGB sensor (with an f/1.8 aperture), a 20-megapixel monochrome sensor (with an f/1.6 aperture) and an 8-megapixel telephoto sensor (with an f/2.4 aperture) work in conjunction to supercharge the camera module's photographic capabilities.

All three sensors, fine-tuned by Leica, work together with each being assigned a specific function. The 40-megapixel sensor captures the colours in the scene, the 20-megapixel monochrome sensor captures additional detail, as well as texture and depth data for a bokeh effect (when required), whilst the 8-megapixel telephoto sensor helps when zooming in.

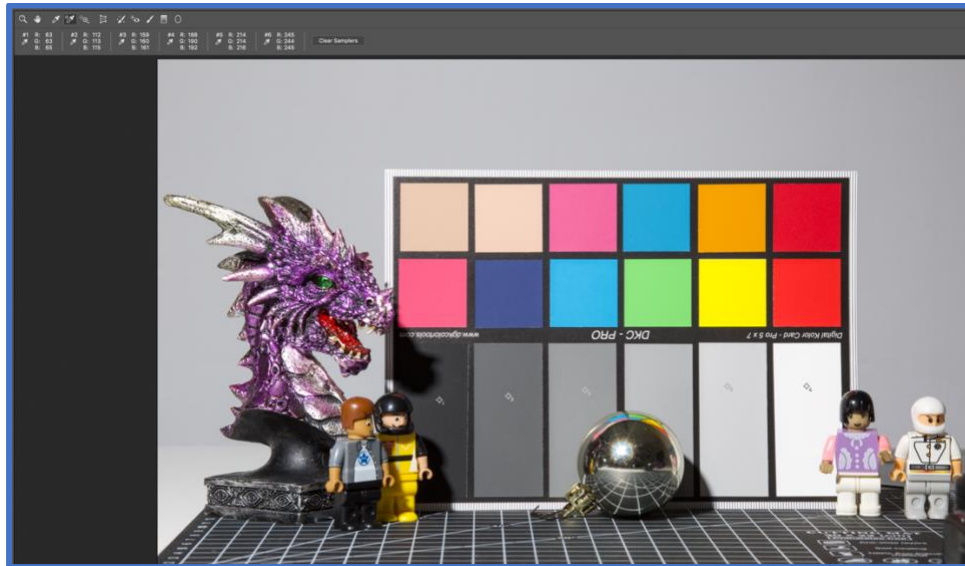


A 10M ISO 400 1/20 sec f1.8 capture JPEG



10M ISO 160 1/45sec F1.8 JPEG

The fact is that smart phones are genuinely becoming better and better at taking pictures, and their developers are devising features and functions well ahead of those traditional camera makers offer. These features often exist to compensate for the physical limitations of the tiny camera units, but they also put incredible flexibility into the hands of the user. At every turn in history the advances of smaller formats have been opposed by 'proper' photographers, but that has done nothing to prevent the inevitable progress of the convenience and popularisation of photography.



I've set myself a little project to try and understand the colour science of the camera and how to get the best possible images from it. So far it is looking quite promising. A direct comparison between the iPhone X is also likely to happen especially shooting 4K video – tripod mounted.

The camera, despite all the positive reviews does have some major issues which have been overlooked by all the reviews that I have seen.

The flash doesn't synch when you use the Pro Mode with RAW, only in the regular 10M JPEG set up – you end up with black images.

There's no optical zoom even though the marketing hype suggests that there is.

Optical zoom is when the lens elements physically move to change the way the light hits the imaging sensor.

The point is to be able to change the image field of view without moving and without changing the image quality. That doesn't happen here!

What the Huawei P20 Pro (and most other multi-camera smartphones) does is switch between cameras with different lenses to change the focal length.

Again, this isn't zooming at all. It's like having one camera with a 27mm prime lens and one with an 87mm prime lens and putting one down and picking up the other one when you want to use a different focal length.

There is some digital zooming (cropping) which can smooth the transition between using the 27mm wide angle lens/camera combination and the 87mm lens/camera combo.

You may also notice that sometimes your selfie photos are very soft, even blurry.

It turns out that this front facing camera has a pretty narrow depth of field due to its wide aperture... and it also has fixed focus.

