



## INVESTIGATING THE ETHICAL DILEMMAS AND LEGAL IMPLICATIONS RELATED TO THE COLLECTION AND USE OF FORENSIC EVIDENCE IN CRIMINAL PROCEEDINGS

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### ABSTRACT

*The gathering and presentation of forensic evidence are considered vital tools for delivering justice, but such use poses various complex ethical concerns and legal debates. The collection of forensic evidence poses very hard questions that lead to significant ethics issues in crime litigation, for example, regarding privacy rights over evidence required in achieving a verdict. In the discussion of criminal investigation, informed consent, the possible bias during the collection process, and the respect for confidentiality is analyzed. Besides, the paper considers the legal and ethical questions in the forensic evidence used as proof in courts to avoid such misuses and misinterpretation, and further conflict of interests. In the context of law, forensic evidence plays a big role in how criminal trials would be conducted and shaped. Legal frameworks, such as national and international laws, will determine the admissibility of evidence standards as well as protection of rights, like presumption of innocence and right to fair trial. This article discusses the possible consequences of unlawfully collected or mishandled forensic evidence that may lead to wrongful convictions and infringement of basic legal rights. Case law and precedents are evaluated to show where the convergence of law and ethics becomes most significant in forensic science. As emerging technologies like DNA analysis, digital forensics, etc continue to improve and evolve; with them emerges a new, hitherto unimaginable and increasingly complex tapestry of problems at the threshold of ethics, laws, recommendations and suggestions found towards the last end of an article include making the evidence collecting procedures better by upgrading the gathering mechanism, Reforms in Law and better quality of training programs given to experts handling forensic equipment. Overall, ensuring a balance between justice and the respect for the rights of an individual keeps the integrity of criminal proceedings intact.*

**Keywords:** Forensic Evidence, Ethical Dilemmas, Legal Implications, Criminal Proceedings, Privacy Rights, Consent, Bias, Evidence Admissibility, Fair Trial, Emerging Technologies, DNA Analysis, Digital Forensics.

### I. INTRODUCTION

Forensic evidence indeed is the crux of every criminal justice system across the world. It proves or disproves the allegations made by criminal investigations as well as informs

criminal cases. Not only does accuracy and reliability guarantee a conviction, the collection and application of forensic evidence lead to a range of ethical and legal challenges. The pursuit of truth versus the protection of rights again applies ethical decision-making to forensic practitioners and law enforcement. This forms significant concerns that surround whether the process can be trusted in maintaining justice impartially because issues like consent, privacy, and even the potential bias that may exist when the evidence is being collected create a major concern.

The legal import of forensic evidence is immense; courts are navigating complex rules as to how evidence is admitted during criminal trials. Laws surrounding the practice of forensics govern the legalities of the admissibility and acquisition of the evidence lawfully and justly, and so violation of standards can result in wrongful convictions of innocent individuals or the denial of presumptions of innocence and violations of due process. Ethical concerns and legal exposures often go hand in hand, and constant caution must be applied to ensure that the criminal justice system remains honest.

Technological advancement, most specifically in DNA profiling and digital forensic science, introduced complexity in ethical issues and law. Forensic sciences as a new entity raise questions related to privacy and security of information as well as the extent to which law enforcers access individual information. Therefore, during the steady and progressive improvement of forensic methods, examination of their scope from an ethical and legal perspective is indispensable to better protect the rights of people involved while dispensing justice effectively. It aims to discuss the critical issues surrounding this article and present recommendations for handling the challenges these ethical and legal issues give in criminal proceedings related to forensic evidence.

## **II. ETHICAL DILEMMAS IN THE COLLECTION OF FORENSIC EVIDENCE**

The collection of forensic evidence represents a basic element in the criminal justice process but is often involved with considerable ethical dilemmas. These dilemmas arise from the tension between a need for valid and reliable evidence and the need to protect rights of individuals. Some of the key ethical dilemmas in collecting forensic evidence are as follows:

### **Consent and Autonomy:**

The most ethical issue in collecting evidence is that people must be consulted, especially if the samples contain bodily substances like DNA, hair, or blood. This aspect of forensic investigation sometimes raises another fundamental debate: whether all individuals' right to autonomy, privacy, among others, can be respected sometimes when evidence collections are done compulsorily upon people. Therefore, involuntary collection means without a warrant or under any form of coercion can reduce moral legitimacy and likely violations of their rights.

