

Sightech Vision Systems, Inc.

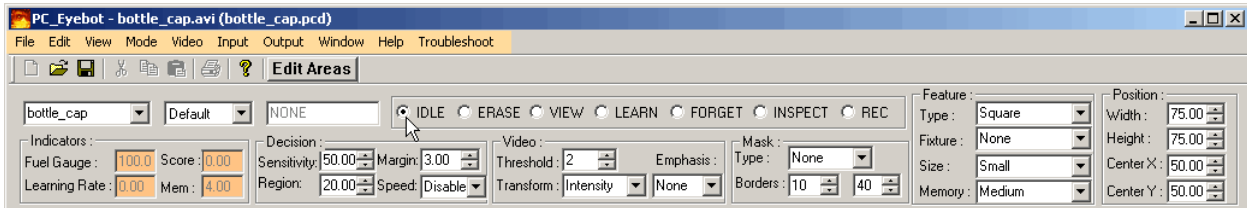
PC Eyebot

Tutorial – PC-Eyebot Console Explained

Published 2005

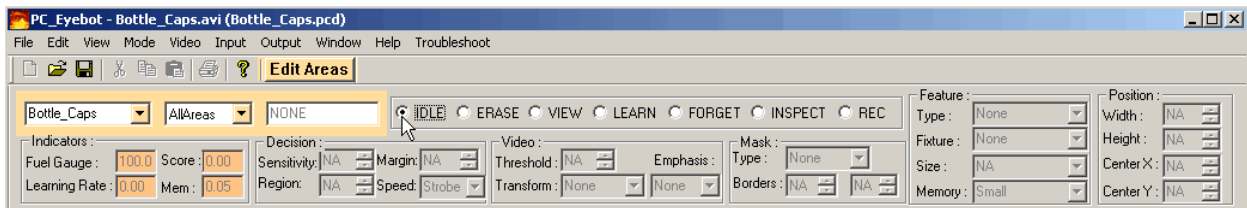
Sightech Vision Systems, Inc.
6580 Via del Oro
San Jose, CA 95126
Tel: 408.282.3770 Fax: 408.413-2600
Email: sales@Sightech.com
Web: www.Sightech.com

Quick look at the Console:



When you open PC_Eyebot, you see the menu bar and the main window. The top menu bar, from left to right, allows you to:

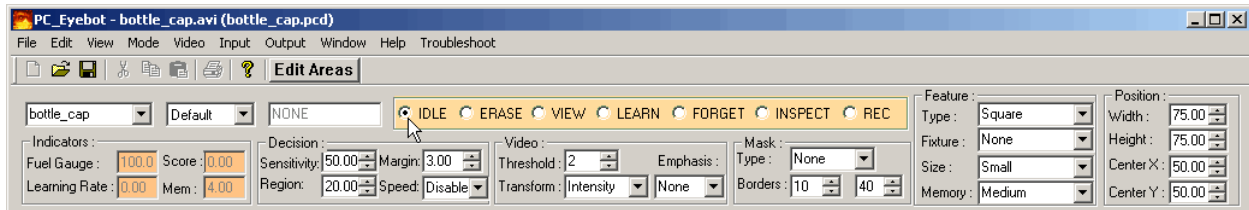
- **File:** Select video source – digital (1394 or USB-2) camera, analog NTSC camera, internet camera, or video file (.avi, .mpg, .wmv, etc).
- **Edit:** Set miscellaneous settings, edit **Product Code**
- **View:** Select which windows to display
- **Input:** Set external input control settings – such as triggered **INSPECT** and **LEARN** modes.
- **Output:** Set various connectivity devices – relays, LAN based reporting, serial port settings, bar-code scanner, etc.
- **Windows:** NC
- **Help:** NC
- **Troubleshoot:** Usually not used by user, used for testing, etc.



