Application Note

IMAGING TERMS

1/2 Inch CCD:
A CCD measuring 1/2 inch along the diagonal across the photosensitive array.

1/3 Inch CCD:
A CCD measuring 1/3 inch along the diagonal across the photosensitive array.

1/4 Inch CCD:
A CCD measuring 1/4 inch along the diagonal across the photosensitive array.

1/5 Inch CCD:
A CCD measuring 1/5 inch along the diagonal across the photosensitive array.

1394:
A high-speed serial communications standard officially known as the IEEE 1394.

24-bit color:
24-bit color images are composed of three 8-bit color channels, red, green, and blue. When combined, the red, green and blue channels provide up to 16.7 million possible colors. The term "true color" refers to 24-bit color.

36-bit color:
36-bit color images are composed of three 12-bit color channels, red, green, and blue. When combined, the red, green and blue channels provide up to 68.7 billion possible colors.

4:1:1:
Digital component video format where three components (Y: luma, Cr: red color difference, Cb: blue color difference) are produced such that for every four luma (Y) samples, there is a chroma (CR, Cb) sample.

4:2:2:
Digital component video format where three components (Y: luma, Cr: red color difference, Cb: blue color difference) are produced such that for every two luma (Y) samples, there is a chroma (CR, Cb) sample.

4:4:4:
Digital component video format where three components (Y: luma, Cr: red color difference, Cb: blue color difference) are produced such that for every luma (Y) sample, there is a chroma (CR, Cb) sample.

8-bit grayscale:
Images that contain 256 possible shades of gray.

A/D:
See *Analog-to-Digital Converter*

Aberration:
Lens distortion. The failure of a lens to produce an exact point-to-point correspondence between the object and its resulting image. Various types are chromatic, spherical, coma, astigmatism and distortion.

Absorption:
The loss of light of certain wavelengths as it passes through a medium. Absorbed light is converted to other forms of energy (e.g., heat).

AGC:
Abbreviation for Automatic Gain Control. A circuit for automatically controlling amplifier gain in order to maintain a constant peak-to-peak output with a varying input within a predetermined range of input-to-output variation.

Aliasing:
The result of sampling a signal whose frequency is higher than the Nyquist rate (half the sampling frequency). A signal that is aliased cannot be recovered after sampling. In digital imaging applications using CCDs with color filter arrays, aliasing results from spatial frequency of an image being higher than the color mosaic spatial frequency.

Ambient light:
Light, which is present in the environment.

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Analog:
A continuously variable electronic signal (typically a voltage or current).

Analog-to-Digital Converter (A/D):
A device, which maps an analog voltage or current signal to a discrete series of digitally encoded numbers (signal) for computer processing.

Anti-aliasing:
Low-pass filtering a signal so that the information content is less than half of the subsequent sampling frequency. Optical filters that perform anti-aliasing are referred to as "spatial" or "blur" filters.

Aperture Correction:
Compensation for the loss in sharpness of detail because of the finite dimensions of the image elements or the dot-pitch of the monitor.

Aperture:
The aperture is the size of the lens opening when viewed from the front of the lens.

API:
An Application Programming Interface (API) provides standard documented access to software functions, allowing customers and third parties to develop and customize their own commercial applications.

Area Array Sensor:
An imaging sensor device with both rows and columns of sensors, forming an array, which captures a two-dimensional image.

Aspect ratio:
The ratio of the width to the height of a frame of a video image. The U.S. television standard is 4:3 or 1.333 and the HDTV standard is 16:9, which is almost the same as the aspect ratio of the screen in a movie theatre.

Astigmatism:
Lens distortion where off-axis points are blurred in either the radial or tangential directions.

Auto White Balance:
True AWB algorithms automatically and constantly adjust the processing of the image data so that white areas appear white. Once white balance occurs, the remainder of the colors should be correct.

Autofocus:
The ability of an imaging system to automatically control the focus of the lens to obtain the sharpest image on the detector.

