

# Fingerprint Analysis in Forensic Science

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## Overview

Fingerprints are unique to each individual. Even identical twins, who share the same DNA, have unique fingerprints. Fingerprints can be utilised for a variety of purposes, including background checks, biometric security, mass catastrophe identification, and, of course, criminal circumstances, thanks to their uniqueness. For more than a century, fingerprint analysis has been used to identify criminals and solve crimes, and it remains a highly valuable tool for law enforcement. One of the most essential functions of fingerprints is to assist investigators in connecting one crime scene to another involving the same individual [1]. Fingerprint identification also aids detectives in tracking a criminal's past, previous arrests and convictions, and in making choices about sentencing, probation, parole, and pardoning.

Crime scene investigators unearth tangible evidence to assist establish what happened and who was involved by undertaking a methodical examination of these regions [2]. This procedure must be carried out carefully and extensively to ensure that vital evidence is captured and that fragile evidence is not destroyed. On a deserted stretch of shore, a body washes up. An apartment complex is destroyed by a fire in a methamphetamine lab. During her journey home, a driver is killed in a car accident. All of these are possible crime scenes.

At a crime scene, the case investigator and crime scene professionals collaborate to: define and secure locations where evidence may be found; investigate and document the scene; gather physical evidence; and preserve, package, and submit the evidence to the laboratory for processing [3]. The investigator can attempt to reconstruct the aspects of the crime using these important pieces of evidence.

The more meticulous the crime scene team is in its work, the more probable it is to ascertain the facts of the case precisely. The quality of the evidence and how it is handled will have an impact on the attorneys' ability to debate the case's facts and, eventually, the jurors' ability to reach judgments about guilt or innocence [4].

Dusting a smooth or nonporous surface with fingerprint powder is one of the most used procedures for detecting and collecting latent fingerprints (black granular, aluminium flake, black magnetic, etc.). If any prints appear, they are photographed as described above and then removed with transparent adhesive tape from the surface. To preserve the print, the lifting tape is placed on a latent lift card [5].

Fingerprint powders, on the other hand, can taint evidence and prevent other techniques from revealing a buried print or other information. As a result, investigators should use a different light source or cyanoacrylate (super glue) before employing powders. Computerized methods are utilized in criminal justice cases to search various local, state, and national fingerprint databases for potential matches. Based on the method used to execute the search, many of these systems produce a value indicating how close the match is. After that, fingerprint examiners look over the possible matches and make a final decision. Fingerprint examinations can be performed by forensic scientists, technologists, or police officers, but the examiner must have the necessary knowledge and expertise. Many agencies now require incoming examiners to hold a four-year science degree (biology, chemistry or physics). Furthermore, organizations may demand that examiners obtain certification from the International Association for Identification (IAI).

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