### **Privacy and Confidentiality:**

Evidence collection in forensics often requires collecting extremely personal and sensitive information, such as bodily fluids, genetic material, or digital information. This therefore

raises an ethical issue on the aspect of how much personal information ought to be open to the law enforcement and if privacy rights can be protected adequately in this context. For example, mishandling or the wrong disclosure of forensic sensitive information will lead to violations of confidentiality and even malice against reputations as well as personal lives in the event of misusing or mishandling evidence.

Another significant ethical concern of this aspect is bias in the collection of forensic evidence. Evidence can be selectively collected or interpreted to reflect or perpetuate societal biases such as racial, gender, or socioeconomic discrimination. For instance, evidence may be collected more aggressively from some groups, an action that would constitute disparate treatment and have disparate impacts on minorities. Evidence collection should be carried out in such a way that is fair and not biased in order to make everyone equal.

#### **Chain of Custody and Evidence Integrity:**

Evidence integrity is an essential factor of forensics admissibility into the court system as well as for justice to prevail. Breaking the chain may bring questions into evidence reliability and authenticity. Improper handling, storage, or documentation of evidence can lead to a breach in the chain of custody. Issues of ethics will arise if evidence management is not transparent or if there is a lack of accountability, thus affecting the fairness of the criminal process. The risk of evidence tampering, contamination, or destruction must not be taken because public trust is at stake for forensic practices.

#### **Avoiding Secondary Harm and Psychological Impact:**

Forensic evidence is invasive or traumatic, such as in sexual assaults, violent offenses, or when remains are needed. Ethically, it leads to questions of how better harm can be minimized in protecting the well-being of any victims and their relatives as well as those handling the investigation at hand. Considerations include that between the demands for evidence recovery and the psychological aspect of survivors in the process and the way people are handled throughout the investigation-especially when victims are vulnerable-that needs to occur.

Such ethical dilemmas thus require a balance to be struck between the quest for securing justice on the basis of forensic evidence and the rights and dignity of people involved in the criminal process. The responses to these ethical challenges would, therefore, call for strict guidelines, proper training of law enforcement and forensic professionals, and robust checks to ensure that the practices of evidence collection are fair, transparent, and accountable.

### **III. ETHICAL DILEMMAS IN THE USE OF FORENSIC EVIDENCE**

While the use of forensic evidence in criminal cases is inevitable to determine who's right or wrong, using forensic evidence creates several ethical dilemmas. These stem from the misinterpretation or misuse of these findings in and out of the court. The following are a few of the ethical dilemmas regarding the forensic evidence:

#### **Risks of overreliance or misinterpretation:**

Forensic evidence is valuable, but it does not always come out clear. Ethical concerns arise when forensic evidence is misinterpreted or presented in an overly definitive manner and leads to a wrongful conviction. Experts can give the appearance of absolute confidence that may actually lead to creating false impressions before a court or jury. It could lead to a reliance on the forensic evidence at the cost of other very vital evidence and at times the same forensic evidence might be viewed as infallible.

### **Conflicts of Interest and Expert Bias:**

Forensic experts play an important role in the presentation and interpretation of evidence before the court. Therefore, ethical dilemmas may be thrown up by cases where forensic professionals have pecuniary, professional, or even personal interests they may seek to further in line with their eventual conclusions. Sometimes, experts hired by the prosecution or the defense make biased statements before testifying rather than making neutral, objective analytical opinions. Such a conflict of interest would undermine the credibility of the forensic evidence and undermine the fairness of the trial process.

### **Selective Use of Forensic Evidence:**

The selective usage of forensic evidence is another ethical dilemma-the evidence that might support the narratives of one of the parties must be given extra prominence while completely ignoring or lessening the credibility of the others. Such manipulation of the narrations to give biased results must not occur at the cost of ethical standards when all the other relevant forensic pieces of evidence-either inculpatory and exculpatory-have got equal importance so that the piece of evidence narrates what would be expected after its usage to the court's eyes.

### **Possibility of Misuse or Fabrication of Evidence:**

There is a chance, though rare, that forensic evidence may be manufactured or altered to have an influence over the outcome of a case. The possibility of corruption in the forensic science laboratories or law enforcement agencies is, therefore, a matter of ethics. Misuse of forensic evidence can, in its tampering, report falsification, or intentional misrepresentation, undermine the very foundations of the criminal justice system. Ultimately, it could result in wrongful convictions, loss of reputations, and extreme punitive measures, including even capital punishment for innocent people.