Automatic Iris Lens:
Also called "auto iris," a lens that automatically adjusts the amount of light reaching the imager by opening or closing an iris in front of the lens.

AWB:
See Auto White Balance.

Back Porch:
That portion of the composite picture signal which lies between the trailing edge of the horizontal sync pulse and the trailing edge of the corresponding blanking pulse.

Background:
The portion of a scene behind the object, which is in the foreground. Typically the subject is in the foreground and everything else is in the background.

Backlighting:
Putting a light source behind an object so that a silhouette of that object is formed.

Bandpass Filter:
An absorbing filter, which allows a known range of frequencies to pass, and blocking all others.

Bandwidth:
A frequency expressing the difference between the lower and upper limiting frequencies of a frequency band; also, the width of a band of frequencies.

Barrel Distortion:
Lens distortion resulting from an optical imperfection which causes an image to bulge on all sides similar to a barrel.

Baud rate:
The speed at which symbols can be transmitted. Baud rate is not the same as "bits per second." Except in the most primitive systems, the bit rate will be higher than baud rate since each baud represents multiple bits.

Beamsplitter:
An optical device, which divides one beam into two or more separate beams. A simple coated piece of glass in the optical path might reflect a portion of the light down onto the object, while allowing the remainder to pass.

Binary:
Having a value of either one (1) or zero (0).

Bit:
An acronym for a Binary digit. It is the smallest unit of digital information, which can be represented. A bit may have one of two values, zero (0) or one (1).

Black Level:
The signal level that represents "black" in a system.

Blanking:
The time during a raster scan retrace when the video signal is suppressed. In a conventional video signal, blanking occurs during the horizontal retrace and also during the vertical retrace.

Blooming:
For CCDs, this effect results when a potential well fills up and charge spills over to adjacent pixels which results in the appearance of more pixels being illuminated than actually were.

Blur filter:
A spatial filter, which reduces the resolution of an image at the plane of interest. Blur filters are used as anti-aliasing filters to avoid color aliasing.

Brightness:
The intensity of the light at an area of interest.

Bus:
A path in the computer to transfer information within the computer or to the device(s) to which the data are addressed.

Byte:
A standard unit of measure - 8bits = 1 byte.

CCD, Frame Transfer:
A CCD where the entire image is transferred from the sensing area to a storage area on chip. Data (charge) is read out from the storage area in a full frame mode.

CCD, Full-Frame:
A CCD imager where an entire matrix of pixels is read out of the CCD in a way where each photosite transfers charge to the next photosite. If light continues to fall on the photosites, the image will be smeared.

CCD, Interline Transfer:
The CCD is configured into odd and even lines. Data (charge) is transferred in two fields, the first field is made up of all odd lines and the second field is made up of all even lines (or vice versa). A complete frame is composed by interlacing the odd and even fields.

CCD, Progressive Scan:
A CCD configured so that all lines are scanned in order to form the complete frame in a single scan.

CCD, Interlaced Scan:
A CCD configured so that all lines are scanned in two passes called fields, where the first field represents the even lines and the second field represents the odd lines.

CCD:
An abbreviation for Charge Coupled Device. A CCD converts photons into charge packets on a per-pixel basis. These are serially transferred from imaging sites to a readout channel where they are shifted out of the CCD through a charge-to-voltage conversion buffer giving an output voltage representing the magnitude of the light out of the CCD on a per-pixel basis.

CCIR 601:
The International Radio Consultative Committee for the digitization of color video signals recommendation covering the sample rate, resolution, and color conversion (RGB to YCrCb), etc.

CCIR 656:
The International Radio Consultative Committee for the digitization of color video signals recommendation covering the physical interface for component digital video.

CCIR:
Consultative Committee, International Radio.

CCTV:
Abbreviation for Closed-Circuit Television.

CDS:
Correllated Double Sampling

CFA:
See *Color Filter Array*

Chroma:
The color part of a video signal is called Chroma. That quality of color which includes both hue and saturation. White, black, and grays have no chroma.

