



How to take better photos *controlling quality in camera*

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Learning Technologies | CCIT

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Introduction

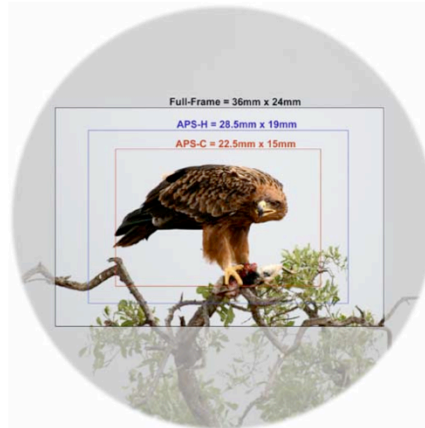
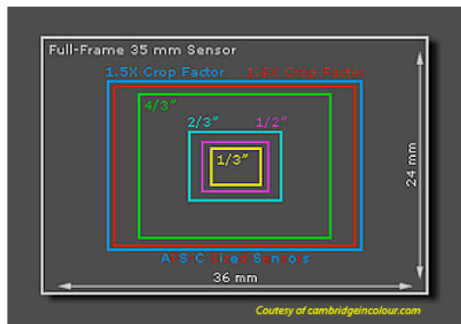
- What setting does my camera need to be on if I want to print pictures/post to FB?
- Why do the pictures I take at night look so grainy?
- Should I shoot in JPEG or RAW?
- Should I shoot in Manual mode?

You might be asking some of these questions are it relates to digital photography and controlling quality starting with your camera.

Megapixels

- For any images you plan to print or retouch 8-megapixel or higher is recommended
- For images you want to email or post to Facebook – anything less is fine
- MOST cameras now are being sold with 10+ megapixels

sensor size and crop factor



The crop factor is the sensor's diagonal size compared to a full-frame 35 mm sensor. It is called this because when using a 35 mm lens, it **croops out this much of the image** at its exterior (due to its limited size).

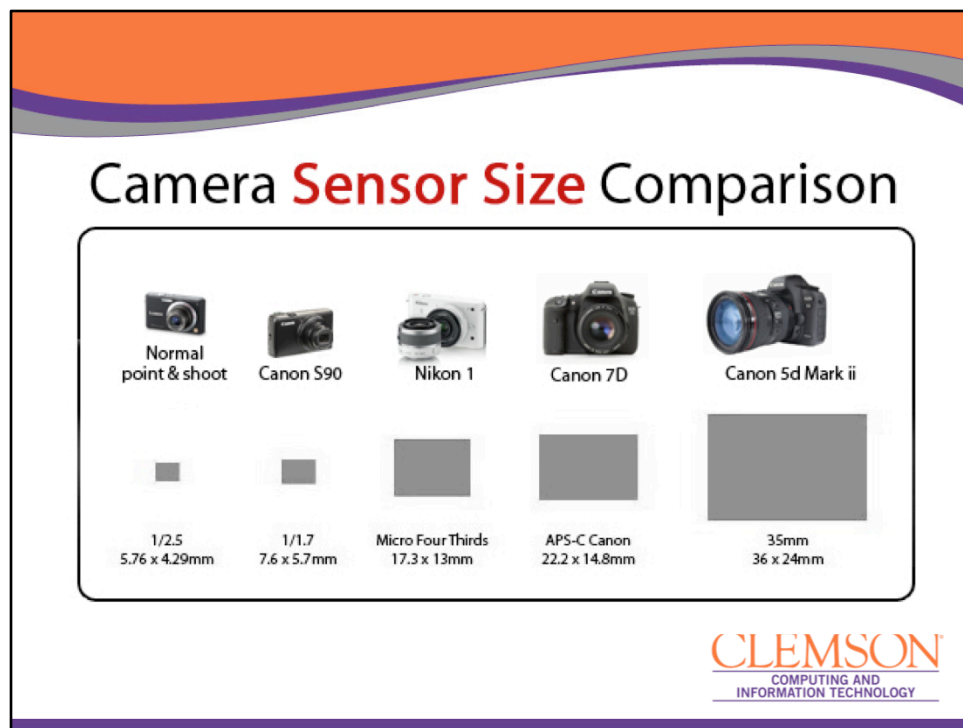
Camera phones and other compact cameras use sensor sizes in the range of $\sim 1/4"$ to $2/3"$.

You might think that throwing away image information is never ideal, however it does have its advantages.

Nearly all **lenses are sharpest at their centers**, while quality degrades progressively toward to the edges.

This means that a cropped sensor effectively discards the lowest quality portions of the image, which is useful when using low quality lenses (as these typically have the worst edge quality).

