

# Shutter speeds integral to the quality of your pictures

In my last article, I covered half of the exposure equation with an explanation of how the diaphragm in your lens worked. The diaphragm created an opening called the aperture, which controlled how much light entered the camera. By changing the size of the aperture, you could increase or decrease the amount of light and also control how much of the image would be in sharp focus.

This article will deal with the other half of exposure, which is controlling the length of time the light is allowed into the camera through the camera's shutter. As the name implies, the shutter is a device that opens and closes allowing light to pass through. In a camera the shutter is set up to work for a very specified time called its speed. While the nomenclature used to identify apertures can be somewhat confusing, shutter speeds are more straightforward and easier to understand.

Shutter speeds are expressed numerically as fractions of seconds. Most cameras can run the range of a mere thousandth of a second to multiple seconds. If your camera displays this information in the viewfinder or LCD screen, the numbers usually are displayed as whole numbers. So a shutter speed of 1/125th of second would display as simply 125. When the shutter speed is one second or longer often a quotation mark precedes the number to indicate seconds.

Shutter speeds are simple fractions of a second. If you cut a full second into a half you would have half of a second. If you were to cut that fraction into a half, you would have a quarter of a second. And on it goes. Shutter speeds are designated in



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## Bits & BYTES



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**Above, at 125th of a second, action can be frozen. Top right, at 30th of a second, moving objects blur, and, lower right, at 1/4 of a second, everything is blurred because the camera cannot be held steady long enough.**

increments of either half or double the shutter speed preceding it or following it. There is an exception.

When 1/60th of second is split, the number is rounded up to 125th second, which provides easier numbers to work with like 250, 500, 1000, 2000, 4000 etc.

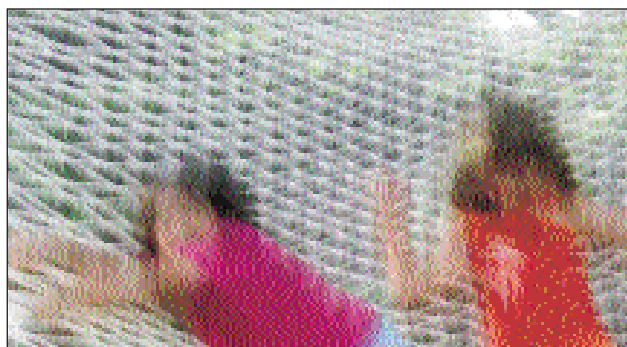
For most cameras, the shutter is still a mechanical device that physically keeps the light from hitting the camera's sensor. The shutter can be inside the lens of the camera or right in front of the sensor. If you have an old film camera, you can open the back and see how the shutter works by dry firing the camera at slow shutter speeds.

D-SLRs, Digital – Single Lens Reflex, cameras are a little more involved. The design of the camera uses a mirror to reflect the image coming through the lens up into the eyepiece. At the moment the image is taken, the mirror flips up

allowing the image to be recorded by the sensor and then flips back down. Ironically, the photographer doesn't actually see the image being recorded as the viewfinder goes black and white as the mirror moves.

So why all the different shutter speeds? Just like apertures, you need a variety of them to compensate for all the different situations you might encounter. If the sun always remained overhead and there were no clouds, we could probably get away with just one shutter speed and one aperture. But in reality this only happens in the middle of a cloudless day and I doubt we would want to be limited to only taking pictures during that time. The amount of light we see constantly changes. Even the light striking a subject can greatly vary as the correct exposure for some one sitting under a tree would be different from the tree.

Shutter speeds not only



control the length of time light is allowed into the camera, they are also control how action is portrayed in the image. Fast shutter speeds can freeze a moving object, while slow shutter speeds can cause a moving object to blur.

Blurring or freezing motion can all work in creating the story the photographer is trying to tell. If freezing motion actually removes the concept that motion is happening, than a slower shutter speed that adds a little blur to the subject can be more effective.