Chroma-kill:
A function that will remove chroma from a signal based upon some criteria.

Chromatic Aberration:
Where the focus varies with the wavelength of the light. The effect will be manifested as the classic rainbow halo around objects. This aberration is compensated for by selecting appropriate lens elements, which when taken together have very little net chromatic aberration.

CID:
Charge Injection Device - A photo-sensitive image sensor implemented with large scale integration technology. Based on charge injection technology, a CID can be randomly addressed, non-destructively read, can be subscanned in a small region and is less susceptible to charge overflow from bright pixels to neighbors. The pixel structure is contiguous with maximum surface to capture incident light, which is useful for sub-pixel measurement.

CIE:
The Commission Internationale de l'Eclairage, the international commission on illumination. In the CIE chromaticity coordinate system, a plot of ratios (x, y and z) of the three standard primary colors (tristimulus values) to their sum. The most common diagram is the 2 dimensional CIE (x,y).

CIF:
Common Interchange Format. 352 x 288 pixels (H x V).

Clamping:
The process that established a fixed reference level for the picture brightness at the beginning of each scanning line.

Clipping:
The shearing off of the peaks of a signal.

CMOS:
Complementary Metal Oxide Semiconductor.

C-mount:
A standardized, threaded means of mounting a lens to a camera.

CMYG:
Cyan, Magenta, Yellow, and Green. This form usually refers to a color mosaic in the subtractive color space.

CMYK:
Printers' primary colors, Cyan Magenta, Yellow and Black.

Collimated Lighting:
Radiation from a given surface with every light ray considered parallel.

Color Bar Test Pattern:
Special test pattern for adjusting color TV receivers or color encoders. Color bars usually contain the colors, white, yellow, cyan, green, magenta, red, blue and black.

Color Burst:
That portion of the composite color signal, comprising a few cycles of a sine wave of chrominance subcarrier frequency, which is used to establish a phase reference for demodulating the chrominance signal. Normally approximately 9 cycles of 3.579545 MHz for NTSC and 4.433618Mhz for PAL.

Color Filter Array:
See *Mosaic, Color*

Color Fringing:
Spurious colors introduced into the picture by the change in position of an object from field to field.

Color Saturation:
The degree to which a color is free of white light.

Color Space:
A two or three dimensional space used to represent an absolute color coordinate. RGB, HSI, LAB and CIE are all representations of color spaces.

Color Sync Signal:
A signal used to establish and to maintain the same color relationships that are transmitted.

Color Temperature:
A colorimetric concept related to the apparent visual color of a source, but not its actual temperature.

Color:
A visual object attribute which may be described by a "coordinate system" such as hue, saturation and intensity (HSI), CIE or LAB. Wavelengths in the visible part of the electromagnetic spectrum to which retinal cones respond.

Coma:
The difference in magnification between light which passes through the center of a lens (on axis) and the light that passes through the edge of the lens (off axis). This effect may also cause points of off axis light to form tails reminiscent of comets.

Composite Video:
The combined analog picture signal, including vertical and horizontal blanking and synchronizing signals. Composite video is also referred to CVBS, which stands for Color, Vertical synchronization, Blanking and Signal.

Contrast Enhancement:
Stretching of the gray level values between dark and light portions of an image to improve both visibility and feature detection.

Contrast Range:
The ratio between the whitest and blackest portions of television image.

Contrast:
The range of light to dark values in a picture or the ratio between the maximum and minimum brightness values.

Crosstalk:
An undesired signal from a different channel interfering with the desired signal.

CRT:
Cathode Ray Tube.

Curvature of Field:
Images where all of the points are not in focus in a plane, but rather over a slightly curved surface. Since the CCD image surface is flat, the image will appear to be in focus at the center, but not at the edges, or vice versa.