General Control Windows:

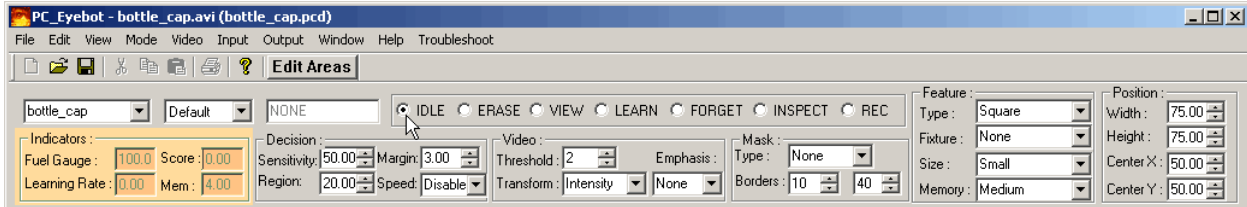
- **Edit Areas Button** – Activates a dialog that allows the user to add, modify, or delete Areas. It also allows easy Area sizing by allowing “click and drag” Area definition.

- **List Box 1** – Choose camera/video source – currently one allowed
- **List Box 2** – Select active Area or All Areas
- **Decision Status Display** – the end result of our intelligent quality inspection machine vision process



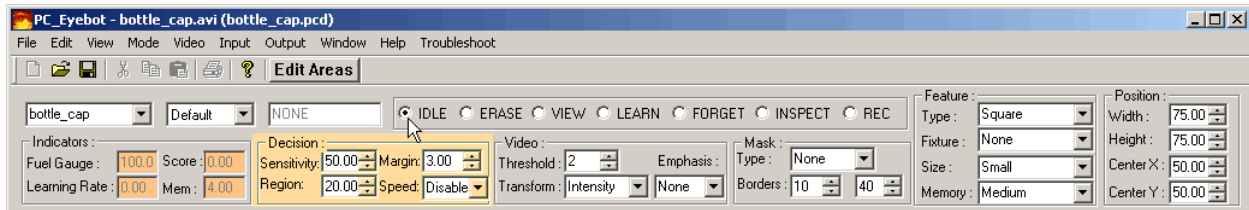
Mode Bar – 7 Mode Selection Buttons:

- **IDLE** (default) – continues to receive video frames, but no processing
- **ERASE** – erases and initializes data training memory
- **VIEW** – displays resulting binary form of image resulting from image convolutions, threshold processing, etc. The feature size is also displayed.
- **LEARN** – our unique self-learning process – it extracts up to 13 million feature per second. This mode offers massive self-programming of the target’s qualities – thereby eliminating normal machine vision programming. A learning rate is calculated during this process.
- **FORGET** – an advanced learning mode that massively un-learns what was trained with the **LEARN** mode. This mode allows powerful and extremely sensitive differentiation between multiple situations. This is used to detect the presence of seals, surgical instruments in kits, crimps on fittings, etc. We call use of **LEARN** with **FORGET** Absence / Presence mode.
- **INSPECT** – activates the inspection process which detects differences from what was trained with in **LEARN** mode.
- **REC (OGNIZE)** – activates the Presence / Absence mode. This is the run mode when you have trained using both **LEARN** and **FORGET**. With great sensitivity, it detects the presence of unique qualities about what was trained with the **LEARN** mode but was absent when trained with the **FORGET** mode.



