

Photography: Size does matter, Part 1

By David Stonier-Gibson, Editor, Melbourne PCUG, Australia

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www.melb-pc.org.au

editorpc (at) melbpc.org.au

A slightly more technically advanced topic this month: Sensor size.

When buying a digital camera, the main headline specification everyone looks at seems to be megapixel count - 6Mpx, 12Mpx, 18Mpx, 24Mpx. (The other one is zoom range, but that will have to wait for another time).

The image sensor is the bit that takes the place of film; it converts the light intensity at millions of points in the image into electrical signals. It is also the most expensive part of the camera. The cost of an image sensor, hence the price of a camera, is strongly dependent on the dimensions in square millimetres of the sensor. How many pixels are fitted onto the sensor has only a secondary effect on cost. But the quality of the image will depend on the size of the individual pixels. We all understand that the more pixels the more detail the sensor can capture, which is a Good Thing. But there is an opposing consideration: The camera lens focusses an image onto the sensor. The pixels in the sensor convert light intensities in different parts of the scene into proportional electric currents. A small pixel will generate a smaller current for a given light intensity than will a large pixel (that's why the solar panels on houses are large, so they can produce a lot of current). Unfortunately, the electronics surrounding the pixel will generate unwanted random currents called noise - that's an immutable fact of physics. The amount of noise is independent of the size of the pixel (the electronics, amplifiers etc., exist independent of the sensor). So, the smaller the pixel the more significant the noise. And the less light the more significant the noise. In a camera, noise translates to graininess in the image.

Back to overall sensor size: For a given sensor size, fewer pixels will mean larger pixels and relatively less noise. Alternatively, for a given pixel count, the larger the sensor the lower the noise (and the dearer the camera). Clearly there is a design trade-off between pixel count and noise performance; large pixel counts may be impressive in advertisements, but they are not the be all and end all.



Image completely RAW, out of the camera. He now wears size 15 shoes!



Taken in 2004 with my Canon 3000 entry level DSLR camera sporting a 6Mpx sensor. An A3 print adorns his Mum's wall, and it would easily stand enlarging to A2 and beyond.

Should you worry about this? It depends on what you are after. If you will only ever be publishing your pictures on social media or making small 10x15cm prints, it won't matter. But if you want to make large canvas prints to decorate a wall or take photos in low light conditions without using a flash, it will matter. The sensors in phone cameras are invariably small; there is just not space for a large sensor and the larger lens that must follow. The sensors in DSLR cameras are much larger, a DSLR will generally produce pictures capable of more enlargement, and work better in low light level conditions.

Next month I will reveal when a small sensor will produce better pictures!