D/A:
See *Digital-to-Analog Converter*

dB:
An abbreviation for Deci Bel which is one tenth of a Bel, where a Bel is the logarithm (base 10) of the ratio of two powers. Essentially, a dB is a measure of the power ratio.

DCT:
Discrete Cosine Transform.

Depth of Field:
The in-focus range of a lens or optical system. It is measured from the distance behind an object to the distance in front of the object when the viewing lens shows the object to be in focus.

Dichroic Filter:
A filter used to transmit light based on its wavelength, rather than on its plane of vibration. Transmits one color, while reflecting a second when illuminated with white light. Often used in heads-up displays.

Diffraction Pattern Sampling:
Inspection by comparing portions of the interference pattern formed on a screen or special sensor from light waves diffracted by object edges.

Digital Camera:
A camera that captures images in digital, electronic form rather than in chemical form (e.g., silver halide).

Digital Signal Processing:
A mathematical algorithm that operates on a signal quantity using finite-precision operations.

Digital-to-Analog Converter:
A circuit used to convert between the digital and analog domains.

Digitization:
Sampling and conversion of an incoming video or other analog signal into a digital value for subsequent storage and processing.

Dispersion:
Separation of a beam of light into its wavelength components, each of which travel at slightly different speeds. Also called chromatic dispersion.

Distortion:
The deviation of the actual signal from its ideal.

DPI:
Abbreviation for Dots Per Inch. The number of distinct pixels that can be produced horizontally or vertically in a linear inch.

DRAM:
Acronym for Dynamic Random Access Memory.

DSP:
See *Digital Signal Processing*

Dynamic Range:
The measure of the range light sensitivity a sensor is able to reproduce, from the darkest to the brightest portion of a scene. Usually expressed in dB.

EAV:
End of Active Video.

EIA Sync:
The signal used for the synchronizing of scanning specified in EIA Standards RS-170, RS-330, RS-343, or subsequent issues.

Electro-magnetic Spectrum:
The total range of wavelengths, extending from the longest (audio) to the shortest (gamma rays) which can be physically generated. This entire spectrum is potentially useful for imaging, well beyond just the visible spectrum.

EPLD:
Electrically Programmable Logic Device.

Exposure:
The amount of light in an image. The exposure of an image can be modified by changing, f/#, exposure time, or available light.

F/Stop:
Also called F Number. The ratio of the focal length to the lens aperture. The smaller the f- number, the larger the lens diameter and brighter the image and narrower the depth-of-field.

Field of View:
The maximum angle of view that can be seen through a lens or optical instrument.

Field:
One of the two equal but vertically separated parts into which a television frame is divided in an interlaced system of scanning.

Field-of-view:
The area which can be seen through the optical imaging system.

Filter:
A device or process that selectively transmits frequencies. In optics, the material either reflects or absorbs certain wavelengths of light, while passing others.

Firewire:
IEEE 1394 High-speed serial interface standard.

Flicker:
Flicker occurs, when a video picture sequence is less than approximately 24Hz. The human eye distinguishes the sequence as single pictures and perceives it as flicker.

Flickerless mode:
A mode where the video picture sequence is above 24Hz.

F-number or f-stop:
See f/Stop

Focal Length:
The distance from the focal point to the principal point of the lens.

Focal Plane:
A plane (through the focal point) at right angles to the principal point of the lens.

Focal Point:
The point at which a lens or mirror will focus parallel incident radiation.

Focus:
The point at which rays of light converge for any given point on the object in the image. Also called the focal point.

Footcandle:
See lumen/ft^2.

Footlambert (FL):
A unit of luminance equal to 1/candela per square foot or to the uniform luminance at a perfectly diffusing surface emitting or reflecting light at the rate of one lumen per square foot. A lumen per square foot is a unit of incident light and a footlambert is a unit of emitted or reflected light. For a perfectly reflecting and perfectly diffusing surface, the number of lumens per square foot is equal to the number of footlamberts.

FPGA:
Field Programmable Gate Array.

