



# Forensic Photography Concepts and Applications for Better Crime Scene Examination

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## Abstract

"A picture is worth a thousand words," and crime scene photography is a case in point. All crime scenes begin with photography, which is done with the almost priority. The most efficient and straight forward way for an investigating officer to depict a crime scene is through photographs and criminal sketches. By documenting the original site and surroundings, crime scene photography serves to offer a true and accurate record of the crime scene and tangible evidence that was present. Regardless of how well a detective can orally describe a crime scene pictures can convey the same information more clearly and effectively because they freeze time and capture the evidence. A trial's forensic photography is an essential component. Additionally, crime scene images are frequently used as the basis for the decision.

**Keywords:** Forensic Photography; Digital Camera; Interchangeable Lens; Exposure; Depth of Field; Ruler; International Standards Organization (ISO)

**Abbreviations:** ALS: Alternative Light Sources; ISO: International Standards Organisation; NFSTC: National Forensic Science Technology Center; BJA: Bureau of Justice Assistance.

## Introduction

A picture is worth a thousand words, which is particularly true in forensic or crime scene photography. For the past 200 years, photography has shown and recorded history, from landscapes to important events. The history of forensic photography is as old as the camera. When a fake document photograph was permitted to be used as courtroom evidence in Belgium in 1851, it became well-known. It began as a forensic investigation tool and advanced into a technique for forensic scene analysis and identification in the 1870s. The forensic investigators can use it to capture a permanent

visual record of the situation, which they can then examine for additional research. Compared to sketching, photography is useful for measuring an item's precise location and position in relation to other objects. In many cases, forensic images were able to provide the requested description. With time, criminologists came to appreciate the usefulness of forensic photography because it could produce an obviously definitive record of the evidence or even the victims at the crime scene, thus stopping time. In addition to serving as a source of proof, forensic images can serve as a blueprint for rebuilding a scene for additional processing if necessary. The memories of the witness who may have seen the offender without realizing it can be retrieved using these reconstructive events. Photographer to document a crime scene using systematic investigative techniques by taking pictures from several angles, such as from the ground and from the air. Given that the majority of the evidence at a crime scene is transient,

forensic pictures play a crucial role in the investigation and charging process. In light of this assertion, it is crucial to remove the Fingerprints, take the remains of the victims for an autopsy, and restore normalcy to life. Whereas forensic images capture the majority of transient evidences, such as the forms of blood stains that are swabbed up, they also denote the placement of evidences at the scene of the crime and their relationship to the immediate surroundings. When the crime scene disappears, these images can subsequently be vital to the investigating team. Even if videotaping captures everything, still photos are crucial at every crime scene since they allow for direct comparison. The use of objective images can offer dependable, controllable evidence that can lead to conviction. So, by presenting the first look of the crime, such as the victim's body and weapon location, shape, and size of injury marks, forensic photography can be used to fix an item crime. Last but not least, to take pictures of crime scenes that won't be preserved in their original form, like skid marks. The usefulness of the photographs as a crucial component of all legal departments and police services was quickly recognized by judicial authorities after it was discovered. If they are pertinent to the case, forensic images are authoritative for court hearings and trials and give the judge and jury a permanent visual record of the crime scenes with gathered evidence from scene. Physical evidence would be what has been produced in court. The forensic photographer needs to be technically proficient and have a solid understanding of mechanics to properly document the evidence in a court of law. Information about the brand, model, and serial number of the camera, the manual setting, and the time and date the photo was taken should all be included in the documentation. By doing this, any attempted manipulation of images can be found. This is possible if the referenced agency maintains the integrity and validity of the chain of custody for all photographs [1-7]. However, forensic photography is more than just shooting beautiful pictures it also involves reproducing numerous forensically and legally significant facts as a record and piece of evidence that will last forever [8]. Since then, it has developed steadily and is now a crucial component of forensic inquiry. Only if a photograph accurately and fairly portrays the subject in question will it be allowed to be used as evidence in court [9]. Since forensic photography was accepted as evidence in courts of law more than 150 years ago, photographers have faced several challenges in describing various information about images, including technical issues. Nobody, however, is able to create an image as seen by another person. No one will be able to precisely recall a thing, a scene, or a specific moment as seen by someone else [10]. Due to ignorance, crime scenes and other forensic events are frequently photographed incorrectly, producing ultimately meaningless results. In forensic photography, a situation or object of legal significance is fairly and truthfully captured on camera. Any criminal investigation's corner stone is the photographic

