



Forensic Photography: A Visual and Legal Record of Crime Scene

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Abstract:

Based on priority forensic photography is a source of documenting crime scenes. Currently it enables to signify a crime scene with every significant pieces of location and evidences. Adding to forensic investigation, crime scene photography provides a true and precise record of original scene and evidences relevant to surroundings. Crime scene photograph can illustrate a crime scene easily than verbal description by an investigator as it freezes time and records the evidences. It records all type of crime scenes such as fingerprints, impressions, injuries or bruises on skin in assault cases, human identification, bloodied body and knife in murder case etc. Scientific photography skills and techniques such as UV, IR and Fluorescence light filters are practiced to discover and preserve the hidden information during investigation. It is an integral part of criminal investigation by providing proper documented focused photographs to present actual story of the scene in the courtroom.

Keywords:

1. Introduction

“A picture depicts thousands of words especially true in crime scene or forensic photography.”

Photography has demonstrated and preserved history for past 200 years from landscapes to historic events (3). Forensic photography is as old as the camera itself (7). It was familiarized in 1851 when a forged document photograph was allowed to present it as court room evidence in Belgium. It was born as forensic investigative tool and became an advanced technology in 1870s for forensic identification and scene analysis. It provides a permanent visual proof of the scene to the forensic investigators which later can be analyzed for further investigation. Photography is of value measuring an item's accurate site and position with respect to other items which is missing with sketches. Forensic photographs were able to provide the preferred description for many cases (1, 2, 3 and 4).

With the passage of time criminologists realized the value of forensic photography as it could freeze time by producing an evidently definite

record of evidence or even victim's at scene of crime (7). Forensic photographs are not only used as a source of providing evidence but also as a blueprint for reconstructing a scene for further processing if required. These reconstructive events can be used to recall the memories of the witness who might saw the culprit without recognizing they had (6). Alphonse Bertillon was first French photographer to record a crime scene with organized investigating systems by capturing images at several distances including ground level and aerial shots. Forensic photographs become an important part of investigation and accusing a crime scene as most of the evidence is temporary. With reference to this statement, it is essential to lift the Fingerprints, take the victim bodies for autopsy and life should return to its normal state. Where the Forensic photographs preserve most of transitory evidences such as blood stain's shapes which is swabbed up, it also signifies the position of evidences placed at scene of crime and their relation to its surrounding area. These types of photographs later can be vibrant to investigating team when

the crime scene is vanished (7, 4).

Despite of videotaping does record everything, still photographs are very important at every crime scene as these can be used for direct comparison. Objective application of the photographs can provide permanent and easily controlled proofs that are capable to bring conviction. Therefore forensic photography can be applied to fix an object for future reference as the camera can sees further that human eye cannot such as scratches or bruises on the victim body, ante-mortem defense injuries and secret writings etc. Similarly forensic photographs give solution for the continuation of a crime by providing an initial appearance of the crime i.e. victim's body and weapon position, shape and size of injury marks. Lastly, to photograph the phase of crime that will not be available in its initial state like those of skid marks (3, 4).

Soon after the discovery of the photography, judicial authorities realized its value as central part of all legal departments and police services. Forensic photographs are authoritative for court hearing and trails if they relevant to the case and provide an enduring visual record of the crime scenes with collected evidence from scene to the judge and jurors (3, 7). This evidence presented into court can be termed as physical evidence. For the proper documentation of the evidence in the court of law, the forensic photographer should have sufficient understanding of mechanics and technical skills (2, 4). Documentation should include information like camera brand, model with serial number, manual setting and photograph's time/date when captured. Doing so can detect any modification tried to be done on photographs. This can be achieved if the referred agency control the chain of custody of all photographs and maintain its integrity and validity (3, 4).

2. Principle of Forensic Photography

Forensic photography introduced a new way to the early detectives with their crime scene sketches by producing photographs that are more real and sound to life than drawings. These photographs can record and document the primary state of a crime scene and technically modest enough to be manipulated as they are drastically deviate from reality (7, 4). It does not take a prescribed time to document a crime scene by capturing photographs. It is influenced by size and condition of crime scene with certain complications including environmental factors such as weather and threat to investigating team.

It could have thousands of photographs and hours of work (1). A good photograph of scene should be with precise coverage, sharp focus free from distortion and concerned depth of field (7). To yield proper photographs, following certain rules are followed;

2.1. Secure the Scene

Secure the crime scene as it is after it has been established, as any rearrangement will act as wrong evidence in scene photographed.