### **Effects on the Presumption of Innocence:**

Forensic evidence and particularly seemingly indisputable evidence may be used in an improper manner where it influences public opinion or the legal process unduly, which could endanger the presumption of innocence. Major cases may try to sensationalize forensic evidence as being conclusive or even prove the guilt of someone accused despite the fact that it is in reality not definitive. The ethical conundrum here is ensuring that forensic evidence does not wrongly convict an individual before every aspect of the case has been evaluated, and such a judgment violates a defendant's right to a fair trial.

### **Handling DNA and Privacy Concerns:**

DNA is one of the most effective types of forensic evidence, but at the same time, it has caused a serious concern about privacy. The process of using DNA to identify a suspect or linking someone to a crime can breach a person's rights to privacy when the DNA evidence is leaked or stored. In addition, there is the possibility of wrongly implicating someone based on DNA matches, which happens due to problems such as lab error or contamination. The proper application of DNA evidence must be controlled by strict rules to ensure accuracy, avoid false accusations, and protect privacy.

### **Forensic Evidence in Plea Bargaining:**

The ethical concerns surrounding the use of forensic evidence in plea bargaining are also very important. Prosecutors can make use of this strength of the forensic evidence and threaten the accused with the same to negotiate plea bargains, even when the evidence isn't as sound as it looks. Plea bargaining is an important tool in criminal justice systems, but it raises ethical concerns when defendants are coerced into admitting guilt based on forensic evidence that may not be entirely reliable or when the evidence is presented in a way that undermines the defendant's ability to make a free and informed decision.

These ethical dilemmas point to a need for due care and due handling of evidence throughout the criminal justice system. Forensic professionals, police, and practicing lawyers must embrace the highest form of ethics where evidence integrity is put first and protected and the accused's rights must be respected. The judicial integrity should also come into play here.

## **IV. LEGAL FRAMEWORK SURROUNDING FORENSIC EVIDENCE**

The use and handling of forensic evidence in criminal proceedings are controlled by a very strong legal framework aimed at making sure that it is fair, protecting the rights of individuals, and upholding the integrity of justice. This mainly consists of national and international laws, constitutional protections, and established standards for admissibility and handling of forensic evidence in courts. Some of the important components of the legal framework for forensic evidence include:

### **National Laws and Regulations:**

Every country has its laws prescribing collection, preservation, and admissibility of the forensic evidence. These laws comprise a framework on which forensic science practitioners must conduct their practice for evidence to legally be obtained and used. Criminal procedure code, evidence code, or specific regulations in a country related to forensic science itself detail the standards applied from the time of collection to when the forensic evidence has to appear in court. Laws try to safeguard the rights of the accused in courts of law and yet make it possible to use forensic evidence in a successful search for truth.

### **Rules of Evidence and Forensic Evidence:**

Admissibility rules are different in various jurisdictions, but they are not all the same in their application; however, common principles prevail in all of them. In the United States, for example, evidence in federal courts is governed by the Federal Rules of Evidence, whereas in

state courts, it is governed by the state rules. To be admissible, evidence must fulfill certain criteria: it must be relevant to the case and reliable, meaning scientifically valid and conducted according to established methods. The Daubert Standard was established in the case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.* It establishes whether scientific expert testimony is admissible in a U.S. court of law, which emphasizes reliability and relevance in methods used for forensic analysis.

### **The Fourth and Fifth Amendments:**

The collection of forensic evidence often overlaps with constitutional rights, primarily the Fourth Amendment, which guards against unreasonable searches and seizures, and the Fifth Amendment, which safeguards protection against self-incrimination. These provisions detail the legal rules regarding the means by which evidence may be seized, including with regard to bodily searches, DNA samples, and taking personal property. Generally, a warrant supported by probable cause is required for a search or the seizure of evidence, unless there is an applicable exception, such as exigent circumstances. The Fifth Amendment protects a person from compelled evidence that may incriminate them, especially in cases with DNA or other bodily samples.