documentation of crime scenes [11]. A useful tool for documenting the crime scene and presenting the facts to others is photography [12]. Crime scene photography's objectives are to record the conditions of the scene as they were before any changes were made, record the location and position of evidence items gathered, document the point of view of the principals and potential witnesses, and document spatial relationships of pertinent items according to the definition of crime scene photography [13]. Investigators and others might utilize crime scene photography to provide a lasting visual record of the incident that can be reviewed or examined in the future. In contrast to sketches, it provides precise dimensions and distances between things. In court proceedings and trials, photographs are essential because they give the judge and the jury a permanent visual record of the scene and the evidence that were collected [14]. The first step is to describe how the crime initially appeared, including the location of the body, the placement of the weapons, the size and shape of the injury marks, etc. Second, to capture details of the crime that can't be retained in their original form, including skid tracks or other visual cues, and to serve as a way of presenting evidence in court. Last but not least, to make evident those features of evidence that are ordinarily invisible to the human sight, such as any abrasions on the victim's body, such as bluish bruises, wounds from ante-mortem defense, secret handwriting, etc. The importance of color photographs of the victim's injuries, which reveal their size, shape, and whether they are fatal or self-defense wounds, is immeasurable to the investigating officer [15].

### Forensic Photography

The most recent scientific advancement that combines UV and IR light with photography has greatly expanded the field of criminal investigation. Many tedious tasks that were previously required can be avoided, and many tasks that would otherwise be impossible can be completed. Digital cameras enable crime scene photographers to instantaneously assess their images and, if necessary, adjust the camera settings while still on the scene in order to get the best possible shot. While documenting a scenario, analytical and critical thinking skills are continually put to use. The point of entry and exit should be displayed in a way that makes the force marks visible. There should also be a scale included [16]. Use a regular lens (45mm to 55mm) rather than a wide angle lens when taking photos of a room's interior using a 35mm DSLR camera. When taking close-up photos, a wide angle lens produces distortion because the apparent distance between the objects looks to be greater than it actually. Photographs with overlap should be taken while holding the camera vertically. The scene will be seen from the top of the walls to the floor thanks to the vertical format. Environmental elements like rain, snow, or traffic can occasionally make it difficult to take pictures. In order

to get as much visual documentation from a scene that is deteriorating as possible, the photographer must act quickly. To record things like fingerprints, indentations, shoe and tyre track impressions, vehicle identification numbers, and very small pieces of evidence, special imaging techniques and lighting should be used. Alternative light sources (ALS) that aid find processed latent fingerprints or other concealed evidence for photo graphing include lasers, blue or green lights, and colored filters. Oblique angle lighting is the use of a flash, camera flash, or ALS at a very low angle to create shadows that enable the photography of an impression or imprint. Micro lenses may capture incredibly detailed photos of small objects, such as tool marks or other traces of the past. The lighting of the scene should be appropriately captured in photographs. If necessary, a photographer will add artificial light, such as a flash, after those pictures are taken to make up for a camera's limitations in capturing the visible range of light in particular circumstances [17].

### Principles and Procedures of Forensic Photography

- **Photography:** There are certain rules to be followed to obtain proper photographs of the crime scene. They are given below-
- **Securing the Scene:** Any changes made to the site after the crime has been determined should be secured as is, as they will serve as false evidence.
- **Assessing the Situation:** Light and weather conditions should be assessed, and camera settings should be modified as necessary.
- **Shooting the Scene:** The photographer should use wide-angle images to capture the complete scenario, followed by close-up shots to highlight how the evidence fits into the scene as a whole.
- **Taking Pictures of the Victims:** When photographing the victims, it is important to draw attention to the victims' location, injuries, and state.
- **Taking Pictures of the Evidence:** Each piece of evidence should be photographed both with scale to indicate size and without scale to show relationship with overall scene, and photographs should be taken directly at right angles to eliminate potential distance distortions for clear visualisation.
- **Placing Markers for Evidence:** To ensure that no one has tampered with the crime scene, the first shot of the entire scene is crucial. The scene should be photographed both with and without the evidence markers.
- **Using Specialised Imaging Methods:** To identify fingerprints, bite marks, and footprints, alternate light sources such as lasers, blue or green lights, and colored filters should be used [18].