2.2. Evaluate Conditions

The scene conditions such as light and weather should be evaluated by adjusting camera settings accordingly.

2.3. Shot the Scene

The entire scene should be captured by using wide range shots and the close up shots to visualize the relationship of scene with over all scene and evidence as follows;

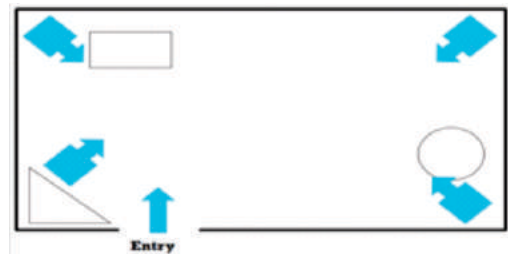


Figure 1: An overview of a crime scene captured with relation to evidences and other objects (1)

2.4. Victims Photograph

Photographs of victims should be highlighted with location, condition and injuries.

2.5. Evidence Photograph

Photographs of evidence should be taken directly at right angles by removing distance distortion for clear vision. Evidence with each part should be photographed with and without scale to show size and relationship with overall scene respectively as in following figure;

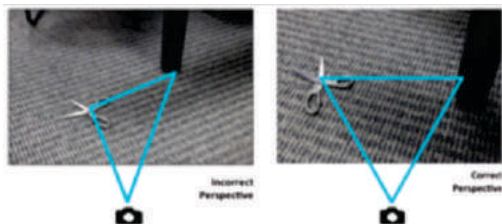


Figure 2: Evidence photography using scale and angles positions for clear visualization (1).

2.6. Mark the Evidence

Crime scene should be captured with and without evidence markers so that to confirm if the scene has been altered, therefore the first shot of entire scene is very essential.

2.7 Reshot for New Evidence

The entire scene including all evidence should be reshot if any new evidence is marked by the investigator. These photographs should have the entire scaled piece of evidence with sizes (1, 2, 3, and 4).

2.8 Use of Special imaging techniques

Distinct techniques and lighting are used for capturing objects like fingerprints, indentations, vehicle identification numbers, shoe print, tire track impressions and tiny parts of evidences as follows;

• Alternate Light Source (ALS)

Alternate light source or ALS includes lasers, blue or green lights and colored filters. Colored filters help to detect and illuminate latent fingerprints for photography as in following photograph;

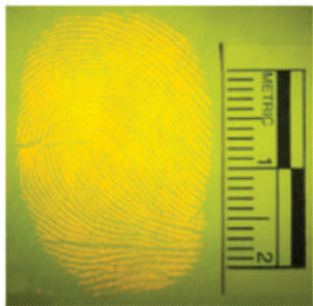


Figure 3: Use of Green Light to illuminate a latent fingerprint (1).

Ultraviolet, Infrared and florescence are used for capturing latent fingerprints go hand in hand forensically. Where the visible fingerprints are photographed without lifting, the latent prints are firstly developed by powder dusting or suspension method and then photographed. Thus reducing the chances of forgery by being invisible genuine for match (3, 8). Fluorescence powders and chemicals are used to photograph the latent fingerprints by enhancing them. Chemical which are naturally fluorescent such as riboflavin present in fingerprint residues, can be noticed earlier to any treatment. However, UV lights and fluorescence powders or liquid dye stains are used for most of fingerprints to fluoresce (8) as shown in the following figure;

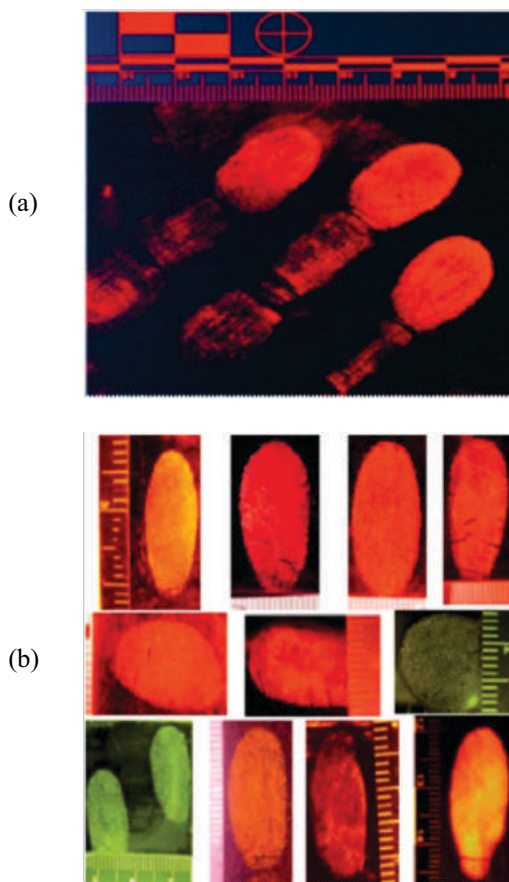


Figure 4: (a) and (b) UV Fluorescent fingerprints (8).