### **Chain of Custody and Legal Documentation:**

Another important legal aspect of the forensic evidence context is the principle of chain of custody, that is, documentation and tracking of evidence from the time it was collected until its presentation in the courtroom. Any break in the chain of custody invalidates evidence on the account that it attacks not only its genuineness but integrity. Strict judicial standards govern handling forensic evidence whilst documented and put away from being contaminated or interfered with accidentally to lose their custody. Therefore, the chain of custody makes criminal courts have reasons to crosscheck whether it properly handles its pieces of evidence throughout for continuous evidence reliability.

### **International Laws and Standards:**

International laws and standards also apply to forensic evidence when cases are under investigation or shared between two or more countries. International conventions, treaties, and agreements generally govern the collection, sharing, and use of forensic evidence while respecting the sovereignty of other countries along with the legal frameworks of those jurisdictions. Other regional human rights instruments that influence the handling of forensic evidence are the rights found within the European Convention on Human Rights (ECHR), including the right to a fair trial, the right to privacy, and rights to be protected from torture or degrading treatment. Interpol and the United Nations also have guidelines for forensic cooperation across borders, especially in terrorism, organized crime, or international human rights violation cases.

### **Forensic Evidence and Legal Ethics:**

Attorneys and judges, among other legal professionals, play a critical role in ensuring that forensic evidence is presented in court within the confines of legal and ethical standards.

Forensic evidence in the court should always be presented considering ethical considerations. Prosecutors and defense attorneys are obligated to the court to make sure that no forensic evidence is exaggerated or misrepresented. They remain committed to justice and fairness. Judges should also be assured to admit only validly obtained, reliable, and relevant forensics in court and evaluate the qualifications and credibility of the forensic expert testifying.

### **Role of Expert Witnesses:**

Forensic experts typically act as witnesses in criminal cases. They testify on scientific aspects of evidence as professional witnesses. Normally, most legal systems will require the qualifications of expert witnesses testifying and the methods and opinions must be founded upon sound scientific principles. In the United States, both the Frye Standard as well as the Daubert Standard are used to determine the qualifications of expert witnesses and whether their testimony is reliable. The credibility of the forensic experts guarantees that the findings presented in the court are dependable and represent an accurate picture of the evidence collected.

### **Legal Ramifications of Unlawfully Gained Forensic Evidence:**

Forensic evidence seized illegally can be very problematic under the law. In most cases, the exclusionary rule does not allow for the use of illegally obtained evidence in criminal court. For example, evidence procured in contravention of the Fourth Amendment may be suppressed from use within the United States. This can prevent the police from doing illegal searches and seizures. Besides, wrongly collected forensic evidence might even result in a case getting dismissed or an unfair conviction being quashed.

The legal structure related to forensic evidence has been drafted keeping in mind both the interest of effective law enforcement and protecting the rights of the individual. This would be a mix of constitutional protections, statutory regulations, and established legal standards that work in harmony to ensure that forensic evidence is gathered, preserved, and used in legally valid and ethically sound ways. As the field of forensic science continues to evolve, the legal framework will have to adjust to new challenges while keeping within the boundaries of justice.

## **V. LEGAL IMPLICATIONS OF UNETHICAL FORENSIC PRACTICES**

Unprofessional and unethical forensic practices can result in serious legal consequences not only on the individuals involved in the misconduct directly but also on the principle of criminal justice in general. Collection, handling, and presentation of evidence contravene the principles of ethics in forensic practice since it negates the criminal proceedings' standards of equity in litigations, which may lead to false and wrongful convictions, the violation of constitutional rights, and a miscarriage of justice. Some of the most critical legal implications of unethical forensic practices include the following:

### **Exclusion of Evidence:**

Exclusion of evidence in court is among the most direct legal effects of unethical forensic practices. In most jurisdictions, evidence collected by wrong means or not properly collected and processed cannot be allowed in court. The exclusionary rule is a central precept in legal systems, like the United States, that bars evidence obtained from searches and seizures illegally, such as by violating constitutional rights, or through coerced confessions, Fifth Amendment violations. If forensic evidence is collected or examined in a way that compromises those rights, it may never be allowed into evidence at trial, which could jeopardize the case against the defendant and even lead to charges being dismissed.

### **Wrongful Convictions:**

Ineffective forensic practices can lead to wrongful convictions, a very serious legal penalty with huge ripples for the accused and the justice system alike. The innocent may get wrongly convicted when misidentifying the suspect, mishandling of the evidence, or improper forensic analysis, which might include DNA contamination, or flawed interpretation. Using unreliable forensic evidence can easily deny a person the right to fair and just treatment under their constitutional right for a fair and just trial. This may lead to miscarriage of justice where the innocent is punished severely in terms of long imprisonment or even death penalty while the perpetrators go scot-free.