That means there is only a specific distance from the lens that's going to be sharp, so if you want the photo to look good, you must get your face in just the right spot.

Don't hold the phone straight out with your hand... those will be blurry.

Bend your arm a bit and get a little closer so that your face is within the focus area.

In low light the camera does perform extremely well. The "night shot mode" does a great job of capturing multiple images, overlaying and merging the results. Just a little too much sharpening is applied for my taste and the output is JPEG only so you can't change the sharpness level.



Whilst the camera does support a RAW file output (nearly 80M file size) in DNG format I've found that the image has a blue vignette which I have been unable to find a way to totally overcome. In-camera it is obviously controlled with very little evidence of this in the resulting image.



An example of a DNG file showing the "hot" centre with colder outer.

This may be due to the IR filter over the sensor as they tend to produce this type of pattern.

I've not been able to find any camera profiles for the camera phone that could be used in Lightroom or Photoshop Camera Raw.



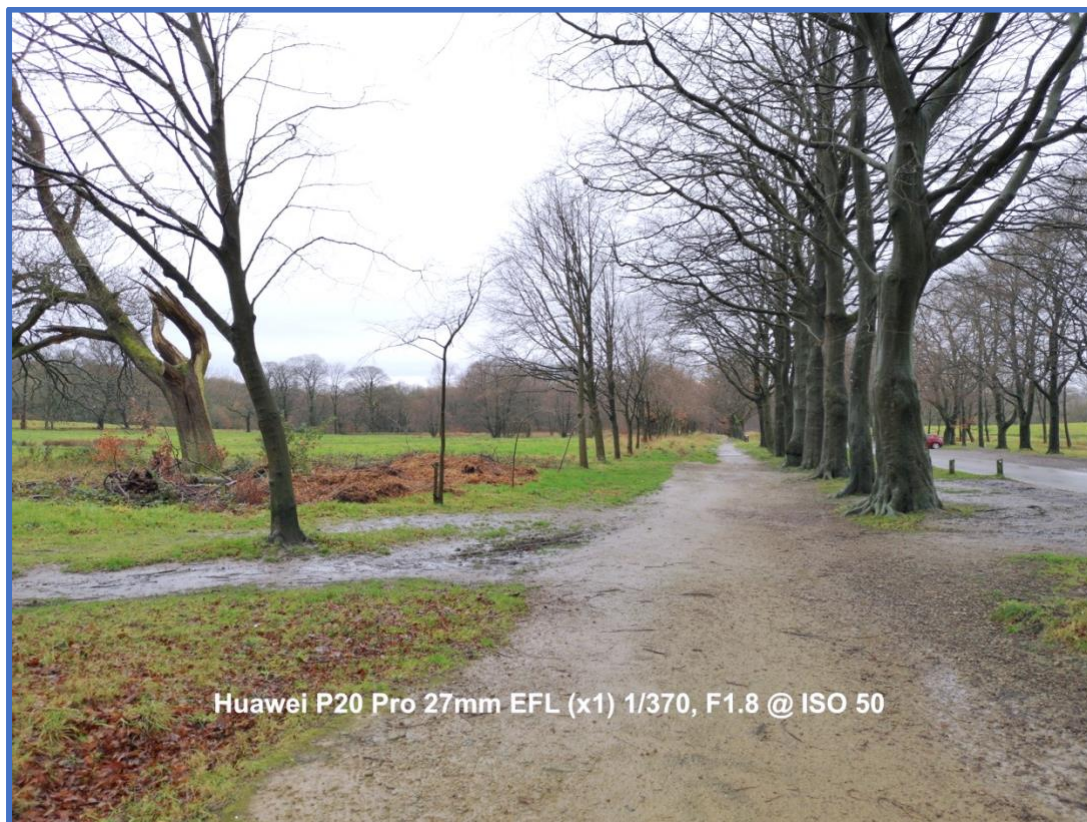
My partial solution to the blue "hot spot" is to use a radial filter (as shown opposite)

I've found that +11 on the temperature slider and +17 on the tint slider improves the overall image quality.

You also need to set vignette amount to 100 and midpoint to 0.

I need to find a way of automating this perhaps through a script file or similar.