Shutter speeds at 1/125th of a second and higher will stop moving objects. How much speed is stopped depends upon the subject. A racecar on a track may look stationary at 1/4000th of a second, but will still blur at 1/125th. But that same shutter speed may perfectly freeze a person walking.

Moving objects will begin to blur at shutter speeds below 1/125th of second. If you are hand holding the camera, using a shutter speeds below 1/30th of second will generally result in totally blurred pictures. The pulse generated by your

heart will create enough, body movement causing the image to blur. For these longer shutter speeds, the camera needs to be supported on something stationary like a tripod, or a make shift tripod like a table or held firmly against a wall.

A more recent development in cameras is a feature called image stabilization. Basically the camera tries to offset any motion your body is generating which allows you to shoot at shutter speeds that would not be considered hand-holdable. But keep in mind these stabilizers only steady the camera, they will not help your images if the subject is moving and you are using too slow a shutter speed.

There is another general rule of thumb when it comes to the power of your lens and the shutter speed used. To minimize blurring when handholding a camera, you should shoot at a shutter speed that is numerically close to the focal length of the lens. So if your lens is 200mm, use 250th of a second for a shutter speed. This used to be an easy rule to calculate, but

unless you are shooting with a full frame D-SLR it gets a little more complicated. Most D-SLRs have smaller sensors than the 35mm full frame standard. So the effective power of the lens is magnified by about 1.5 times. A 200mm lens effectively becomes a 350mm. With point and shoot cameras, it becomes even more difficult as the sensor size is even smaller. You will have to check the owner's manual to see what the equivalent power of the lens is compared to a 35mm lens. Just keep in mind that with higher magnification you need a faster shutter speed or the camera needs to be supported if you want sharp pictures.

Why would you want to use a slow shutter speed? Well sometimes it may be necessary just to take a picture due to very little available light. But more often it may just be for creative exposures. You have probably seen waterfall pictures where the water has a cotton candy look or a night street scene where car lights are streaks. Both of these effects are created through long exposures of perhaps several seconds.

As your shutter speed drops below 1/125th of a second moving objects blur. And if the shutter speed drops below 1/30th of a second the entire picture can blur. So if you are getting blurred results with your images, check your shutter speeds. This can be done on pictures already taken. In addition to the image, your camera records the camera's settings called metadata. You can locate this information while poking around in the menu display of the camera or just about any software program that can view images can also show you this information.

## Cell phone industry's trade group sues San Francisco over radiation law

NEW YORK (AP) — The wireless industry sued the city of San Francisco on Friday to stop a law that requires cell phone stores to post how much radio energy each model emits.

It's the first law of that kind in the nation. The industry trade group known as CTIA — The Wireless Association said the law will mislead consumers into thinking that one phone might be safer than another on the basis of

radiation measurements.

Studies have not conclusively found that cell phone radiation is a health risk. Research continues on brain tumors.

In its lawsuit filed in U.S. District Court in San Francisco, the industry group said the city is usurping the authority of the Federal Communications Commission, which sets limits for phone radiation.

Dennis Herrera, the city attorney,

said the ordinance gives cell phone buyers access to the same information at stores that they could get from other sources, such as the FCC's website.

"I think San Francisco is on solid legal ground in its effort to inform and protect consumers," he said.

Previously, Mayor Gavin Newsom's office said that the ordinance is "a quite modest measure that will provide greater

transparency and information to consumers for whom this is an area of interest or concern."

The local ordinance requires cell phone retailers to disclose a measure of much energy will theoretically be absorbed by a user's head. FCC limits this specific absorption rate, or SAR, to an average of 1.6 watts per kilogram. Measurements for phones sold in the U.S. are available on the agency's site,

but not usually in stores.

"Nobody should be suggesting to consumers that they ought to be shopping for phones based on a difference in SAR values," said John Walls, vice president for public affairs at CTIA. "There's no scientific basis to suggest, as the ordinance does, that two phones with different values have a safety distinction between them," as long as they're below the FCC's limit.