### **Civil Lawsuits and Liability:**

Forensic scientists, police officials, or the prosecutors who abuse their positions and practices may become liable to civil suits. People wrongly convicted because of unethical practices by forensic science experts can file suits for damages during imprisonment, injuries to their reputations, and emotional distress with other related damage. Law enforcement officers and forensic scientists who commit misconduct may be held personally liable for the harm caused. The government may be liable for the failure to properly supervise forensic practices or the allowance of unethical behavior within its agencies to continue.

### **Dissipation of public confidence in the criminal justice system:**

Forensic malpractices lead to the dissipation of public confidence in the criminal justice system. Each time forensic professionals or the law enforcers are discovered to have conducted themselves unethically, the public could lose confidence in the integrity and reliability of the forensic evidence presented. This skepticism may impinge upon the further credibility of forensic investigations and deprive the legitimacy of convictions, thus making it very challenging for the justice system to satisfactorily perform its roles. Public perception of injustice may also be increased in such high-profile cases of forensic mishandling, hence demanding systemic reforms and proper oversight.

### **Dismissal of charges or acquittal:**



The dismissal of criminal charges or acquittal of a defendant is sometimes the legal consequence of unethical forensic practices. For instance, if a prosecutor bases his case on forensic evidence that has been compromised by unethical practices, the defense can successfully argue that the evidence should be disregarded, and as a result, the charges may be dropped. Alternatively, the case may be dismissed if it is determined that the evidence is so unreliable or tainted that it cannot be used to prove guilt beyond a reasonable doubt. And when ethical misconduct has the potential to compromise the integrity of the trial, acquittals are sometimes ordered even if evidence shows that the defendant is likely guilty.

### **Convictions Reversed on Appeal:**

If evidence of unethical forensic practice is discovered only after a person has been convicted, the conviction is likely to be reversed in appeal. Forensic evidence handling, interpretation, or acquisition practices that are unfair may lead the appellate court to rule that defendant was denied due process. The defendant could end up being acquitted or retried if the appellate court reverses the conviction by deeming evidence insufficient for the conviction. It can be pretty cost and time-inefficient for defense and the criminal justice system as such reversal takes place and wrongfully convicted persons are exonerated.

### **Impact on the admissibility of forensic experts' testimony:**

Lack of professionalism in forensic investigation may even deny the admission of testimony from forensic experts. An expert's method might be found faulty or, worse still, his testimony will be based on an unethical or untrustworthy practice. His testimony might be found to be inconsistent in future cases. The Daubert Standard in the U.S. or comparable legal structures on expert testimony require that forensic testimony is premised upon scientifically sound methods and principles. When unethical conduct is established in connection with a forensic expert, his evidence is excludable as well, with him prohibited from appearing and testifying in later proceedings. Additionally, professional associations mete out disciplinary measures whereby credentials and all professional standing become void.

### **Liability under criminal law of experts and police:**

Extreme unethical conducts by the Forensic Experts end up bringing upon criminal liability towards those perpetrators of such activities. If forensic specialists or police fabricate evidence deliberately, alter and destroy forensic exhibits, or, worse still, plant evidence for purposes of cases, criminal proceedings may be opened against them. Possible charges would run the gamut from obstruction of justice to perjury and perhaps even fraud charges. Such a conviction will automatically lead to several prison terms to profession-wide disbarment besides long-term impairment of reputations. Strict legal and ethical responsibility is required for forensic specialists and law enforcers alike to uphold highest levels of personal and professional standards of conduct.

As such, legal repercussions are harsh and multidimensional for unscrupulous acts of forensics. It includes wrongful conviction, and sullied reputations of justice processes, together with potential liabilities at both criminal and civil levels. Catastrophic outcomes may thus result for the individual as well as society in general. It is on account of these facts that

the need for forensic science to be undertaken within an atmosphere of strict ethical standards becomes absolutely necessary to ensure rights for the accused, public trust, and administration of justice.

## **VI. IMPACT OF EMERGING TECHNOLOGIES ON FORENSIC EVIDENCE**

Emerging technologies have greatly transformed forensic evidence collection, analysis, and use in the criminal justice setting. While this technology provides forensic practices with the opportunity to offer better and timely services through improving accuracy and speed, it imposes new challenges involving ethics, legal, and science. Here is a discussion on some of the major impacts the emerging technologies would have on the forensic evidence together with its resultant implications on criminal justice.