Most DSLRs have a 1.6x crop factor – is the 22.5mm



This offers a good comparison of typical sensor sizes for various cameras on the market

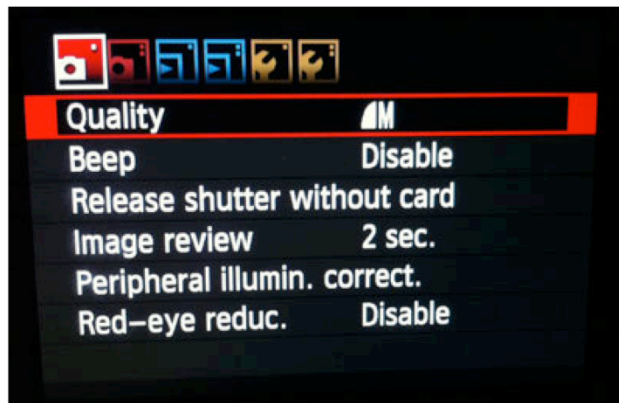
Here is a brief cost comparison:

Nikon 1 \$396

Canon 7D \$1700

Canon 5d Mark ii \$2900

camera Menu options



Screenshot is for a
Canon Rebel T3i

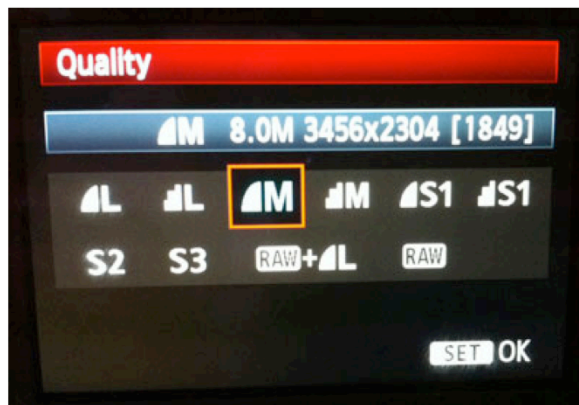
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<http://multimedia.journalism.berkeley.edu/tutorials/canon-rebel-t3i/basic-setup/>

To change the quality of your photos, use the **menu button** on your camera. Scrolling through the various functions you'll see QUALITY in the menu – select this option to choose what resolution/pixel dimension you want to shoot your pictures at.

Note: The options presented in the menu, and the number of tabs displayed, will depend on which mode you are in on the main mode dial on the top of the camera. The more advanced modes will display more options.

camera Menu options



Screenshot is for a
Canon Rebel T3i

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To change the quality, select the first menu, scroll to the **Quality setting** and push the set button.

The **settings for resolution/megapixels**, which concern the file size of a photo, are presented as large (L), medium (M), small (S1-3) and RAW (the largest setting). The Canon T3i is an 18 megapixel camera. At the largest setting, images will be shot at 5184x3456 pixel dimensions, which equates to a 11x17 inch photograph printed at 300 dpi.

The settings for compression are displayed next to each size as icons for smooth or blocky curves: The smooth curve means higher quality, and the blocky curve means lower quality. The quality is defined by the amount of compression that is performed on the photo. Lower quality photos that are highly compressed are smaller in size. This will allow you to store more photos on a memory card.

JPEG VS RAW

- JPEG same as JPG
 - Default camera file format
 - Auto adjusts your images for sharpness and white balance in camera
 - Don't use JPEG 2000 – mainly used for the pro movie making
- RAW
 - No processing in camera – have to process on computer
 - HUGE file sizes (will need multiple SD cards)
 - Proprietary to camera make and model

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JPG Basics

JPGs (same as JPEGs) are normal digital camera images. Cameras create JPG images from raw image sensor data based on your settings like Sharpness and White Balance. The camera makes the JPG and then the raw data evaporates as soon as the JPG is recorded.

Beware JPEG 2000 which you only find in some advanced software. It was a newer proposed version of JPG that has been forgotten today for still photography. It is COMPLETELY INCOMPATIBLE WITH the current JPG systems. JPEG 2000 has found application in the Digital Cinema Initiative and will be used as their standard for the movies many or most of us will be seeing in theaters today and in the near future.

Raw Basics

Raw files are just the raw sensor data. It isn't a picture until it is processed further. Most fancy digital cameras allow you to save the raw data instead of the actual JPG picture. If you do, you still have to do the processing in your computer to make an image (JPG or otherwise) that you actually can see. Cameras do this processing in hardware much faster than your computer can do it in software.

