



ADVANCED
AUTOMOTIVE
ENGINEERING
EDUCATION

FORENSIC EVIDENCE IN AUTOMOTIVE



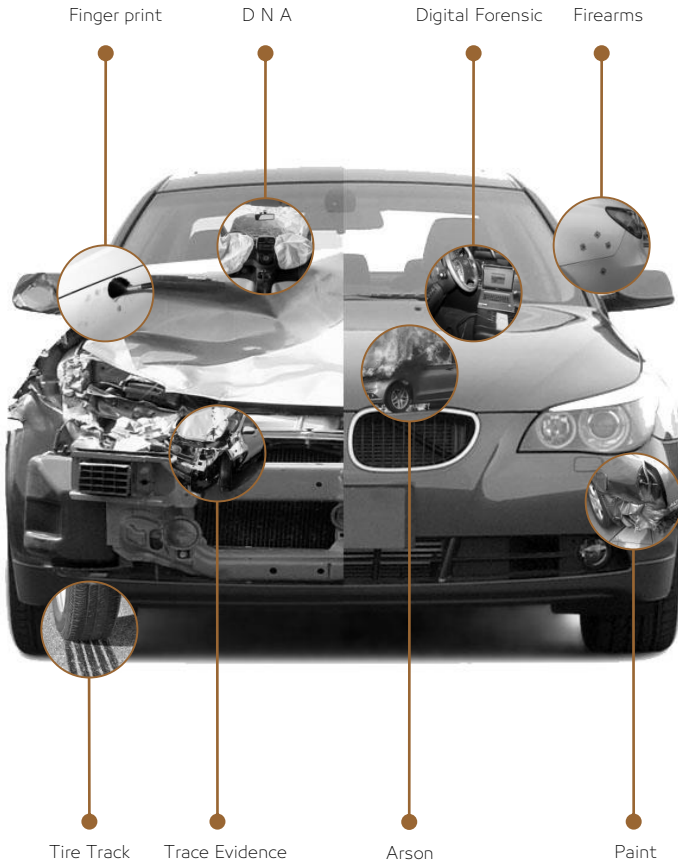


Together for Road Safety

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Forensic Evidence in Automotive



ARSON

A SIMPLIFIED GUIDE TO ARSON EVIDENCE

Introduction

The Automotive is constructed of steel, iron and metal, mechanical parts, electrical and electronics parts, wiring, tires and upholstery. Some parts which can be considered inflammable. Arson investigators examine the physical attributes of vehicle arson scene and identify and collect physical evidence from the scene. This evidence is then analyzed to help determine if the cause of the arson was normal or deliberate.

Principles of arson analysis

Automotive arson can be difficult. Multiple points of origin are common because of all the natural accelerants in a Automotive. The arson itself destroys potential evidence. There are several fuel sources, including gasoline, wiring, and both interior and exterior components. There are numerous ignition sources, including the engine, electrical systems and exhaust parts. The significant electrical wiring system has to be completely evaluated, which is both time-consuming and physically difficult.

Arson evidence investigations

The investigation of Automotive arson is similar to the investigation of any other criminal case. A complete Automotive arson investigation includes examination of the site of the arson as well as examination of the Automotive itself. Automotive arson Investigations Consider Many Potential Causes:- Mechanical Failures or Malfunctions, fuel system, Electrical Failures or Malfunctions, Incendiary Causes, Crashes, Smoking. Investigations of Automotive fires come from the following basic lines of inquiry, inspection of the evidence of the origin of the arson, an investigation into the Automotive owner's history, the witnesses who might have information concerning the arson.



DNA

A SIMPLIFIED GUIDE TO DNA EVIDENCE

Introduction

DNA evidence is physical genetic evidence that is left behind by a person that is being accused of committing an act of some kind, normally criminal in nature. DNA evidence is solid evidence that can assist investigators in identify perpetrators of a crime.

Principles of DNA Evidence

DNA constitutes genetic markers that each person has which identify their specific set of genes and are therefore tied to that specific person. Identical twins are able to have the same DNA, but otherwise everyone's DNA is distinct.

DNA evidence examination

DNA evidence is especially valuable for investigating violent crimes such as homicides or sexual assaults because blood, semen or saliva may be left behind by the perpetrator or victim. If the blood found in a suspect's Automotive contains the victim's DNA, this is a powerful piece of physical evidence possibly linking the victim to that Automotive. If a perpetrator leaves behind a mask, hair, cigarette butt or bottle at the scene, samples of sweat, skin cells or saliva can be collected and the resulting DNA profile compared to samples from the parties in question.



FINGERPRINT

A SIMPLIFIED GUIDE TO FINGERPRINT EVIDENCE

Introduction

Fingerprint analysis has been used to identify suspects and solve crimes, and it remains an extremely valuable tool for law enforcement. One of the most important uses for fingerprints is to help investigators link one crime scene to another involving the same person.

Principles of fingerprint analysis

Fingerprints are unique patterns, made by friction ridges (raised) and furrows (recessed), which appear on the pads of the fingers and thumbs. Prints from palms, toes and feet are also unique; however, these are used less often for identification, so this guide focuses on prints from the fingers and thumbs.

When and how is fingerprint analysis used?

Fingerprints are especially important in the criminal justice realm. Investigators and analysts can compare unknown prints collected from a crime scene to the known prints of victims, witnesses and potential suspects to assist in criminal cases.