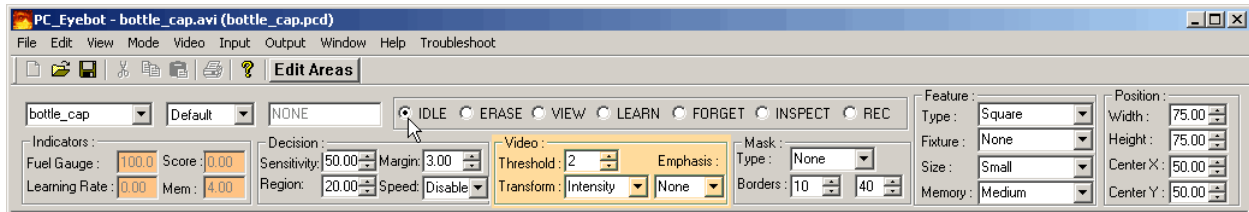
Numeric Displays:

- **Fuel Gauge:** Value (range 0...100) that, for a selected **Area**, represents how much training memory is remaining. It is best to stop training if it drops below 70. Often, especially under good lighting conditions, it does not drop much below 90.
- **Learning Rate:** This value (range 0...100) is presented during training in **LEARN** or **FORGET** mode. Usually, when it drops below 10, training is complete. When memory is **ERASE**'ed and
- **LEARN** mode is initiated, the learning rate starts out as a high value, but it drops as training progresses.
- **Score:** Value (range 0...100) that is presented during **INSPECT** and **REC** (OGNIZE) modes. This value is compared to the user specified **Decision Sensitivity** value to determine the **Decision Status**, which is displayed in the **Decision Status** window.
- **Mem (ory):** Value that represents the amount of memory allocated by the user defined **Areas**. The number of **Areas** and the **Memory Sizes** used affect the total memory allocated.



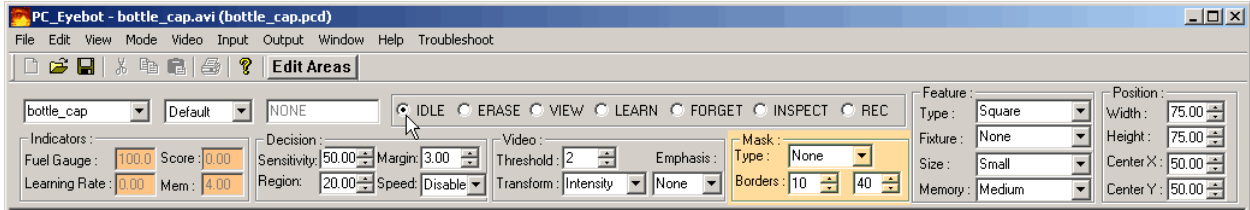
Decision Group – User Specified:

- **Sensitivity** (default 50) – User specified value (range 0...100) that is compared to the **Score** that is presented during **INSPECT** or **RECOGNIZE** Modes. If the **Score** exceeds the **Sensitivity** value, then the **Decision Status** is affected accordingly.
- **Region** (default 20) – User specified value (range 0...100) that provides a decision threshold to be used internally to make numerous small local decisions. If, in any region, the threshold is exceeded by defect density, then a “**HIT**” is placed on the displayed image and the **Score** is increased accordingly. A “**HIT**” can be noticed by the color added to the image to indicate the area of defect detection. This implements a very powerful multi-level hierarchal decision system – similar to those used in other neural network systems.
- **Margin** (default 3) – User specified value (range 0...100) that adds a **MARGINAL** band to the interpretation of the **Score**. This band begins at **Sensitivity** less **Margin** and ends at **Sensitivity** plus **Margin**. The total size of the **MARGINAL** band is, therefore, plus and minus the **Margin** value. If **Sensitivity** is set at 20 and **Margin** is set at 5, then **PASS** would be below 15, **MARGINAL** would be from 15 to 25, and **FAIL** would be over 25. **Margin** is a powerful feature that allows some products that are borderline in quality, to be binned specially.
- **Speed** (default Disabled) – List box that offers a choice of decision speeds. Except for **Strobe**, the decision **Score**, is calculated as a rolling average over several frames. **Strobe** is used for high speed applications where ejection timing is critical. **Medium** or **Slow** is used when product is observed for an extended time before a decision is required. The over-sampling can implement a more sensitive and confident decision process.
 - **Strobe** = 1 frame
 - **Instant** = 2 frames
 - **Fast** = 4 frames
 - **Medium** = 10 frames
 - **Slow** = 30 frames
 - **Disabled** = <specified elsewhere>