• Oblique Light

Flashlights, camera lights and ALS are used at a low angle to produce a shadow that would allow the impressions or fingerprint for photography as shown in following figure (1, 2, 3, and 11);

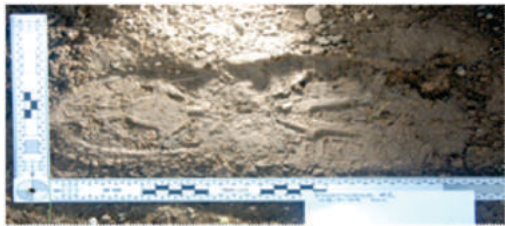


Figure 5: Oblique light used to create a contrast to a footprint (1).

To photograph an impression, the first and foremost step is orientation of impression in the scene. Close-up shots are made by placing a scale on same plane as the impression. Strong colored filters of UV and fluorescence lights are used from different angles to show the finest details of an impression as shown in the following figure (2, 8 and 11);

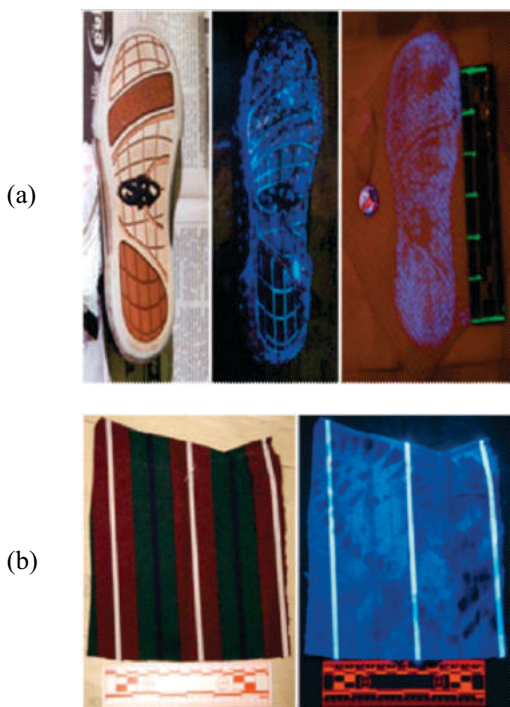


Figure 6: (a) Luminol fluorescing a “cleaned” shoe, (b) UV absorbed by blood (8).

Oblique light with an adequate cross light followed brightness with flashlight can photograph different fingerprint subjects such as dust, wax and clay grease. Low oblique light is used to capture fingerprints on glass and mirrors by placing white card or cloth behind them. Transmitted light or back lightening is used with diffusion screen to capture the fingerprint from perspiration prints left on glass (2, 11).

• Macro Lenses

Macro lenses are used for close up photographs of small objects including tool marks, trace evidence and fingerprints as shown cartridge case in figure 7. At the scene, the documents should be photographed accurately with lighting conditions provided. Photographers can add artificial light such as flash light to the photographs after capturing them so that any sort of camera limitation should be avoided (1, 2, 3, and 4).



Figure 7: Cartridge case details photographed with macro lens (1).

Fingerprints are photographed by using macro or close-up lens with gray card for proper exposures. A well detailed fingerprint can be obtained using black and white films which are more contrast (2).

3. Basic Equipment of Forensic Photography

A forensic photography kit might vary based on crime scene or laboratory protocols. Most of the kits have basic camera or even several cameras, electronic flashes, different light source filters, numerous lenses for close up shots, midrange and wide range angles, a tripod, cable release, ruler, gray/index card and protective measurements from rain, cold and heat exposure (1, 2, 4, and 7).