Comparing this camera phone to my daily camera, the Canon EOS M50, the results are encouraging. Here's two side by side pictures from my recent video.



The P20 has 3 levels of colour – standard, vivid and neutral (used here)



You can see my review of the [Huawei P20 Pro Camera here](#) on my photoblog with more sample images.

Oversampling, Pixel binning, Line skipping and Cropping for 4K Video

So why do we need to consider these options for 4K video recording?

Well the reason being that a stills camera pixel count and aspect ratio do not match the resolution and aspect ratio of 4K UHD video which is 3840 x 2160 pixels.

So, the camera needs to reduce the still image aspect ratio and resolution to the resolution and aspect ratio to that needed by the video.

The method employed will generally be driven by the cpu processing capabilities of the camera and in general, the easier it is for the camera to do this the worse the outcome will be.

The easiest method and least cpu intensive is **cropping**.

During this process the camera just takes the 3840 x 2160 pixels from the centre of the whole sensor and ignores the rest!

It has two main disadvantages - it changes the field of view when switching from stills to video and does not maximise the data that is available from the sensor.

Oversampling, is when the camera uses a much higher resolution than is needed and then down samples that to the required image size. Now this requires the highest amount of in-camera processing but does achieve the best end results.

The benefits of oversampling can be seen in lower noise in the final video. When noise is viewed in relation to the size of the pixel that it is being generated within it is smaller than that from larger pixels. The quality of the noise may not have changed but it looks less.

Another benefit is in the appearance of aliasing (or jaggies). Lines, particularly those which run at a slight angle show less of a stair casing effect with smaller pixels.

Line skipping.

Full frame video cameras use this technique rather than the inferior cropping mode.

In this method, the camera skips vertical lines of pixels to reduce the readout to the resolution needed.

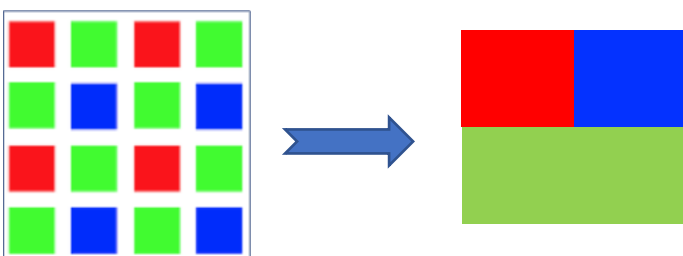
Now there are lot of different algorithms used to perform this type of function which can also blend and average pixels to reduce the horizontal lines needed to 3840.

The processing power required to perform this is far less than needed for oversampling but slightly more than cropping and thus the cameras don't overheat as much.

We lose the benefits of the oversampled method as we are not using the smaller pixels to reduce noise and aliasing so we do have a slightly inferior result but it still maintains the same field of view.

The most complex process is **pixel binning**.

In this method, which incidentally is constantly evolving as new algorithms are developed, you can relate this to the colour filters that are placed above every pixel on the imaging sensor.



The "Bayer" filter matrix and the combined images for pixel binning

You may remember that in the most frequently used system - the Bayer filter- we have twice as many green pixels as red and blue ones. Now if we combine the “like” pixels in any given block of say 16 pixels we can produce an output that is 4 times smaller (2 x 2). This is 4 blue, 4 red and 8 green pixels and thus this is the same format as the larger array but has reduce the resolution by 4 times and this applies to the noise averaging in the process.

The resulting block of pixels should have a higher signal to noise ratio resulting in an improved overall image quality. Purists may argue that the colour information is not proportionate as the resulting set has twice as much green information as red or blue.

So, oversampling produces the best image result followed by pixel binning and then line skipping with cropping as the worst option.

In some circumstances a higher resolution sensor using a 1:1 crop has the benefit of no aliasing and moiré issues, is very fast and now with improvements in chip fabrication we are reaching a situation where we can have all the computational work done on the imaging sensor itself so no heavy maths crunching need be done by the camera cpu. Sony, I believe have patents for such an imaging processor on chip!

The higher the frame rate of the video the more emphasis this places on processing power requirements - not only in cpu clock cycles but also the heat generated. All this results in the usual compromises that must be made in the camera design and hybrid cameras (those shooting both stills and video) suffering the most. A dedicated stills or video only camera would be the best solution but in today’s world we generally like to have multi functionality and hence we do need to consider what compromise is acceptable.