Quality	Resolution (megapixels)	File Size (MB)	Possible Shots with 4GB card
L (smooth)	5184x2456 (18mp)	6.4MB	570
L (blocky)	5184x2456 (18mp)	3.2MB	1120
M (smooth)	3456x2304 (8mp)	3.4MB	1070
M (blocky)	3456x2304 (8mp)	1.7MB	2100
S1 (smooth)	2591x1728 (4.5mp)	2.2MB	1670
S1 (blocky)	2591x1728 (4.5mp)	1.1MB	3180

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If you are shooting photos only for the Web, it is recommended to shoot at M smooth. Eight megapixels is generally considered more than enough for web photos (in fact it's a bit large) but still allows flexibility to crop and adjust photos as needed.





camera Modes: *Auto Modes*




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The main mode selection dial of the camera has a number of options to choose from. It's best to think of the green rectangle as the middle option; everything below the green rectangle is an form of automatic called basic zone, and everything above the green rectangle are more advanced features for experienced photographers called creative zone.

camera Modes: Auto Modes

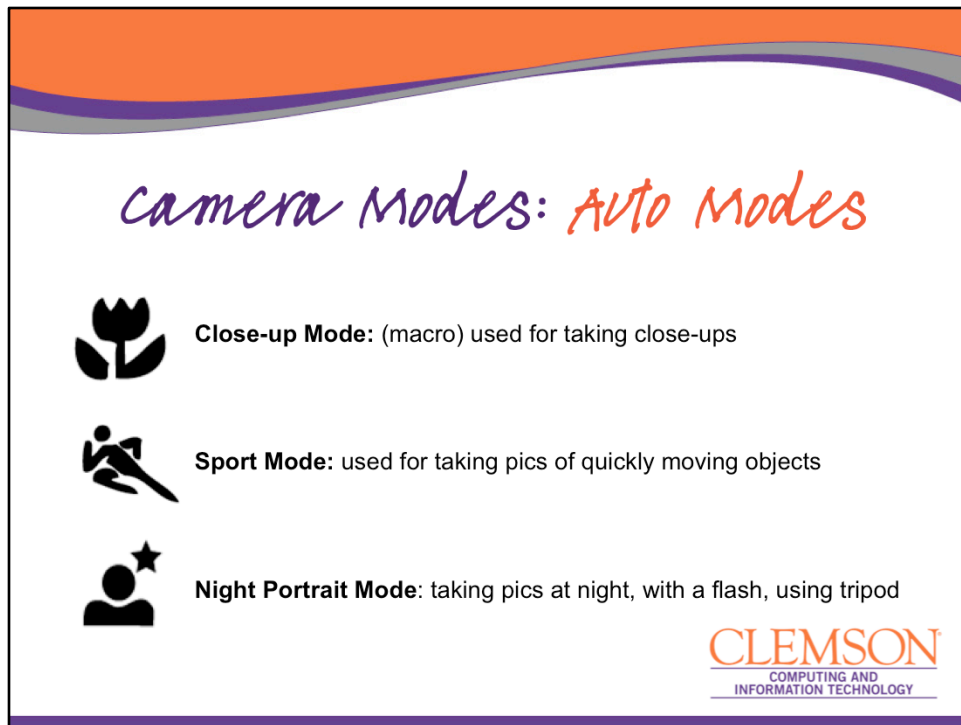
- 
Auto Mode: the camera is a “point-and-shoot” camera
- 
Flash Off Mode: will never pop up, even if the scene requires it
- 
Portrait Mode: pictures where you want to blur the background
- 
Landscape Mode: gets as much in focus as possible



Scene Intelligent Auto (full auto): The green rectangle with an "A" will put the camera in a mode that offers the fewest possible options for the photographer to change. The camera is essentially a point-and-shoot camera, with all the exposure settings done automatically for you. Simply put the camera into this mode, point the camera, and take a picture. The flash will automatically pop up if there is low light and the scene requires it.

Flash Off Mode: This is the same as full automatic mode, but the flash will never pop up, even if the scene requires it due to low lighting. This mode is useful for situations where a flash will be a distraction, or is not permitted. To compensate for the low lighting, the camera will increase the sensitivity of the sensor (ISO) and may result in grainier-looking photographs.

Portrait Mode: This mode is ideal for taking portraits of people, or pictures where you want the background to blur to remove distractions that might interfere with seeing the main subject. This mode will automatically set the aperture to its widest possible setting so the depth of field is shallow (thus causing background to be blurry). The amount of blur will largely depend on the type of lens being used, and sometimes will depend on how close you're zoomed on the subject. Most zoom lenses will reduce the aperture when zoomed at its fullest setting, thus preventing



Close-up Mode: Close-up mode (sometimes called macro mode), is used for taking close-up pictures of subjects. This mode will adjust various attributes of the camera to prepare it for bringing out the detail in close-up pictures. It also tones down the flash so it doesn't blow out the subject matter, as what typically happens in situations when the camera is too close to the subjects. Note that all lenses have a minimum focusing distance. This is the minimum distance the lens can physically be to the subject before the lens can no longer show the subject in focus. For some zoom lenses, this can be a long distance. In these cases, it's best to zoom in as much as possible while keeping the subject in focus.