## President to drop by Michigan auto plants

WASHINGTON (AP) — President Barack Obama will visit U.S. auto plants in Michigan and Illinois next week to highlight his administration's decision to rescue General Motors and Chrysler last year and revitalize the U.S. auto industry.

Obama plans to use trips to General Motors and Chrysler plants in Detroit on July 30 and a Ford assembly plant in his hometown of Chicago on Aug. 5 to discuss the progress in the U.S. auto industry following the government-led bankruptcies of GM and Chrysler.

White House press secretary Robert Gibbs said Friday that Obama will acknowledge the decisions to save GM and Chrysler were unpopular with many Americans but necessary to save hundreds of thousands of jobs and help rebuild the auto industry for the future.

"The president believes that the decisions that we made around the auto industry are a parable for

where we are economically. We had to make some tough and even unpopular decisions but those decisions are laying a new foundation for economic growth and a brighter future," Gibbs said.

GM and Chrysler received tens of billions of dollars in federal aid to undergo swift bankruptcies last year and have begun to show signs of rebounding. GM, which is majority-owned by the government, posted a quarterly profit in May and has repaid nearly \$7 billion in loans from the U.S. government while preparing for an initial stock offering that could further repay taxpayers.

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## India unveils \$35 tablet computer model

MUMBAI, India (AP) — It looks like an iPad, only it's 1/14th the cost: India has unveiled the prototype of a \$35 basic touchscreen tablet aimed at students, which it hopes to bring into production by 2011.

If the government can find a manufacturer, the Linux operating system-based computer would be the latest in a string of "world's cheapest" innovations to hit the market out of India, which is home to the 100,000 rupee (\$2,127) compact Nano car, the 749 rupees (\$16) water purifier and the \$2,000 open-heart surgery.

The tablet can be used for functions like word processing, web browsing and video-conferencing. It has a solar power option too — important for India's energy-starved hinterlands — though that add-on costs extra.

"This is our answer to MIT's \$100 computer," human resource development minister Kapil Sibal told the Economic Times when he unveiled the device Thursday.

In 2005, Nicholas

**IN THEIR OWN WORDS**

**"It puts pressure on all device manufacturers to keep costs down and innovate."**

**Sarah Rotman Epps, an analyst at Forrester Research**

Negroponte — co-founder of the Massachusetts Institute of Technology's Media Lab — unveiled a prototype of a \$100 laptop for children in the developing world. India rejected that as too expensive and embarked on a multi-year effort to develop a cheaper option of its own.

Negroponte's laptop ended up costing about \$200, but in May his non-profit association, One Laptop Per Child, said it plans to launch a basic tablet computer for \$99.

Sibal turned to students and professors at India's elite technical universities to develop the \$35 tablet after receiving a "lukewarm" response from private sector players. He hopes to get the cost down to

\$10 eventually.

Mamta Varma, a ministry spokeswoman, said falling hardware costs and intelligent design make the price tag plausible. The tablet doesn't have a hard disk, but instead uses a memory card, much like a mobile phone. The tablet design cuts hardware costs, and the use of open-source software also adds to savings, she said.

Varma said several global manufacturers, including at least one from Taiwan, have shown interest in making the low-cost device, but no manufacturing or distribution deals have been finalized.

India plans to subsidize the cost of the tablet for its students, bringing the purchase price down to around \$20.

"Depending on the quality of material they are using, certainly it's plausible," said Sarah Rotman Epps, an analyst at Forrester Research. "The question is, is it good enough for students?"

Profitability is also a question for the \$35 machine.

Epps said government subsidies or dual marketing — where higher-priced sales in the developed world are used to subsidize low-cost sales in markets like India — could convince a manufacturer to come on board.

If it works, Epps predicts the device could send a shiver of cost-consciousness through the industry.

"It puts pressure on all device manufacturers to keep costs down and innovate," she said.

The project is part of an ambitious education technology initiative by the Indian government, which also aims to bring broadband connectivity to India's 25,000 colleges and 504 universities and make study materials available online.