4. Types of Forensic Photographs

Crime scene photographs are of three types mainly overview, midrange and close-ups as follows;

4.1. Overview Photographs

Each and every item of evidence at crime scene is photographed. It is important for individual item to be relevant to the crime scene in order to make a sense to the viewers. Similarly the crime scene also should be relevant to its general surroundings. In such way, the whole view of crime scene questioned is documented by overview photographs. The overview photograph is capture of scene where the photographer stands at possible higher height. This presumes the position of the photographer when the photographs were taken. It is done so to relationship of scene with surroundings. An aerial photography can be done from balcony, a rooftop, using fire ladder truck or an aircraft depending on the nature and location of scene. Often overview photograph is not taken by bending or standing on support to get high but if done then note of this fact should be documented. Also if particular point of view is photographed then it must be documented as note. Adequate photographs can return the judge and jury to the crime scene which is not possible in some cases (4, 8 and 20).

Overview photographs include exterior and interior overviews in both cases of indoor and outdoor crime scene. Exterior view photographs relate to the general surrounding area in relation to crime scene as shown in following figure;



Figure 8: Exterior overview of burglary scene(8).

Interior overview not only includes photographs of scenes that took place inside like a room or car but also the exterior overview including entrance and exits as shown in following figure 9. Photographs of the audiences present at the scene of crime can be used in future to detect witnesses or perpetrators.



Figure 9: Interior overview from corner to corner (8).

4.2. Midrange Photographs

Where the overview photographs deal with documenting the crime scene, midrange photographs record individual items by linking them to the scene before close-ups. Midrange photographs as compared to the close-ups, locates the position of evidence with reference to crime scene like a gun's relation to a door frame, blood stains or to the rest of the scene area as in the following figure;

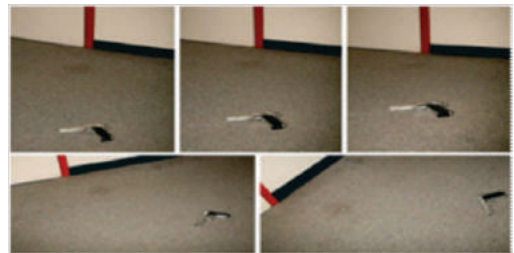


Figure 10: Midrange photographs of a gun and door frame (8).

4.3 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 as shown in figure 11. While capturing close-up images, the photographer needs to take a shot of evidence as it is found in the scene before movement of anything. Then the photographer will capture a duplicate image by using ruler to establish scale (4, 7 and 8).



Figure 11: Close-up series of bloodied knife (8).

5. Photographic Documentation

Using photography in recording crime scene has become a dedicated part of the forensic investigation processing (6). Therefore forensic photography is crucial for the proper documentation of physical evidence in an accurate way for further court proceedings. Following are necessary steps for proper documentation;

- **Lighting;** crimes scene photograph should be taken in day light or using background light.
- **Scale and date;** the injuries photographs should be taken with and without evidence ruler, and must be dated.
- **Body identification;** while photographing, the identification of person/body is important to prove it in court of law therefore the face should be captured properly.
- **Authenticity;** authenticity of photographs should be maintained by recording every process from capturing to presentation in court of law and protecting the captured image by giving trademark.
- **Chain of Evidence (COE);** during the chain of evidence, photograph's origin, usage, storage and evidence processing with its integrity should be clearly documented.
- **Images Storage;** the captured photographs should be transferred to CD-R in any case by storing in locker with limited access.
- **Protection;** computers preserving photographs should be protected with password with limited access. For this purpose special hard disks are used for storage (2, 4, 5 and 8).

6. Photographing Specific Crime Scenes

6.1. Forensic Medical Photography

The aim and objective of medical photography is different. Images taken are primarily used for legal purpose, consequently outcomes should be precise and complete for court use. The photographer should have not only the technical skills of photography but also medical and legal requirements. As the photographs are not repeatable in autopsy cases so forensic autopsy photography should be extremely reliable and followed with minimal delay. A good photograph with clear demonstration and without misleading information can be achieved by using equipment which are easily portable with supplementary mechanical maintenance. For this purpose, factors considered are identification of the body, orientation, background, body color with injuries or spots, lighting, scale and cropping (8, 14) as shown in following figure;