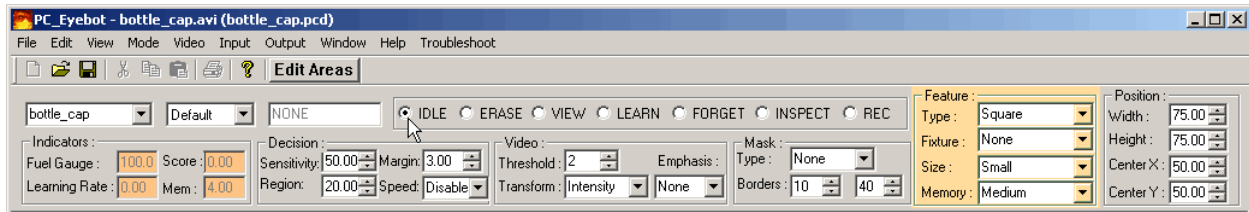
Video Group – User Specified:

- **Threshold** (default 50) – User settable value (range 0...100) that is used to convert RGB images to binary black and white images. With **Transform⇒Intensity**, this value is simply compared to the intensity of the image at every pixel. If the intensity is larger than the threshold, the resulting binary image is white. If smaller, the result is black. With **Transform⇒Tiny, Small**, etc., the **Threshold** is compared to the result of the chosen convolution, and the image is converted to binary accordingly.
- **Transform** – List box offers choice of image binary transformations: **Intensity, Tiny**, etc.
 - **Intensity** – 1 pixel – used often with back-lighting
 - **Tiny** – 3x3 pixels – for imaging tiny defects – very noise sensitive
 - **Small** – 5x4 pixels – good for general use in quality inspection
 - **Medium** – 9x9 pixels – images moderately gross qualities
 - **Large** – 13x13 pixels – overall gross feature inspection – does not image details
 - **MRA** – 9x9 pixels – multi-resolution convolution (being tested)
 - **Line** (default) – 11x11 pixels – detects and emphasizes lines in image
 - **Horizontal / Vertical** – images horizontal / vertical edges
 - **Scratch** – good for surface inspection - detects fine scratches
 - Etc.
- **Emphasis** – List box offers choice of image emphasis filtering. This takes place prior to the execution of the Transform (above) on the image.
 - **None** (default) – no filtering.
 - **Bright** – emphasizes bright image areas while ignoring dark areas.
 - **Medium** – emphasizes mid-level image areas while ignoring both dark and bright areas.
 - **Dark** – emphasizes dark image areas while ignoring bright areas.
 - **Blue** – passes only the blue component of the RGB image – blocks green and red.
 - **Green** – passes only the green component of the RGB image – blocks blue and red.
 - **Red** – passes only the red component of the RGB image – blocks blue and green.
 - Etc.



Mask Group – User Settable:

- **Type** – Allows choice of image masks where active learning and inspection can be constrained only to desired areas of the image.
 - **None** (default) – no mask, all **Area** available for inspection processing
 - **Rectangle** – allows inspection to be constrained to a rectangular mask with an outer rim and an inner rim. Note; if the **Area** is square, this mask will be square.
 - **Ellipse** – allows inspection to be constrained to an elliptical mask with an outer rim and an inner rim. Note: if the **Area** is square, then this mask will be circular.
- **Borders** – the user can set two values that affect the shape of the mask
 - **Value 1** – sets the distance of the outer rim of the mask to the outer edge of the **Area**.
 - **Value 2** – sets the distance of the inner rim of the mask to the outer edge of the **Area**.
 - Values of 10 and 40 with **Ellipse** mask selection would produce a doughnut shaped mask that is 10% from the outside of the **Area**, 30% thick, and a hole of 20%. If the 2nd value is 50, then there is no hole – the mask is just an ellipse. Also note that the mask takes the proportion of the **Area**. Making the **Area** short and wide will make the mask short and wide.

