

Development of Latent Fingerprint using Carbon Powder

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Abstract

The uniqueness of human fingerprint plays the most prominent role in forensic investigation as a physical evidence which is useful for criminal identification. With its unique features no two fingerprints have ever been found to be identical. In legal cases the identification of such print established the relationship between crime scene and the culprit. Generally, there are three types of fingerprint to be found: visible print, plastic print, and latent print (invisible print) which has been taken into account for identification. There is no such crucial method used to decipher the visible print and plastic print because they are easily visible to the naked eye but in the case of latent print the process for enhancement is necessary for the latent fingerprint to be observed by the naked eye. The most encountered fingerprint is the latent fingerprint which is unconsciously left by perpetrators on any surface. For visualizing such prints various methods have been reported for the development of latent fingerprint on different surfaces. This present study introduces a new visualizing agent for the development of latent fingerprint by using carbon powder on various non-porous & porous surfaces through the powdering method. Here we use candle flame to collect black carbon mass and turn it into powder which is used for obtaining latent fingerprints. By the application of this powder it is observed that it gives a clear ridge on various surfaces.

Keywords: Latent, Fingerprint, Carbon, Powder, Crime, Scene

Introduction

A fingerprint is a unique individual characteristic that can't match with any two different human beings. The palmar surface of the hand and feet are covered by a layer of folded skin which ensures various activities¹. The raised surface is known as papillary which is also called as friction ridges. The reproduction of the pattern of the friction ridges on the distal phalanges of the finger and thumb are called as fingerprints. This fingerprint begins to take form on the palmar surface during the third or fourth month of fetal life and they remain unchanged throughout the life of an individual and even no two fingerprints are found to be identical². With these permanence and

unique characteristics of fingerprints. The fingerprint is considered the most valuable physical evidence to aid the criminal justice administration. Generally, fingerprints are of three types: visible print, plastic print, and latent print (invisible print)³.

On the basis of Locard's exchange principle as "Every contact leaves a trace" the latent fingerprint is the most encountered print from the crime scene. Which is unconsciously left by the criminal on any surface in the crime scene. Which is a trace of sweat, oil, or other natural secretion of the skin and they are not typically visible⁴. It is taken into account as trace evidence. The process of enhancement is necessary for the latent fingerprint to be observed by the naked

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eye. For the decipherment of such finger impression the traditional fingerprinting detection techniques for treating latent print is powdering method Which has been used since old era. Which is based on powder adhesion^{5,6}. Various types of fingerprint powder has reported previously for development of latent fingerprint, which may not always effective and having some limitation⁷. The present study introducing a new visualizing agent for development of latent fingerprint by using Candle carbon powder. This material is used by humans as their daily needs. The fine powder Particle of these material provide a good adhesion on both light and dark non-porous surface^{8,9}.

Candle

It is made up of the wax and when it burns they provide light and in some cases a fragrance. It can also provide heat and excrete blackish smokey substance which is non-other than carbon particles. Candle flame consist of three different zones each zones has different temperature. Every Zones has different colours and this will help us in understanding the temperature of each zones.

Materials and Methods

The carbon powder method is used to visualize the Latent fingerprint from various surface. We used unconventional powder that came from candles flame and collected on the steel glass material which is applied on the fingerprint surfaces. The method used for the development of latent or invisible fingerprint is powdering method. It is a physical method for enhancement of latent fingerprint. This method is mainly based on the adherence of fine fingerprint powder particle on the traces of sweat, oil and other natural secretion of skin which is released through ridge pores of skin and forms a mirror image of ridge pattern.

In order, to develop the latent fingerprint the commercially available candle (carbon powder) is used. The carbon powder is taken which is in the form of black colour. This powder is kept for a few minutes in room temperature. Whereas the fingerprint was collected by the subject on different non-porous surfaces such as Almirah, plywood of carrom board, gorilla glass of phone, book cover,

electric switch, sunmaica of wood, stainless steel, White Tiles, Surface of Vehicle the subject deposited heavily sweaty impression on the surface. The phenomenon is based on this while committing the crime the human perspiration secretion of human is abundant as compared to normal on criminals due to physiological response which cannot be controlled by criminals.

The above-mentioned candle (carbon powder) is sprinkled over the questioned surface as the fine powder particle of this material adheres on the traces of perspiration then with the help of camel hairbrush lightly brushing or tapping is done to remove excess powdered material. Hence, the heavily brushing is to be avoided because it may destroy the ridge characteristics. By following powdering method this fine non-conventional powder is used. Which provide good adhesion on traces of perspiration with clear visibility of ridges. Then, the developed images are photographed with the help of DSLR camera, and it transferred into laptop then the images are cropped.

Result and Discussion

The result of the current study showed the development of latent or invisible fingerprint on various non-porous surface by the application of candle (carbon powder) by using this powder or questioned surface it provides better result on both dark and light color nonporous surface due to the colour contrast of the powder. The visualization of latent finger impression on the surface of Almirah, plywood of cardboard, gorilla glass of phone, Book cover, electric switch, sunmaica of wood, stainless steel, surface of vehicle, and the surface of white tiles is successfully done which the pictorial result is shown from Fig 1 to Fig 5.

Thus, this result produce by following the oldest powder dusting method with fine particles of this powder provide good adherence on latent residue of latent impression that present in the form of natural human perspiration and deposited on to the questioned surface. Due to the adherence of particle it provide clear visibility of ridges. Which lead prominent factor in terms of fingerprint identification at a criminal offense . The developed result shows the clear visibility of ridges pattern. These result advice that This cardel (carbon powder) is to be successfully

employed as a new powder method on various porous and non-porous surface for the enhancement of the latent finger prints. This investigation is done with identification and examination of this powder on different surfaces which shows clear visualization of latent fingerprints. It is also observed that after development of latent finger impression on various surface it is clearly visible up to 3-4 days. Even it does not fade until and unless without any destruction onto the surface it provide a positive impact, in case of secondary collection of Finger impression through photography.



Figure 1: Development of latent fingerprint with the help of carbon powder on non- porous switch board



Figure 2: Development of latent fingerprint with the help of carbon powder on non- table.



Figure 3: Development of latent fingerprint with the help of carbon powder on non- porous metal surface



Figure 4: Development of latent fingerprint with the help of carbon powder on non- plastic sheet



Figure 5: Development of latent fingerprint with the help of carbon powder on porous wooden surface

Conclusion

The current study presents a new powdering method by using candle (carbon powder). For Decipherment of latent fingerprint on different various surfaces. This powder is a household product and used by the humans as their daily needs. So, basically it is easily commercially available and simple and cost effective. This newly introduced powder is also overcome with it. This product is formed by most of the natural ingredients which are mentioned above, so it does not lead any potential harm to health. From the present study it is concluded that this household powder is easy to use for the visualization of latent fingerprints on various surface at a crime scene. When other conventional fingerprint powder is not available. This investigation provides a beneficial fact to aid with criminal justice system for solving criminal offence.

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