Frame buffer:
The portion of memory that holds the contents of a single screen image.

Frame Rate:
The number of times per second that the frame is scanned. The U.S. standard is 30 frames per second.

Frame Grabber:
A device that interfaces with a camera and, on command, samples the video, converts the sample to a digital value and stores that number in a computer's memory.

Frame Transfer CCD:
See *CCD, Frame Transfer*

Frame:
The total area scanned in an image sensor while the video signal is not blanked. In interlaced scanning, two fields comprise one frame. Frame rate is typically 30 Hz.

Frame:
The total area, occupied by the television picture, which is scanned while the picture signal is not blanked.

Frequency Interlace:
The method by which color and black and white sideband signals are interwoven within the same channel bandwidth.

Frequency Response:
The range of band of frequencies to which a unit of electronic equipment will offer essentially the same characteristics.

Front Porch:
The portion of a composite picture signal which lies between the leading edge of the horizontal blanking pulse and the leading edge of the corresponding sync pulse.

Gain:
A multiplicative increase in voltage or power, usually expressed in dB.

Gamma Correction:
A nonlinear root function applied to the video signal processing path which corrects for the gamm of the display device.

Gamma Curve:
A non-linear transfer function in the video signal-processing signal path, which corrects for non-linearities in the display device.

Gamma:
A numerical value that describes the response of a display device.

Output intensity = (Video Signal Voltage) exp (Gamma)

GB:
Gigabyte, or 1,073,741,824 bytes of memory.

Genlock:
A device used to lock the frequency and phase of an internal sync generator to an external source.

Graduation:
A smooth transition between black and white and from one color to another.

Gray Scale:
Variations in value from white, through shades of gray, to black on a television screen.

Grid:
Regularly spaced horizontal and vertical lines.

GUI:
Graphical User Interface - a computer control system whereby the operator commands the computer with a mouse or stylus.

H.261:
The ITU standard that deals with video compression standards for video conferencing.

H.263:
A backwards compatible update to H.261.

H.320:
The ITU standard that defines a multimedia terminal for bit-rates that are integer multiples of 64 kbits/s (e.g., ISDN lines)

H.324:
The ITU standard that defines a multimedia terminal for low-bit-rate (e.g., POTS phone lines) visual telephone services of the analog and cellular telephone system.

Halftone:
A type of single-bit image composed of a pattern of black dots that fool the eye into seeing shades of gray. Examples of halftone images are the pictures you see in a newspaper. These images usually look very coarse.

HDTV:
High Definition TV proposed broadcast standard to double the current 525 lines per picture to 1,050 lines, and increasing the screen aspect ratio from 12:9 to 16:9. The typical TV of 336,000 pixels would increase to about 2 million.

High Pass Filter:
Passes high frequency image information, while attenuating low frequency data.

Histogram:
In image processing, a representation of a frequency distribution of gray levels by means of bins whose widths represent intensity ranges and heights represent the number of pixels for a given gray level.

HSI Conversion:
A mathematical conversion from the color RGB space to hue, saturation and intensity values.

HSI:
An abbreviatin for the Hue-Saturation-Intensity color representation. A mathematical conversion from RGB.

Hue:
One of the three properties of HSI color perception. A color attribute used to express the amount of red, green, blue or yellow a certain color possesses. White, gray and black do not exhibit any hue.

Hz:
An abbreviation for hertz - an international unit of frequency which equals one cycle per second.

IEEE 1394:
See Firewire

Illumination:
Normally a wavelength or range of wavelengths of light in addition to ambient light used to enhance a scene so the detector, normally a camera, can produce an image.

Image Plane:
The plane at right angles to the optical axis at the image point.

Image Processing:
Digital manipulation of an image to extract or enhance features, make measurements, or alter image contents.

Incident Light:
Light, which falls directly onto an object.

Index of Refraction:
A property of a medium that measures the degree that light bends when passing between it and a vacuum.