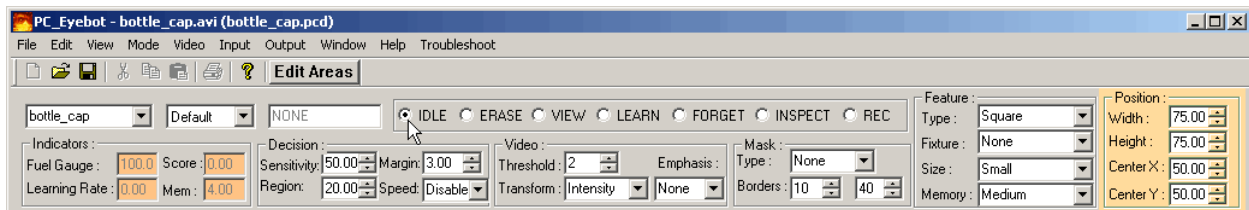


Feature Group – User Settable:

- **Type** – This specification defines the type(s) of information that are combined in features for learning.
 - **Rectangle, Square** (default) – general use shape-based inspection. **Rectangle** is somewhat better for detailed text inspection.
 - **Circular, Burst** – special shape based inspection
 - **Wide** – for inspection widths of tubing, etc.
 - **Color_10, Color_20, Color_50** – inspects for color and shape defects. There are 3 choices with **Color_10** being a little color and **Color_90** being mostly color.
 - **Spectrum** – 24 bit color only – no shape information learned or detected.
 - **Coloration** – Advanced color mode that learns features consisting of “colorations”. These are features with no rotational component that consist of information relating to color transitions. This learns into a massive 48 bit color space.
 - **Texture** – Advanced shape base learning. Extremely sensitive and inspects into shadows as well as bright areas of an image. This mode, along with **Spectrum** and **Coloration**, does NOT use any specified **Video⇒Transform**. This mode sometimes learns too much detail.
 - **Graylevel** – Combines gray-level data along with shape data from the specified **Video⇒Transform** to generate the feature data for learning.
 - **Behavior** – Experimental mode that will inspect behavior as well as shape and color information. It will learn “how something moves” as well as other things. Changes in behavior will be seen as defects.
- **Fixture** –
 - **None** (default) – Features learned at any XY are OK at any XY
 - **Horiz-Coarse, Horiz-Medium, Horiz-Fine** – features learned at any X location apply to any other X location
 - **Vert-Coarse, Vert-Medium, Vert-Fine** – features learned at any Y location apply to any other Y location. This mode does not care about horizontal movement, but is sensitive to vertical placement of labels, etc. Useful for canning applications, etc.
 - **Full-Coarse, Full-Medium, Full-Fine** – features learned at any XY location only apply to the same XY location during inspection. This mode cares completely

about placement of everything. It is very fussy and is useful for applications like cell telephone keypad inspection.

- **Radial** – features learn at one radius from the center of an **Area** apply to any other location of the same radius during inspection.
- **Size** – specifies the physical size of the feature – can be seen as the pink rectangle in the center of an **Area** with **VIEW** mode selected.
 - **Small** (default) – for small defects
 - **Medium** – general use size
 - **Large** – for gross, larger defects
- **Memory** – specifies the training memory model size. This affects how much learning can be done and to what detail.
 - **Small** – trains quickly, does not learn too much detail
 - **Medium** (default) – general use size
 - **Large** – trains into a very large memory – training takes significantly more time, but the inspection can be much more detailed. Fussy inspection tasks often require this mode.



Area Position Group – User Settable:

- **Width** (default 75) – sets width of selected Area.
- **Height** (default 75) – sets height of selected Area.
- **Center X** (default 50) – sets X center point of Area
- **Center Y** (default 50) – sets Y center point of Area.