### Basic Equipment for Crime Scene Photography

To produce appropriate photos, a few conditions must be met.

- Normal lens
- Wide angle lens
- Close-up lenses
- Filters
- Memory Card
- Flash Light with extra batteries
- Tripod
- Notebook and pen
- Ruler

### Capturing the Image

To represent the crime scene conditions they are given below -

- Shutter
  - Aperture
  - Camera International Standards Organization (ISO)
  - Flash or external light source
  - Depth of the field
  - Exposure
- **Shutter:** The shutter controls how long light is permitted to remain on the digital sensor. When an object is moving, a fast shutter speed stops it, making it easier to see where it is at any given time, where as a slower shutter speed emphasizes the moving object [19].
  - **Aperture:** The amount of light needed to take a picture is determined by the size of the lens opening. The f-number or f-stop of an aperture is used to represent its size. Maximum aperture is shown by F 2.8, and minimum aperture is shown by F 32 [20].
  - **Camera ISO:** It is an international standard that uses a numerical value to represent a sensor's sensitivity. Light has an impact on ISO sensitivity. For a correct exposure, less light with a greater ISO sensitivity is required [21].
  - **Flash or External Light Source:** It creates a rapid burst of synthetic light that aids in illuminating a topic [22].
  - **The Depth of Field:** What determines whether an object is in focus is the amount of space in front (foreground) and behind (background) it. Less depth of field results from larger apertures, and greater depth of field results from smaller apertures [23]. A subject's proper exposure is determined by the amount of light that falls on, emanates from, or is reflected off of the subject. An exposure meter is used to measure it. Close the diaphragm (f-stop) and accelerate the shutter to rectify severely overexposed photos, which are challenging to capture. Images that are poorly underexposed lack any indication of background shadiness, which can be fixed by lowering the shutter speed from 1/250 to 1/125 and lowering the diaphragm (f-stop) from f 5.6 to

f 4 [24,25].

### Type of Forensic Photographs

Crime scene photographs are of three types overview, midrange and close-up as follows-

- **Overview Photographs**

At the crime scene, every single piece of evidence is photographed. In order for the viewers to understand each object, it must be pertinent to the crime scene. The crime scene should also be pertinent to its surroundings in general. In this approach, aerial images capture the entire scene of the alleged crime. The scenario is captured in the overview photo while the photographer is maybe standing at a higher height. This assumes the photographer was in that position when the pictures were taken. To improve the link between the scene and its surrounds. Depending on the type and location of the scene, aerial photography can be done from a balcony, a roof top, a fire ladder truck, or an aero plane. Most of the time, an overview photo is not taken by leaning over or standing on a support to go up high, but if it is, this fact should be noted. Additionally, if a specific point of view is captured on camera, a note must be made about it. In some circumstances, it may not be possible to bring the judge and jury back to the crime scene, but adequate images can [26,27]. In both examples of an indoor and an outdoor crime scene, overview photos contain both exterior and interior perspectives. Photos taken from the outside show the approximate area around the crime scene. Photographs of the spectators at the crime site can be used in the future to identify witnesses or offenders.