Infrared filter:
A filter which blocks the infrared portion (wavelength between ~800nm and ~1500nm) of the light spectrum.

Infrared:
The region of the electromagnetic spectrum adjacent to the visible spectrum, just beyond red with longer wavelengths.

Intensity:
The relative brightness of a portion of the image or illumination source.

Interference:
Extraneous energy which tends to interfere with the reception of the desired signals.

Interlaced Scanning:
A scanning process in which all odd lines then all even lines are alternately scanned. Adjacent lines belong to different fields.

Interline Transfer CCD:
See *CCD, Interline Transfer*

Iris:
An adjustable aperture built into a camera lens to permit control of the amount of light passing through the lens.

ISDN:
Integrated Services Digital Network.

Isolation Amplifier:
An amplifier with input circuitry and output circuitry designed to eliminate the effects of changes made at either upon the other.

ITU:
International Telecommunication Union.

ITU-601:
See *CCIR 601*

ITU-656:
See *CCIR 656*

Jitter:
Rapid variations in a waveform due to mechanical disturbances or to changes in the characteristic of components.

JPEG:
The "Joint Photographic Expert Group" have proposed a standard for still image compression. JPEG defines the algorithm by which the image is decompressed.

Kilobyte:
Kb, or 1.024 bytes of information.

Lateral Color:
is the effect seen when the magnification varies with the color of the light. For example, the red image might be slightly larger than the blue image when displayed on a typical CRT.

Lens:
A transparent optical component consisting of one or more pieces of optical glass or plastic with surfaces so curved (usually Spherical), that they serve to converge or diverge the transmitted rays of an object, thus forming a magnified real or virtual image of that object near the focal point.

Light:
Electromagnetic radiation detectable by the eye, ranging in wavelength from about 400 to 750nm.

Line Scan Camera:
A solid state video camera consisting of a single row of pixels. Also called a linear array camera.

Lossless compression:
A compression method in which the reconstructed data is identical to the original source.

Lossy:
Image compression algorithm in which the original, pre-compressed image, cannot be exactly recovered from the compressed result.

Low Pass Filter:
A digital or optical filter which passes slow changing, low frequency information, while attenuating high frequency, detailed edge information.

LPI:
An abbreviation for lines per inch.

LSB:
Least Significant Bit

Luma:
Black and White part of a video signal is called Luma.

Lumen (LM):
The unit of luminous flux. It is equal to the flux through a unit solid angle (steradian) from a uniform point source of one candela or to the flux on a unit surface of which all points are at a unit distance from a uniform point source of one candela.

Lumen/FT^2:
A unit of incident light. It is the illumination on a surface one square foot in area on which a flux of one lumen is uniformly distributed, or the illumination at a surface all points of which are at a distance of one foot from a uniform source of one candela.

Luminance:
Luminous intensity (photometric brightness) of any surface in a given direction per unit of projected area of the surface as viewed from that direction, measured in footlamberts (fl).

Lux:
International System (Sl) unit of illumination in which the meter is the unit of length. One lux equals one lumen per square meter.

Magnification:
The relationship between the length of a line or the size of a feature in the object plane with the length or size of the same in the image plane.

Modulation Transfer Function (MTF):
The spatial frequency response of an imaging system component.

Modulation:
The process, or results of the process, whereby some characteristic of one signal is varied in accordance with another signal. The modulated signal is called the carrier. The carrier may be modulated in three fundamental ways: by varying the amplitude, called amplitude modulation; by varying the frequency, called frequency modulation; by varying the phase, called phase modulation.

Monochrome:
Refers to a black and white image with shades of gray but no color.

MOS Sensor Array:
An image sensor fabricated using the same technology as modern microprocessors. This technology allows for greater flexibility in addressing and ingration of signal processing on the same substrate as the sensor.