TRACE EVIDENCE

A SIMPLIFIED GUIDE TO TRACE EVIDENCE

Introduction

These are referred to as trace evidence, and can be transferred when two objects touch or when small particles are disbursed by an action or movement. For example, paint can be transferred from one Automotive to another in a collision or a hair can be left on clothes in a physical assault. This evidence can be used to reconstruct an event or indicate that a person or thing was present.

Principles of trace analysis

Trace evidence is physical evidence found in small amounts at a crime scene. Trace evidence can be used to link people or objects to places, other people or other objects, and often serves as a starting point, or lead, for a particular line of investigation. Important developments in trace evidence came alongside advances in microscopy, chemical analysis, and for evidence comparison purposes, database technology.

Trace evidence examination

Every case potentially has trace evidence to consider, and investigators must use their knowledge, training and experience to thoroughly examine the scene, identifying and properly collecting the most probative evidence, including traces. This examination includes a focused search for and careful collection of anything that may yield clues or the potential for identifying key players.



ECUs

A SIMPLIFIED GUIDE TO DIGITAL FORENSIC EVIDENCE

Introduction

Digital forensics is becoming an important feature for many embedded devices. In vehicle systems, digital forensics involves multiple Electronic Control Units (ECUs) used to support the connected and intelligent vehicle's technology. Digital evidence from these ECUs can be used in forensics investigation and analysis. Such a mechanism can potentially facilitate crash investigation and insurance claims and crime investigation.

Principles of Digital forensic Analysis

An ECU is a real-time system that consists of both hardware and software and is specialized to control or monitor parts of the vehicle's functionality. This is done by continuously reading inputs in form of digital and analogue in-signals, such as switches and sensors. The output of the ECU is communicated over a Controller Area Network (CAN) that links the ECUs together and transports diagnostic messages and operational parameters.

Digital forensic Evidence Examination

For accidents involving vehicles, the experts can identify all the variables and parameters leading up to, during, and just after a crash, collision or criminal case. Vehicle systems store a vast amount of data such as recent Event Data Recorders (EDRs) vehicle provide a wealth of data regarding automobile accidents, including the vehicle's speed at the time of the accident, engine RPM at the time of accident, braking information, airbag deployment, and more...



PAINT

A SIMPLIFIED GUIDE TO PAINT EVIDENCE

Introduction

The paint of Automotive can often be traced back to a specific make and even model, particularly beneficial in hit and run incidents in which paint chips from the suspect Automotive have been left behind at the crime scene. As each car manufacturer will mix paints to a specific formula, two seemingly identical shades can actually have distinct compositions. These fragments may have been transferred to the victim's clothing, to another Automotive, or simply left on the ground following an impact.

Principles of Paint Analysis

The analysis of paint can take on three forms; mechanical, chemical and physical. The mechanical analysis is will attempt to make matches between flakes of paint. The chemical analysis aims to establish the exact composition of a sample using various chromatography techniques. The physical analysis of paint relates to color, texture, thickness, appearance, and the pattern of occurrence. All of these can be determined using microscopy.

Paint evidence examination

Paint evidence occurs as transfers in a variety of crimes, including vehicular hit-and-runs, paint evidence that is usually encountered in Automotive; Paint analysis can also include other coatings and polymers. Paint evidence is found in the majority of hit-and-run cases, and it may provide a link between a victim and the responsible Automotive. Paint evidence may also be present in various other types of crimes.



TIRE TRACK

A SIMPLIFIED GUIDE TO TIRE TRACK EXAMINATION

Introduction

Tire track evidence can be found at many crime scenes. These tire track impressions are referred to as “pattern evidence” because the impressions form a unique pattern. The tread on each tire of a Automotive may provide investigators with similar information. Examiners can attempt to identify the type of tire that made an impression. With this information, This evidence can then be used to help determine type of the Automotive.

Principles of Tire Track

The basic theory behind tire track analysis much like fingerprints, tires may leave behind either prints or impressions that can be examined by investigators. The type of evidence left behind depends largely on the type of surface traveled. These imprints or impressions can be compared to a suspect’s Automotive tire to determine if the tire is the same one that left the impression. Tire track are referred to as “pattern evidence” because the impressions form a unique pattern. The tread on each tire of a Automotive may provide investigators with similar information.

Tire track examination

For the identification of Automotive tire tracks at the crime scene, can measure the type of tread pattern, wheel base and front and rear tracks. The quality of these measurements depends on the soil texture, the axle design of the Automotive and its weight, Based on the tire size of the original Automotive. The databases of Automotive and tires are a useful resource for crime scene investigators to find specific Automotive and tires at a crime scene.



FIREARMS

A SIMPLIFIED GUIDE TO FIREARMS EXAMINATION

Introduction

The field of forensic firearms identification, sometimes called ballistics, is at its heart the ability of a firearms examiner to determine if a particular bullet or cartridge case was fired from a specific firearm. This determination can be made thanks to small, often microscopic markings on bullets or cartridge cases that are unique to ammunition fired from that firearm.

Principles of firearms

The basis for firearms identification is founded on uniqueness: upon close examination, virtually all objects can be distinguished from one another, and the same is true for firearms. Fortunately for criminal investigators, the uniqueness of each firearm transfers to the cartridge case and bullet whenever the weapon is fired. This has been proven through physical sciences including physics, metallurgy and materials science.

Firearms evidence examination

Firearms evidence can usually be found at any crime scene where a weapon has been fired. When evidence such as shot shell casings, cartridge cases and bullets is found at a crime scene or from Automotive, etc. an examiner can analyze it to determine the type of firearm used. The examiner can also compare shot shell casings, cartridge cases and bullets from different crime scenes to determine if a common firearm was used.