- **Midrange Photographs:** Midrange images record specific items by connecting them to the scene before close-ups, whereas overview photographs deal with capturing the crime scene. Compared to close-ups, midrange photos show where the evidence is in relation to the crime scene like a knife relation to a door frame, blood stains or to the rest of the scene area.
- **Close-up Photographs:** Finally the evidence is documented with close-up shots with marks identifying scars on victim's body or a serial number on tool of crime like knife. The photographer must take a picture of the evidence just where it is in the scene before anything moves when taking close-up pictures. The photographer will then take a duplicate image while establishing scale using a ruler [28].
- **Scale and Date:** The images of the injuries must be dated and should be taken both with and without the evidence ruler.
- **Forensic Photogrammetry:** The use of Photogrammetry in the forensic sciences is known as forensic Photogrammetry. It entails taking measurements from

the images of the crime scene. It has been applied not just to the forensics disciplines but also to other fields. It has been a useful tool for giving investigators, attorneys, and insurance adjusters better information. Forensic Photogrammetry is used to create an accurate 3D reconstruction of the accident or crime scene so that the suspect's dimensions (position and distance) with regard to the scene can be determined later. Even many years after the use of Photogrammetry, all photographs are still helpful to recover or preserve data that can find new piece of crucial evidence for measurements to an investigator. The measurement of crime scene mapping, crush on damaged vehicles, skid marks, bullet trajectories, blood spatters, suspect height, shoe and tyre prints, and other forensic applications can all be done using forensic Photogrammetry and. In forensic photography, two types of Photogrammetry close-range and aerial are employed. In order to make 3D images and locate lost objects and locations for forensic, archaeological, architectural, and engineering purposes, close-range Photogrammetry uses regular cameras. For topographic maps, such as terrain mapping from an aircraft, aerial Photogrammetry is utilized. Six or twelve inch rulers, American Board of Forensic Odontology (ABFO) scales for bite marks or fingerprints, bureau scales for foot prints, and 25 and 100 foot tape measures for drawing and drafting are necessary for forensic Photogrammetry of crime scenes [29,30].

- **Importance of Photography from a Judicial Point of View:** After photography was invented, judicial authorities instantly recognized its significance. Today, all of the bigger police forces have well-equipped photographic sections that are capable of handling all types of photography, some of it of an advanced kind. As soon as photography was invented, judicial authorities quickly recognised its importance, and they now maintain fully functional photography labs. The first step in a crime scene investigation is to photograph each room at the scene by taking as many pictures of the corpus delicti as possible and saving the finest ones for later use. Taking numerous photos and later choosing the finest ones has become easier with modern high-end DSLR cameras photographs of the interior of the room showing its current state, items left there, trace evidence such as cigarette butts, tool marks, impressions of shoe prints, and soil samples stained with blood left behind, signs of activity before the incident, such as the telephone receiver off the hook or wires cut, playing cards neatly stacked or scattered, TV and lights turned on, food in various stages of cooking, coffee cups, drinking glasses, or liquor bottles, time watch, and clock, and interior photos showing the conditions of the room. In general, items that appeared to be in use right before the crime was committed or that appeared

to have been moved from their usual position should be documented. In many jurisdictions, recording the crime scene on video has become standard procedure yet, it might never completely replace still photography. When recording a crime scene, common mistakes made include quickly rotating the camera, poor lighting and focusing, and improper use of the camera's zoom feature. Each room and view of the crime scene should be described on video, and the photographer should make sure that no other detectives or crime scene technicians are present while the recording is being made. Crime scene photography can help the profiler create a psychological and behavioral portrait of the criminal if it is done correctly. As the police department acquires and presents evidence, digital imaging equipment including digital cameras, photo CD discs, and image handling software can be valuable assets. However, procedures should be followed to protect the evidence's integrity and genuineness in order to ensure that it is valid and will be accepted by courts of law.

## Conclusion

Forensic photography is really important. By producing a stable visual proof of the crime scene and the original state of the evidence throughout the whole investigation. By providing the jury with a vivid picture in the courtroom, it reconstructs the action of the incident that occurred. Prior images were used as a visual record of the crime scene and the position of the evidence inside the scene rather than as evidence itself. A forensic photograph provides not only a general overview of the crime scene and the pertinent evidence, but also additional information about the immediate surroundings, such as the weather and the time of day or night. These images show tyre prints, footprints, bloody body parts, attack wounds, homicide and murder scenes, as well as any tools used in committing crimes like a knife or gun. If the photographer is proficient with their camera, they can capture these images at their best. The indiscernible evidence is captured using specialised methods like UV, IR, and fluorescence filters. The images are acceptable in courtrooms if they are properly documented with all relevant information, including the case name and the location, and a maintained chain of custody.

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