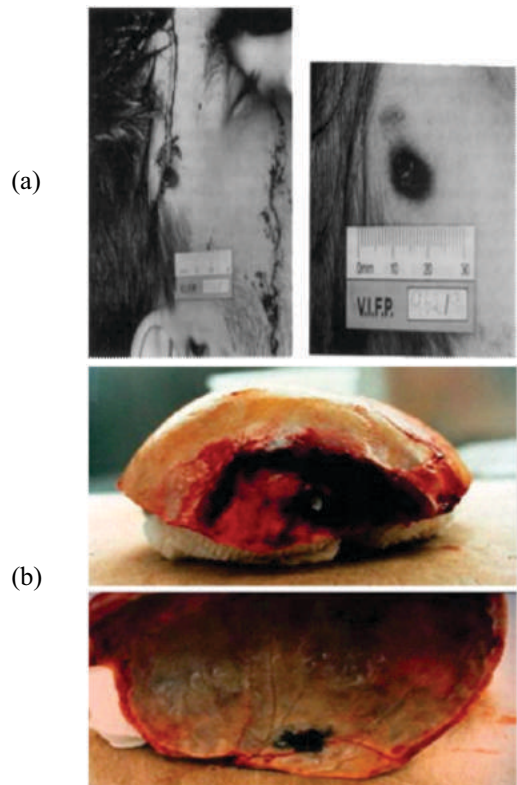


Figure 12: (a) gunshot orientation to the temple (14), (b) Contact gunshot wound to skull (8).

Forensic medical photography has a significant role in preserving injury patterns, bite marks,

bruises and wounds in skin of sexually abused victims as physical evidence as shown in figure 13. It is important for odontologist, pathologist and legal system to accurately photograph these injury patterns. Photographs are the only visual and permanent proof of injuries and wounds on the victim body as there is vast time interval between the crime event and court trials. Therefore proper photographing of injuries as a source of recording and preserving evidence, is imperative for crime scene investigators (13, 14 and 15).

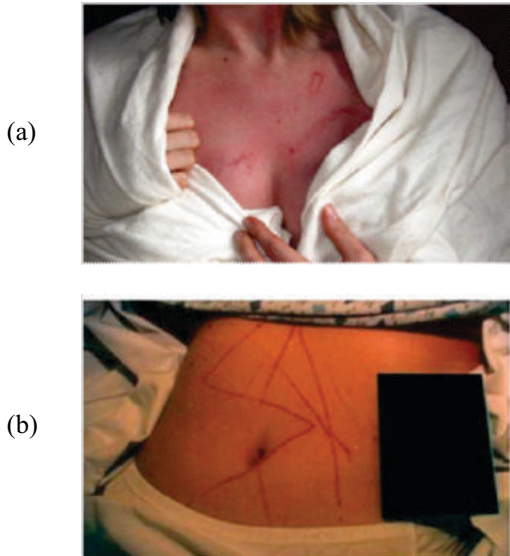


Figure 13: (a) and (b) Injuries to rape victim (8).

There is dramatic increase in referrals to physician for medical evaluation including forensic photography as a result of increase in reports of sexual abuse in different age groups of victim. Photographs of significant lesions and injuries with high quality close-ups can be an imperative part of this assessment. Colposcopes and instant camera systems are required. Medical doctor examining the sexually abused cases should know basics of operating camera, film procedure and medical legal approach to sufficient photography system. Case studies and discussions are carried out by physicians to photograph the victims (8, 13 and 15).

6.2. Forensic Dental Photography

Human identification is now possible by understanding the mechanism of dental identification which is solely based on comparisons between antemortem and postmortem data of the victim. This can be

achieved only when modern tech devices used for the prime management of postmortem data and if the victims do have the dental treatment records. In most of the situation the victims do not have such records so antemortem data is approached from personal belongings. One of the antemortem data detected from personal belonging is smile photographs which are considered as common record for dental identification. Such a forensic case in 2011 of an airplane crash has been reported in present study (19) where the antemortem smile photographs were compared with the postmortem dental photographs of the burnt victim. Both of these two data were of discrete physical characteristics and identified the burnt body by the application of the forensic photography using image superimposition technique as illustrated (19) in following figure;

