What is HP In-camera Red-Eye Removal?

HP In-Camera Red-Eye Removal finds and corrects red eyes caused by a reflection of the strobe (flash) off the retina of the human eye. When the ambient lighting level is low, the pupils are large and red-eye occurs more frequently.

Note: most cameras (including most HP cameras) have a red-eye reduction mode that causes a pre-flash to induced people’s pupils to shrink. HP In-Camera Red-Eye Removal goes beyond this by actually editing the images to remove red-eyes.

Having red-eye removal in the camera allows convenient correction of pictures on the spot. There is no need to use a PC software package to remove the artifacts. The pictures are then printable with no further effort from the user. The images to the right show a photo before and after HP in-camera red-eye removal.

What is Automatic In Camera Red-eye removal?

In 2006, HP expanded In Camera Red-eye removal by making it fully automatic in the R725, R727, R827, R927 and R967 cameras. If Red Eye Removal is turned on in the Capture menu the camera will automatically search for and fix red eyes in any photograph taken where the flash (strobe) fired. This happens automatically with no user input required. If you do not like what automatic red eye removal did, you can undo the changes when reviewing the photo later. By default, automatic red eye removal is turned off. This is because automatic red eye removal can impact shot-to-shot time slightly when taking multiple pictures quickly, particularly if you have a slower Secure Digital (SD) card. If you turn automatic red eye removal on, the camera remembers the setting even when the camera is turned off. If automatic red eye removal is
turned off, you can still run in camera red eye removal on any flash photo when reviewing photos as described below.

**How does HP In Camera Red-Eye Removal work?**

The HP patented algorithm works by first locating all the candidate red areas in the photograph. The algorithm then performs a complex series of tests of over 60 different criteria to determine whether the red area is actually part of a human eye. The algorithm looks for irises, eye whites, eye lashes and skin tones surrounding the possible redeye area. These criteria are tested in such a way to eliminate red areas as quickly as possible without performing all of the tests, thus allowing the algorithm to operate very quickly. Red-eyes found then go through a correction phase to darken the red area and remove the color to restore the eyes to a more natural color. Of course, the photographer can choose to accept or reject the proposed changes to the image.

**How is HP In-Camera Red-Eye Removal used?**

Note: if you have a camera which has automatic red eye removal, and you have turned that feature on, the process described below is run automatically as soon as you take a picture. In automatic mode, the changes are made without you reviewing them, but don’t worry, if you do not like what the red eye removal did, you can undo the changes by selecting undo red eye removal when looking at the photo in review mode.

Suppose you’ve taken a photo with your HP Photosmart Digital camera and are reviewing it on the camera LCD. You notice some of the people in the photo have ‘red-eyes’. You select “Remove Red Eyes” from the menu in the camera. The camera analyzes the image, locates any red eyes, fixes them and shows you the proposed changes on the LCD display. Each proposed change is indicated by a green box on the camera display as shown below. You can zoom in and look at what the camera is proposing to do. At that point you can choose to accept the corrections, or go back to the original image.

Note: if you select “Save Changes” the original image is overwritten with the corrected one.

Do other cameras do anything like this?

The HP Photosmart R707 Digital Camera, introduced in early 2004, was the first in the world to ship with in camera red-eye removal. Since then, HP has added this capability to several HP Photosmart Digital Cameras. In addition, since then, at least one manufacturer has also shipped digital cameras which claim an ability to correct red-eyes in the camera. However, the method
and technology used is different. HP’s in-camera red-eye removal is based upon HP technology and is not included in any non-HP camera.

HP In camera red-eye removal has been widely acclaimed as very useful and successful. Therefore, consumers can expect other camera manufacturers to attempt to add this capability to cameras in the future. Automatically detecting and correcting red-eyes in an image is very challenging – and doing it inside the camera is even harder. Therefore, a consumer should evaluate the effectiveness and ease of use of any in camera red-eye removal and not just accept all “in camera red-eye removal” claims as equally valid.

Finally – it is very important to note that HP’s in-camera red-eye removal is not the same as the typical red-eye reduction flash that most cameras have. When a camera specification indicates that the camera has a red-eye or red-eye reduction flash mode, that capability is not equivalent to in-camera red-eye removal.

**Has anything like this been done before?**

There are several software solutions available for removing red-eyes that are both manual and automatic. These solutions work to varying degrees of success. Having the red-eye removal solution in-camera allows the users greater flexibility than ever before and the ability to eliminate the PC from the digital photographic process. Some HP Photosmart printers as well as HP Image Zone software also have HP red-eye removal technology.

**Did HP invent this technology?**

Yes. HP researchers have created their own digital red-eye removal algorithm which was suitable for implementation in an embedded architecture such as a digital camera. This algorithm was based on research into face detection and feature detection research done at HP Labs.

**Does In Camera Red-Eye removal work perfectly?**

No. HP’s in-camera red-eye removal is based upon very complex algorithms that look at both color and context. The routines are not perfect and will sometimes miss red-eyes and sometimes identify something as a red-eye that is not. This is why it is so important that the photographer have control over the corrections the camera is proposing. Routines that run fully automatically – with no ability to reject the changes – may damage images in a way that is not acceptable.

It is important to note that on the rare occasion that HP in camera red-eye removal identifies and corrects something that is not a red eye, often you will not notice it unless it is pointed out to you.

**When I zoom in on a corrected red-eye – it looks blocky. Is something wrong?**

No. A red-eye is a very abrupt and sharp color – it is a reflection of the camera strobe (flash) on the inside of your eye. Therefore, when it is corrected, that will tend to be as abrupt. The challenge is that when people inspect corrected red-eyes they tend to ‘zoom in’ or enlarge the red-eye a great amount, either on the camera LCD or on a computer screen. This over-emphasizes that effect of correcting the red-eye. After all, it is unlikely you will print a picture of
just the single eye enlarged to an 8x10 photo. But often, that degree of enlargement is what people are using to “inspect” what the corrected red-eye looks like. In fact, when printed at normal sizes – any blockiness or abruptness will not be visible. It is a common error to over-enlarge a digital image when inspecting it for defects. Remember – when you print that beautiful photograph, you will be looking at it from a normal distance and at normal enlargement – not at the equivalent size of a billboard viewed from 2 feet.

**My camera automatically removed the red eyes and I don’t like what it did. What can I do?**

Don’t worry. In cameras with automatic red eye removal, you can always undo the changes. Go into the review mode and select Undo Red-Eye Removal from the Design Gallery menu.