

Review Research Paper

Technical Aspects of Crime Scene Photography

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Abstract

A characteristic aspect of Forensic science is that it is the comparison of evidence samples to reference samples. A crime is a violation of a statutory law. Therefore, a crime scene might be defined as any location or item connected with the crime. The interval between the crime event and examination of the scene, affects our ability both to recognize evidence as such and to relate it to the crime event. Crime scene photography helps to capture the scene and analyze it at a later date. It provides a permanent record of the scene & helps to understand the complexities and details of the case. Forensic photography is quite different from the regular photography. Forensic photography highlights mainly on the case as it provides a concrete proof which can be used as evidence in the court of law. It makes the judges and the lawyers understand the complexities of the case and tackle the issues in an efficient manner. It is mandatory to know about the basic concepts of photography and the art of crime scene photography to deal and record the evidence in a efficient manner.

Key Words: Forensic Photography, Crime Scene, Evidence, Judges & lawyers

Introduction:

Traditional definitions of "evidence" include the ideas, "to make evident, something that makes plain or clear, data presented in court in proof of the facts". [1] It is a known fact that a picture is "worth a thousand words". [2]

Photography provides a permanent record of the scene that is taken which helps the individual who know nothing about the case to understand the complexities and details of the case. Describing a case in mere words will be difficult to make a person understand.

Remember that the photographs speak about the case and it should be relevant to what you are trying to say through words. In other words, it is better to capture the scene and the surrounding areas that provide useful information. Photos should be taken, as if it makes none of them to misrepresent the fact in any way. Forensic photography is quite different from the regular photography.

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Regular photographer would like to take the shots which are quite appealing to the person who visualizes it. Contrary to it, Forensic photographer takes the shots which are very disturbing to the person who visualizes it. Forensic photography highlights mainly on the case as it provides a concrete proof which can be used as evidence in the court of law. It makes the judges and the lawyers understand the complexities of the case and tackle the issues in an efficient manner.

Investigation of a crime begins with the information about the crime. Upon such information the investigating officer visit to the scene of crime to make a note about the facts enumerated in the complaint. If the investigating officer is satisfied that a crime has been committed, suitable photographs are taken and proceed with further investigation.

Photograph of the Scene of Crime:

The first photograph of the scene should depict what was present at the scene when it was first seen or when the investigating officer first arrived at the scene. It is better to make a note that nothing is moved or changed before the scene is documented by photography.

Crime scene photography should provide the most comprehensive sense of the scene by taking photographs from three different perspectives: long range or overall views, mid-range or medium views, and short range or close up views. [3] The dividing line between "long shot" and "medium shot" is fuzzy, as is the line between "medium shot" and "close-up". [4]

In the overall views, it should show as much of the scene as possible.

The authors have provided a beautiful example, if the scene of crime took place in the bedroom, the overall views should include the front of the house, and then follow the progression to the actual crime scene, ending with shots of the entire bedroom. The medium or mid-range views should show the evidence in relationship to the other items in the room.

In other words, if you have blood spatter on a wall, shoot that evidence first at mid-range so that it is clear that it is on a wall, not on the floor or ceiling. Then photograph the blood spatter from close-up to get as much detail as possible. Use close-up views for all of the evidence collected. By using these three different views, a record can be made to show the entire scene and the relationship of the evidence to the scene.

After the entire scene and its evidence are photographed, photograph the surrounding area to add perspective. These photographs may include the neighboring homes and streets or fields. [3] The overall views that are needed to be taken vary from case to case.

Equipment:

Equipment required to take a better shot of the scene of crime is very important. Forensic expert cannot compare himself with a professional photographer and has to keep in mind that Forensic photography doesn't necessarily need the most sophisticated and most expensive camera in the market. A regular digital camera can be used for such purposes.

But one can resort to a DSLR camera from fairly basic models to high end models with interchangeable lenses when one has the option of choosing a camera for scene photography.