And finally, we must consider what we want to see in the end production. Those who seek video which is as close to cinematic as we can get using digital technology might favour systems like the cropping method from cameras with a larger pixel count as this reduces the aliasing and moiré and the slightly softer look of the image may be preferred.

It is all about personal choice again and if you want to capture 6K video for stills extraction you want the sharpest image possible.

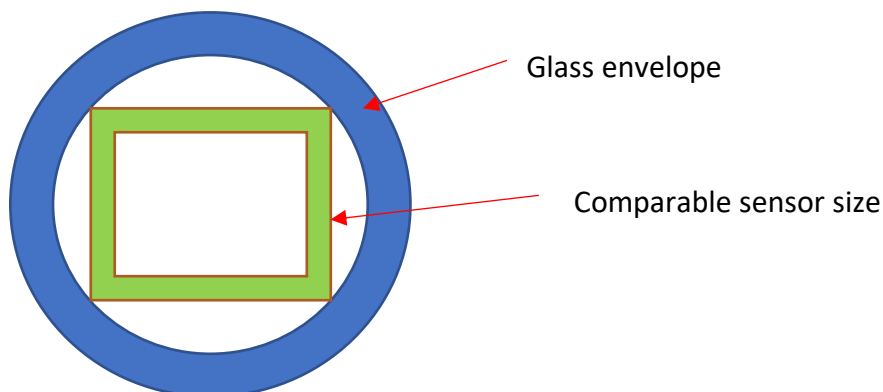
Isn’t photography fantastic?

The 1 Inch Sensor Misconception (and others)!

There is no such thing as a 1 inch digital camera sensor! However, camera manufactures like Sony and Panasonic make believe that there is such a device and you might be forgiven for thinking that this is quite a large sensor capable of getting good low light pictures.

The 1 inch sensor is only 12 mm x 9mm (0.35 in x 0.47 in) and has a surface area just 1/8th of a full frame 24 x 36mm full frame sensor.

So how do they get away with such a blatant misrepresentation as to the size of this sensor?



An end on view of a vidicon imaging tube

Well this dates back some 40 years or so when television cameras had vacuum tube imaging devices called vidicons or plumbicons.

Now because these were glass tubes they had a certain wall thickness to add rigidity to the device and within the flat end of the imaging tube was the photosensitive material.

The industry referenced these imaging tubes by the diameter of their glass envelope.

The size of the ccd or cmos sensor, that came into development, which had approximately the size of the sensitive light collecting area of the vidicon became the new reference term for the new generation of imaging sensors.

So, this is where the 1 inch sensor got its name as its 12mm x 9mm size was the same as that of the 1 inch vidicon tube.

So, here's the real size of some common sensor sizes

Sensor designation	Actual physical size	Crop factor
1/3 inch (apple iPhone 5s, 6,7,8)	7.2mm x 4.8mm	36
1/2.3 inch (Lumix FZ200/300/330 TZ40/45/60)	6.17mm x 4.56mm	5.6
1/1.7 inch (Nokia 1020, Huawei P20 pro)	8.8mm x 6.6mm	3.9
1 inch (FZ1000 FZ2000/2500)	13.2mm x 8.8mm	2.7
M4/3 (Panasonic & Olympus)	17.3mm x 13mm	2.0
APS-C (Canon EFS EOS M)	22.2mm x 14.8mm	1.7

Shooting in snow

If you, like me, are living in the northern hemisphere then we entering our winter season and chances are that we might see snow (some of you may already have some already!).

It might be a timely reminder to be ready to use exposure compensation when shooting any subject that has a snowy foreground or background. It applies to fully auto mode as well as semi-automatic P/A/S modes as well.

Basically, the camera metering system is designed to make all the scene that it "sees" equate to neutral (mid tone) grey. Thus, it will cause the white areas to be underexposed as it tries to bring the whites to mid grey. Use of +EV (maybe 1 – 2 stops needed) to bring the whites back to white instead of grey.

Check your histogram to ensure that peak white is falling before the right-hand side of the graph to ensure highlights are not clipped