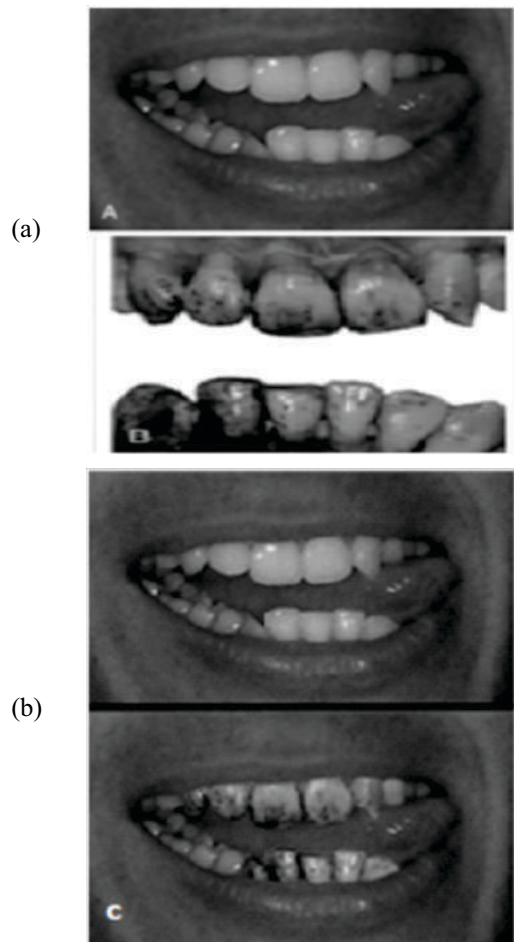


Figure 14: Technique of direct comparison between (a) AM and (b) PM photographs, (c) Technique of image superimposition between AM and PM photographs (19).

Similarly, the forensic photography technically digitized termed as forensic digital photography also aids to forensic dental investigation for the record, crime and medical legal purposes. This technical modification assists and improves forensic dentistry practice involving cases of identification, human abuse and considerably the bite mark cases. Photographs of these cases are analyzed by using ALS filters including UV, IR and fluorescent lights as shown in figure 15. Forensic digital photography plays a vital role in forensic investigation mostly collecting and preserving evidences in identification of alive and departed persons. Forensic identification is mainly achieved by the organization and collaboration of multidisciplinary team including forensic odontologists, anthropologists, pathologists and criminalists (12, 16 and 17).

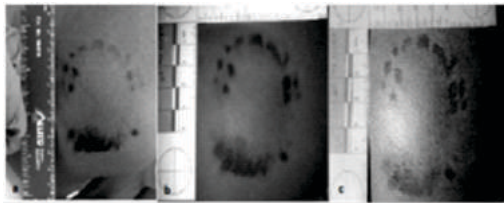


Figure 15: (a) Color image of bite mark on shoulder of black homicide victim, (b) fluorescent image, (c) UV image (16).

6.3. Forensic Facial Photography

With an increase use of the photographs on individual genuine papers of identity including ID cards, passports, security cards, credit cards and driving license, has increased the fabrication of such documents with perpetrator's photographs for the purpose of committing crimes. These altered photographs are used as valued physical evidence for the comparison of the known photographs of the suspects with some individual characteristics left on the evidence. These individual characteristics include facial features such as size, shape (nose, eyebrows, mouth, ears, forehead creases), scars, moles, dimples etc. With the ease and enhanced technology of forensic photography and anatomical morphology, now it is possible to compare facial symmetry and anthropometric measurements for shortlisting the suspects (21) as shown in following figure;

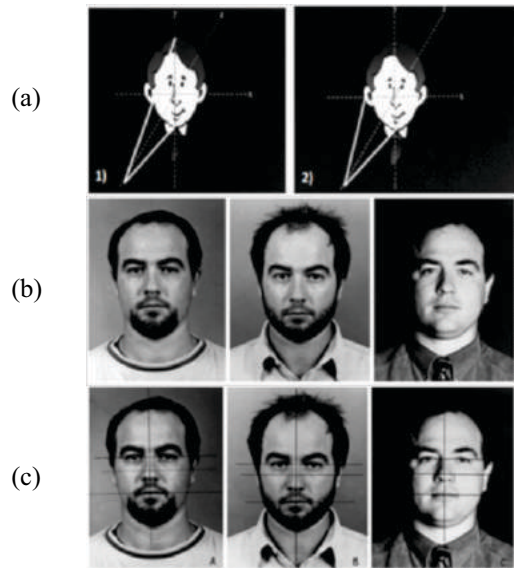


Figure 16: (a) Distance relationships from a camera viewpoint to two points on (1) the vertical axis (2) the horizontal axis, (b) three photographs of one of the authors used as the case study to demonstrate the examination technique, (c) Photographs displaying anthropometric orientation lines (21)

6.4. Forensic Handwriting Photography

Forensic photography also adds to the handwriting examination by detecting various kind of ink in solving a forgery or simulation. Different light sources such as Infrared and Ink Fluorescent are used to visualize the handwriting photographs with simulation, alteration and obliteration etc. The dyes and pigments present in ink react to these lights by showing numerous special effects even similar shades of ink that appear black, shows drastic changes as shown in following figure (3, 8);