It is important to make sure that the person who takes photographs can operate the camera well and that provides high quality pictures. Whether the photograph has been taken on a film or a digital camera, remember that all pictures taken at the crime scene have to be accounted for. It's easy to delete photos with a digital camera, but it has to be remembered that photos should never be deleted that are taken at a crime scene.

If any photos are deleted then, that can invite lot of controversy in the court of law. The unedited photos have to be saved on a compact disc and sent to the court along with the other documents pertaining to the case. [5] The person who takes the photographs in a digital camera has to authenticate that the photographs has been taken by him and none of the photos has

been altered by any means. If required, then that individual has to depose evidence in the court of law as to its authenticity.

When photographing evidence the right features on the camera and the right accessory equipment are required. For example, to show a scene in perspective, a wide angle lens. When taking a close-up shots of blood spatter, fingerprints, tool marks, etc., use of macro photography to get a photograph with the level of clarity and fine details that are needed. In addition, to document properly taken photographic evidence of tool marks and foot prints, portable lighting in addition to the inbuilt flash, is required since using these light sources together provides oblique lighting that enhances the appearance of the print.

Use of Force Documentation: [1]

At times people will make frivolous claims of excessive force and injuries resulting from arrests and uses of force in an attempt to get personal gain. In such situations photography can back up the narrative report and through light to the allegation made there by saves time, effort and perhaps money.

In such cases, the use of micro photography to get a photograph with the level of clarity and fine details that is needed.

Panoramic Images:

Panoramic photography is a technique of photography, using specialized equipment or software that captures images with elongated fields of view. It is sometimes known as wide format photography. [6]

The term has also been applied to a photograph that is cropped to a relatively wide aspect ratio. If the help of professional photographer is sought at the crime scene then it is better to capture the panoramic images which create a virtual tour of the scene in addition to the typical crime scene photography.

There are two types of panoramas that are useful to the Forensic community:

- Spherical Panorama which captures a 360° field of view in all directions around the photographer.
- Object VR (Virtual Reality) which allows a photographed object to be rotated in all directions.

A. Spherical Panorama: [7]

There are multiple ways of creating spherical panoramas.

Part one: Only five pieces of hardware are needed to create a panoramic image:

1. **Digital SLR camera**
2. **8mm Fisheye Lens:** Any lens will work; however, more images needs to be taken to

complete a sphere with a longer focal length than a wide angle lens. For example, an 8mm fisheye lens will capture the entire 360° sphere with just four images in a single row versus a 16mm lens that requires six or more images in two rows. The fewer the number of images, the fewer stitches that need to be prepared, which means less computer processing time.

3. **Panoramic Head:** Parallax is the movement of a foreground object in relation to the background which causes some degree of misalignment between two adjacent photographs during the stitching process.

Parallax errors occur when photographs are captured by rotating the base of the camera on a standard tripod instead of rotating the lens.

To completely eliminate parallax errors, the camera needs to rotate about the entrance pupil (nodal point) of the lens which is generally around the front barrel of the lens. Panoramic heads are designed to position the nodal point of the lens over the center of the rotation of the tripod. There are numerous different styles of panoramic heads available.

4. **Tripod:** Using a tripod minimizes camera movement during an exposure. Most importantly, when shooting panoramic images for stitching, the tripod allows you to maintain consistent alignment between the images, thus improving the stitch process.
5. **Shutter Release:** In photography, shutter speed or exposure time is the length of time a camera's shutter is open when taking a photograph. The amount of light that reaches the film or image sensor is proportional to the exposure time.

Shutter speed is one of several methods used to control the amount of light recorded by the camera's digital sensor or film. It is also used to manipulate the visual effects of the final image beyond its luminosity. [8]

Part Two: Image Acquisition:

The basic idea is to capture all 360° of the scene by overlapping multiple photographs, roughly 20–30% with each adjacent photograph. Keep in mind that there are certain key requirements unique to panorama photography that must be adhered to in order to create a seamless panorama.