Mosaic, color:
A rectangular pattern of pixels where each pixel is covered by a primary color. In the additive color space, each pixel is covered with one of Red, Green, or Blue. RGB is also called Bayer pattern. In the subtractive color space, each pixel is covered with one of Cyan, Magenta, Yellow, or Green (note that Green is part of the primary space but is included to enhance sensitivity).

MPEG:
Acronym for Moving Picture Experts Group. Specifies a standard for compressing, encoding, and decoding motion video and audio.

MSB:
Most Significant Bit

ND Filter:
A filter that attenuates light evenly over the visible light spectrum.

Noise:
A detectable quantity that contains no information.

NTSC:
Abbreviation for National Television Systems Committee. A committee that worked with the FCC in formulating standards for the present day United States color television system.

OEM:
Original Equipment Manufacturer that supplies components to another for resale.

Opaqueness:
Degree to which an object does not transmit light.

Optical resolution:
The true resolution of a camera and the key factor in determining the amount of detail visible in an image. Optical resolution is one type of resolution; the other is interpolated resolution.

Orientation:
The angle or degree of difference between the object coordinate system major axis relative to a reference axis as defined in a 3D measurement space.

PAL:
Acronym for Phase Alternation Line. PAL is the European system for television transmission.

Pan:
The process of moving the display window to view different areas of a scene. This is done most commonly by depressing the pan button and moving the mouse.

Parallax:
The change in perspective of an object when viewed from two slightly different positions. The object appears to shift position relative to its background, and also appears to rotate slightly.

Pattern Recognition:
A process, which identifies an object based on the analysis of its features.

PCM:
Abbreviation for pulse code modulation. A method of representing an analog signal.

Peak-to-Peak:
The amplitude difference between the most positive and the most negative excursions (peaks) of an electrical signal.

Perceptron:
The basic processing element used in neural networks. A simple analog circuit with weighted inputs and a nonlinear decision element such as a hard limiter, threshold logic or sigmoid nonlinearity.

PGA:
Abbreviation for Pin Grid Array. Type of integrated circuit package.

Photodiode:
A single photoelectric sensor element, either used stand-alone or as a pixel site of a larger sensor array.

Photometry:
Measurement of light, which is visible to the human eye (photopic response).

Picture Element:
See *Pixel*

Pincushioning:
See *Barrel Distortion.*

Pinhole:
A small, sharp edged hole, acts as a lens aperture which produces a soft edged image, is distortion free, with a wide field of view and large depth of field.

Pixel:
The unit photosite from which displays and sensor arrays are comprised.

Primary Colors:
Three orthogonal colors. They are Cyan, Magenta, and Yellow in the subtractive color space. They are Red, Green, and Blue in the additive color space.

Prism:
An optical device with two or more non-parallel, polished faces from which light is either reflected or refracted. Often used to redirect light as in binoculars.

Progressive Scan CCD:
See *CCD, Progressive Scan*

QCIF:
Quarter Common Interchange Format, 176 x 144 pixels (H x V).

Radiometry:
Measurement of light within the entire optical spectrum.

Raster Scan:
A scanning pattern, generally from left to right while progressing from top to bottom of the imaging sensor or the display monitor. Generally comprised of two fields composed of odd and even lines.

Reflection:
The process by which incident light leaves the surface from the same side as it is illuminated.

Refraction:
The bending of light rays as they pass from one medium (i.e. air) to another (i.e. glass), each with a different index of refraction.

Resolution:
The amount of resolvable detail in the horizontal or vertical direction in a picture, or imaging device.

Retrace:
The path taken by a scanning signal when it returns to the starting point for the next trace.

RGB video display:
A color monitor that receives its signal for red-green-blue (RGB) over separate lines. An RGB monitor usually provides clearer and more vivid images than those viewed on a composite video display.

RGB:
An acronym for the Red-Green-Blue color space. This three primary color system is used for video color representation.

Ripple:
Amplitude variations in the output voltage of a power supply caused by insufficient filtering.

Run Length Encoding:
A data reduction method used to code a binary image. For each line in an image, data is stored denoting only the starting location of a blob and object and the length of the run of that line over the object.