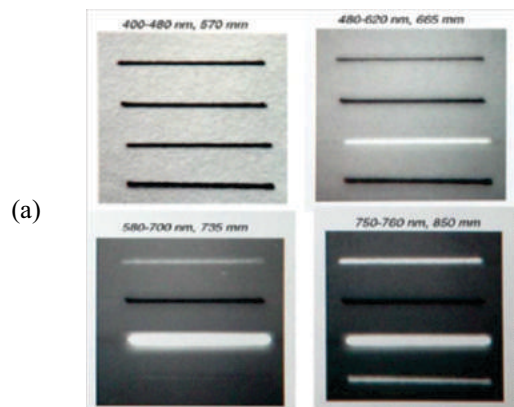




Figure 17: (a) Inks reacting to various lights, (b) Ink fluorescing and transmitting IR in altered check (8).

6.5. Forensic Photogrammetry

Forensic photogrammetry is the application of photogrammetry in the field of forensic sciences. It involves the extraction of measurements from the crime scene photographs. It has been used not only in all disciplines of forensics but also other industries. It has been a practical tool to provide better information to the investigators, lawyers and insurance adjusters. Forensic photogrammetry is applied to obtain an accurate 3D reconstruction of the crime scene or an accident that would determine later the suspect's dimension (position and distance) with respect to scene (22, 23). All photographs after the application of photogrammetry are useful to recover or preserve data that can discover new piece of crucial evidence for measurements to an investigator even after several years.

Forensic photogrammetry can be used for several forensic applications such as measurement of crime scene mapping, crush on damaged vehicle, skid mark, bullet trajectory, blood spatter, suspect height, shoe and tire print as shown height measurement in figure 18 (8, 22 and 23). Two types of photogrammetry are used in forensic photography including close-range and aerial photogrammetry. Close-range photogrammetry uses everyday cameras to create 3D image and recover the lost items and locations for archeological, architectural, engineering and forensic purposes. The aerial photogrammetry is used for topographic maps such as terrain-mapping from an air craft. Tools

required for forensic photogrammetry of crime scene are six or twelve inch ruler, ABFO scales for bite marks or fingerprints, bureau scale for foot prints, and twenty five and one hundred foot tape measure for drawing and drafting (22, 23).

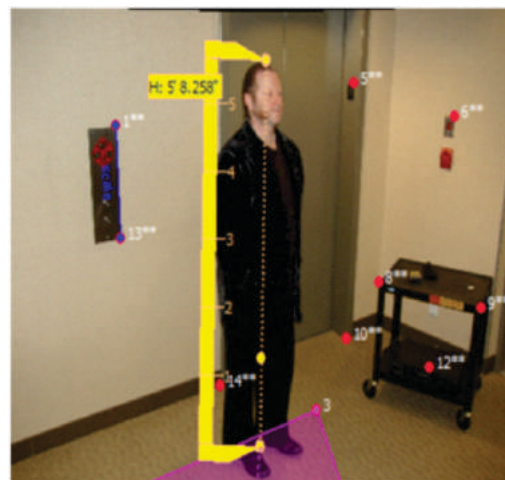


Figure 18: Height measurement with respect to surrounding area from scene photograph (23).

7. Conclusion

Forensic photography plays enormous role throughout the entire investigation by creating a stable visual proof of the crime scene and evidence found in original state. It reconstructs the event of the scene that took place by giving a clear image to the jurors in the court room. Earlier photographs were not considered as evidence but a source to give a visual record of crime scene and evidence location within the scene. Forensic photographs gives not only overall view of the crime scene and the relevant evidence but also the surrounding details such as weather, timing either day or night time. Such photographs include fingerprint, footprint or tire track impressions, bloodied body or assaults injuries, burglary scenes, homicide or murder scene and any tools committing crime such as a knife or gun etc. These photographs can be best captured if the photographer has a sufficient skill and training of using camera. Special techniques such as UV, IR and Fluorescence filters are used in order to capture the undetectable evidences. Proper documentation of the photographs with every signal details from case name to location and maintained chain of custody make them admissible in court room.