Camera Settings:

Each of the photographs taken must use an identical setting since any inconsistency in exposure, focus, or white balance between shots will create a mismatch during the stitching

process. The same holds true for the lens' focal length if a zoom lens is in use; tape down the lens barrel if necessary.

- Ensure the resolution is at the largest setting and ISO at the lowest to get the best quality and cleanest images.
- Lock white balance according to the current environment lighting condition (shooting RAW files).
- Set the camera to full manual mode "M" (Manual mode only if photographer is well versed with camera settings, other wise use aperture/auto mode) and the shutter speed as required for correct exposure.
- Set the aperture of the lens somewhere in the mid-range apertures of f/8 to f/11 to produce the sharpest images. The temptation to set it to f/22 or higher may yield more depth-of-field but will degrade image sharpness.
- Manually lock focus on the main subject or use the hyper focusing method for best results. Since the fisheye lens captures images at such an extreme angle, it has a very large apparent depth of field. This means that the photograph will appear sharply focused from front to back even at a wide aperture.
- Avoid using on-camera flash. Use a slower shutter speed or off camera lighting that can stay consistent throughout the rotation of the camera. [9]

Landscape or Portrait Mode:

With a full-framed sensor camera, the fisheye lens will capture a full 180° view in all directions and produces a complete circular image at the center of the frame surrounded by black unexposed areas on the outer edges of the frame; therefore, the camera can be used in either orientation. However, landscape mode will probably be more stable.

Part Three: Software

Depending on the end results of the panoramic project, a standalone scene or a virtual tour of multiple scenes, two types of software will be needed:

1. **Stitching software**
2. **Touring software**

Stitching software will seamlessly stitch, blend, and then export images as a single scene. They also have additional features such as RAW import, viewpoint corrections, and High Dynamic Range (HDR) panorama creation. Three of the most used stitching software products are PTGui Pro, Panoweaver, and Autopano Pro.

Touring software organizes multiple scenes into an interactive virtual tour. The viewer is then able to navigate the scene and access it from one location to another via mouse drag, buttons, and mapping. The basic elements for all touring software are the clickable “hotspot” creation. The hotspot can be programmed to open another scene, display a photo, open an external file such as a video, or to display contextual information in a popup window. The software also supports the final virtual tour output in readily available non-proprietary software formats such as Adobe Flash or HTML5 for playback.

Inexpensive, off-the-shelf software is also available to stitch the images together. Some of these products include:

- Photoshop Elements (with its Photo merge feature) from Adobe, www.adobe.com
- Photo Vista Panorama from iSeeMedia, www.iseemedia.com
- PanaVue Image Assembler (Windows Only), www.panavue.com

B. Object VR (Virtual Reality): [10]

VR photography is the art of capturing or creating a complete scene as a single image, as viewed when rotating about a single central position. Normally created by stitching together a number of photographs taken in a multi-row 360-degree rotation, the complete image can also be a totally computer-generated effect, or a composite of photography and computer generated objects.

VR panoramas are viewed through movie players, such as Apple's QuickTime software, which may be part of a Web browser plug-in or a stand-alone player application.

QuickTime VR (QTVR) was the original interactive panorama format, but there are now a growing number of different players and plug-ins. Many of these are based on Flash, but some use Java, Silver Light, custom

programming using OpenGL and WebGL, and even JavaScript. Most of the players can be seen in the Panorama Player Comparisons project.

Conclusion:

A properly taken photograph of the scene of crime clearly, brief the investigative team where they could focus the investigation from the onset and save time, pages of reports, and the cost of personnel for that department.

A picture makes the witness who has made observations to recall the event on that fateful day, at the time of trial some years down the road. Use of proper photograph by panoramic images one can actually depict the whole scene as seen through the eyes of a photographer (viewed at the scene of crime).

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