Sampling rate:
The number of discrete (physical) samples of a continuous signal (such as sound or video) taken over a given period of time. The result obtained matches the actual source of the sample when more samples are taken over the same period of time.

Saturation:
The degree to which a color is free of white. One of the three properties of color perception along with hue and intensity (HSI).

SAV:
Start of Active Video.

Scaling:
An operation that changes the dimensions of a drawing by an operator-entered multiplication factor. This operation can be performed in one or more directions. A mechanism for re-sizing part or all of an image.

Sensitivity:
In television, a factor expressing the incident illumination upon a specified scene required to produce a specified picture signal at the output terminals of a television camera.

Shutter:
An electrical or mechanical device used to control the amount of time the imaging surface is exposed to light.

SIF:
Standard Image Format. For NTSC-> 320 x 240 pixels (H x V). For PAL 384 x 288 pixels (H x V)

Signal-to-Noise Ratio:
The ratio between useful television signal and disturbing noise or snow.

Simple Lens:
A lens with only a single element.

Spectral Response:
The sensitivity of a sensor to a distribution of light by wavelength in the electromagnetic spectrum.

S-video:
A video transmission standard, by which the luma and the chroma components are transmitted over separate wires.

Sync Level:
The level of the negative peaks of the synchronizing signal.

Sync Signal:
The signal employed for the synchronizing of scanning.

Sync:
A contraction of "synchronous" or "synchronize".

Sync Pulse:
Timing signals used to control the television scanning and display process. The horizontal synch triggers tracing of a new line from left to right, while the vertical synch initiates the start of a new field.

Synchronizing:
Maintaining two or more scanning processes in phase.

Synchronous:
A camera characteristic denoting operation at a fixed frequency locked to the AC power line (typically 60 or 50Hz).

Tearing:
A term used to describe a picture condition in which groups of horizontal lines are displaced in an irregular manner.

Test Pattern:
A chart especially prepared for checking overall performance of a television system. It contains various combinations of lines and geometric shapes. The camera is focused on the chart, and the pattern is viewed at the monitor for fidelity.

Thresholding:
The process of converting a gray scale image into a binary image. If the pixel's value is above the threshold, it is converted to white. If below the threshold, the pixel value is converted to black.

Ultraviolet:
The region of the electromagnetic spectrum adjacent to the visible spectrum, but of higher frequency (shorter wavelength) than blue ranging from 1 to 400nm.

USB:
Abbreviation for Universal Serial Bus.

VESA:
Video Electronics Standards Association

VGA:
Variable Gain Amplifier

VGA:
Video Graphics Array.

Video CODEC:
A device that encodes and decodes video signals

Video Signal:
(Non-Composite) A signal containing visual information and horizontal and vertical blanking (see also Composite Video Signal) but not sync.

Video:
Visual information encoded in a specific bandwidth and frequency spectrum location originally developed for television and radar imaging.

Visible Light:
The region of the electromagnetic spectrum in which the human retina is sensitive, ranging from about 400 to 750nm in wavelength.

Wavelength:
The distance covered by one cycle of a sinusoidal varying wave as it travels at or near the speed of light. It is inversely proportional to frequency.

White Balance:
See *AWB*

Window and level:
A linear mapping of pixel luminance values. Widely used for medical images where pixel data is greater than 8 bits.

Window:
A selected portion of an image or a narrow range of gray scale values.

Y Signal:
The video signal component containing brightness and contrast information.

Y/C:
Luma/chroma.

YCrCb:
Luma, Chroma Red, Chroma Blue.

YUV:
Similar to YCbCr, where U is a linearly scaled version of Cb and V is a linearly scaled version of Cr.

Zoom Lens:
A compound lens which remains in focus as the image size is varied continuously. May be motorized or manually operated.

Zoom:
To enlarge or reduce, on a continuously variable basis, the size of a an image primarily by varying lens focal length.


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