8. References

- [1] National Forensic Science Technology Center (NFSTC), "A Simplified Guide to Crime Scene Photography," Bureau of Justice Assistance (BJA), award #2009--D1--BX--K028. Available: info@nfstc.org.
- [2] S. Gouse, S. Karnam, H. C. Girish and S. Murgod, "Forensic photography: Prospect through the lens," *Journal of Forensic Dental Sciences*, vol. 10(1), January-April 2018. Available: www.jfds.org.
- [3] R. Rohatgi and A.K. Kapoor, "Importance of Still Photography at Scene of Crime: A Forensic Vs Judicial Perspective," *Journal of Harmonized Research*, vol. 2(4), pp. 271-274, 2014. Available: www.johronline.com.
- [4] Forensic Science Training Unit FBI Laboratory, "Fundamental Principles and Theory of Crime Scene Photography," National Criminal Justice Reference Service, Feb, 1995. Available: NCJRS.gov.
- [5] K. Mancini, "Forensic Photography," Westchester.gov.com. Available: www.westchestergov.com.
- [6] J. Claridge, "Forensic Photography," *Forensic Explorer.com*, 1 Jan, 2017. Available: www.exploreforensics.co.uk.
- [7] S. Dowdey, "How Crime Scene Photography Works," *Science.howstuffworks.com*, 2019. Available: <https://science.howstuffworks.com/crime-scene-photography.htm>.
- [8] M.R. Edward, "Crime Scene Photography," Elsevier Inc. 2nd Ed, pp 1-685, 2010. Available: <http://www.elsevierdirect.com/companions/9780123757289>.
- [9] A. Wittmann, "Overview of the Forensic Photography," *J Forensic Science & Criminal Investigation*, vol. 2(2), 2017. Available: DOI: 10.19080/JFSCI.2017.02.555581.
- [10] A. Bell, "Crime Scene Photography in England, 1895-1960," *Journal of British Studies*, vol. 57, pp. 53-78, January 2018. Available: <https://www.cambridge.org/core>.
- [11] N. Marin and J. Buszka, "Forensic Photography Techniques," eBook, 1st Ed. Pp. 92, September 2014.
- [12] G.M. Gordon and M. Steyn, "An investigation into accuracy and reliability of skull-photo superimposition in a South African sample," *Forensic Science International*, vol. (216), pp. 1-6, 2012. Available: www.elsevier.com/locate/forsciint
- [13] E. Vogeley, M. Clyde and G. Bertocci, "Experience with wood lamp illumination and Digital Photography in the documentation of Bruises on Human Skin," *Arch Pediatric Adolescent Med*, vol. 156, pp. 265-268, 2002. Available: <https://archpedi.jamanetwork.com>.
- [14] A.P. Henham and K.A.P. Lee, "Photography in forensic medicine," *Journal of Audiovisual Media in Medicine*, vol. 17, pp. 15-20, 1994.
- [15] L.R. Ricci, "Medical Forensic Photography of the Sexually Abused Child." *Child Abuse & Neglect*, Vol. 12, pp. 305-310, 1988.
- [16] S.G. Gregory, "Forensic Photography," *Research Gate*, 201-242, 1997. Available: <https://www.researchgate.net/publication/285100083>.
- [17] N. Balaji, S. Senapati and M.K. Sumathi, "Forensic Digital Photography," A Review. *Int. J Dent Med Res*, vol. 1(3), pp. 132-135, 2014. Available: www.ijdmr.com.
- [18] J.H. Wagner and G.M. Miskelly, "Photography of blood," *Journal of Forensic Sciences*, vol. 48(3), pp. 593-603, 2003.
- [19] R.F. Silva, A. Franco and J.B. Souza, "Human Identification through the Analysis of Smile Photographs," *Am J Forensic Med Pathol*, vol. 36, pp. 71-74, 2015. Available: www.amjforensicmedicine.com.
- [20] H.J. Kim, S. Lim and J. Moon, "A photographic forensic case study: Myths, principles and techniques," *Mathematical and Computer Modelling*, vol. 55, pp. 3-11, 2012. Available: doi:10.1016/j.mcm.2011.01.001.
- [21] G. Porter and G. Doran, "An anatomical and photographic technique for forensic facial identification," *Forensic Science International*, vol. 114, pp. 97-105, 2000. Available: www.elsevier.com/locate/forsciint.
- [22] M. Mayda, "Forensic Photogrammetry." Available *Int. J Dent Med Res*, vol. 1(3), pp. 132-135, 2014. Available: www.ijdmr.com.
- [23] "Forensic Photogrammetry," DCM Technical services Inc. Available: <http://www.dcmtechservices.com>