Sport Mode: This mode is used for taking pictures of quickly moving subjects. It works best outdoors or when there is a lot of light. It attempts to reduce the amount of motion blur as much as possible by using high shutter speeds. Sport mode will always be restricted by the amount of available light in the scene, and when it's too dark, motion blur may be introduced into the scene.

Night Portrait Mode: Night portrait mode is for taking a very specific type of picture: at night, with a flash and using a tripod. Night mode attempts to bring out the background lights that often are lost when using flash photography at night. It's important to note that if you don't use a tripod with night mode, your photos are likely to end up blurry.

camera Modes: *creative Modes*



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camera Modes: *creative Modes*

- Program Mode (P)
 - In this mode the camera will automatically choose the best shutter speed and aperture size (size of lens opening) settings based on the scene
- Shutter Priority (Tv)
 - Tv stands for Time Value
 - You pick the appropriate shutter speed for your picture and the camera will find the corresponding aperture setting



Program Mode Auto Exposure (P): In the P mode, the camera will automatically choose the best shutter speed and aperture (size of the lens opening) settings based on the scene. You also can switch through different shutter-aperture combinations in this mode, choosing the best to suit your needs. To do this, press the shutter button half way and use the dial next to it to scroll through the settings), You can manually set the ISO light sensitivity of the camera's sensor. Finally, this mode also allows you to adjust exposure compensation to over or under expose the scene by ± 3 "stops" by $1/3$ stop increments (a stop is a measurement of exposure, measured in increments of "exposure value" or EV). To switch through the different combinations, use the wheel next to the shutter button. All these manual settings can be used in the Tv, Av and M modes described below.

Shutter Priority Auto Exposure (Tv): In the Tv mode (which stands for Time value), you pick the appropriate shutter speed for your picture and the camera will find the corresponding aperture setting. You can set the shutter by clicking the wheel next to the shutter button.

camera Modes: *creative Modes*

- Aperture Priority (Av)
 - You pick the appropriate aperture for your picture and the camera will find the corresponding shutter speed
- Manual (M)
 - You have to pick both the shutter and aperture settings
 - Use the light meter to determine under or over exposure



Aperture Priority Auto Exposure (Av): In the Av mode, you pick the appropriate aperture for your picture and the camera will find the corresponding shutter speed. You can set the aperture by clicking the wheel next to the shutter button.

Manual (M): In the M mode, you have to pick both the shutter and aperture settings. The camera does not provide any type of auto exposure adjustment. The camera will display a meter showing whether the current setting is over or under exposed, and by how much. You can change the shutter speed by clicking the wheel next to the shutter button. To change the aperture, hold down the "Av" button on the back of the camera, and click the wheel next to the shutter button.

camera simulator

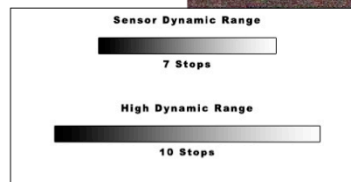


- <http://camerasim.com/camera-simulator/>
- You adjust ISO, aperture, shutter speed and "take" the picture to see how it comes out

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What causes "noise"

- High ISO
- Low lighting
- Sensor Size and Dynamic Range



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Noise in an image can make the quality of an image look bad. Keep in mind some ways to prevent or fix noise in your images.

ISO

If in a low light situation and cannot use flash you should use a high ISO – this makes the sensor more sensitive to light but can also make your pictures more grainy

PIXEL SIZE: NOISE LEVELS & DYNAMIC RANGE

Larger sensors generally also have larger pixels which give them the potential to produce lower image noise and have a higher dynamic range.

Dynamic range describes **the range of tones which a sensor can capture** below when a pixel becomes completely white, but yet above when texture is indiscernible from background noise (near black). Since larger pixels have a greater volume — and thus a greater range of photon capacity — these generally have a higher dynamic range.

compressing Images

- Start by taking the pictures at a low resolution
JPEG if you don't need a hi-res image
- Use post-processing software to reduce the file size

ISO

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PIXEL SIZE: NOISE LEVELS & DYNAMIC RANGE

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questions?

- **Hope Carroll | hwayne@clemson.edu**
 - Has Canon T2i, 18-55mm kit lens, 430ex ii flash
 - Wants Canon 60D, 18-135mm lens, 70-200mm f/2.8L IS USM Telephoto lens (\$2445)
 - Taught digital photography and post-processing for over 5 years