### **Analysis of DNA Genes and Creation of Genetic Fingerprinting:**

DNA analysis is one of the most impactful areas that emerging technologies have impacted. With new techniques such as Next-Generation Sequencing and Low Template DNA Analysis, forensic scientists can now extract DNA from smaller or more degraded samples than ever before. This has greatly increased the ability to solve crimes that were not previously possible to be solved, especially in cases of DNA evidence that is limited, aged, or deteriorated. However, these also raise questions about the accuracy of results, complexity in interpreting profiles, and the possibility of false positives or misidentifications, especially when the DNA is mixed up or in low amounts.

### **Digital Forensics and Cybercrime Investigations:**

This gives the crime investigator modern usage of digital forensics that incorporates all modern tools to identify criminal acts in their computer-generated records. Such technologies, for example, emerge, which could now gather information from cell phones, computers, cloud storage, and even encrypted communications. Moreover, the investigation could sift through the evidence digitally by means of data mining, artificial intelligence, and machine learning. Though, these technologies raise ethical and legal dilemmas such as privacy concerns, security of data and perhaps unconscionable surveillance. Legal arguments follow issues surrounding the legality of accessing or using personal information for purposes one has not consented to and other accuracy issues of digital forensics.

### **Facial Recognition Technology:**

Facial recognition technology could alter dramatically the way law enforcement identifies suspects and associates criminal individuals or actions. For example, the face recognition in CCTV footage or crime scenes may be compared against a database of known people so that suspects may be easily identified and evidence collected within no time. However, there is a raised concern over privacy use, danger of misidentification, and inherent racial biases in some algorithms. Incorrect identification or wrongful match may lead to wrongful arrests, violation of civil liberties, and erosion of confidence between the people and the law enforcement.

**Artificial Intelligence and Predictive Policing:**

Applications of artificial intelligence and predictive policing are becoming prevalent in the collection and analysis of massive amounts of data in efforts to predict crime and identify offenders. AI systems can recognize patterns and trends by analyzing historical crime data, social media posts, and other publicly available information to help law enforcement make decisions. This technology has the potential to increase the efficiency of investigations but raises concerns about bias, discrimination, and the over-policing of certain communities. Due process, individual rights, and whether these technologies are targeted towards the vulnerable or not will be ethical concerns involved in the use of AI for predicting crimes.

**Biometric Technologies for Identification:**

Some of the other biometric technologies are fingerprint scanning, retina scans, and voice recognition, among others, besides facial recognition. These are also increasingly used in forensic investigations, offering increased accuracy in identifying suspects or linking people to a crime scene. However, like all technologies, there are issues of false positives (where the innocent is mistakenly identified) and false negatives (where the perpetrators are not identified). Legal questions also arise on consent for collection of biometric data, violation of privacy, and security of sensitive biometric data to avoid misuse.

**Smart Forensics and Internet of Things (IoT):**

The Internet of Things, often abbreviated as IoT, is a scenario where common and everyday devices like smart home appliances and wearable technology-which is popularly represented as fitness trackers-connected to the Internet. Such connected devices may acquire data that potentially can be part of the chain of evidence needed in a crime investigation. These include, among others, capturing the location and activity or the communications of an accused in committing theft, assault, or murder. However, such data used for forensic purposes creates issues related to privacy and ownership of data as well as the legal process involved in accessing data stored in personal devices without consent.

**Forensic Robotics and Drones:**

Forensic robotics and drones are fast-emerging areas. They are used to capture evidence in danger and inaccessible environments, including criminal scenes, dangerous environments or where car accidents and disasters occurred. Drones come with cameras, which may possess high-resolution that can sweep off everything in the sky, but in other scenarios, there exist robots that would navigate into spaces unsafe for humans as they would take care of not tampering the integrity of evidence. Legal issues associated with this technology are warrantless searches and the possibility of an invasion of privacy if drones are used for surveillance purposes and not under sufficient control.

**Blockchain Technology for Evidence Integrity:**

Another emerging technology being researched in order to ensure and track forensic evidence from creation to disposal is blockchain. Blockchain can have a decentralized and immutable ledger applied to any step in the collection, handling, or analysis of evidence that helps

demonstrate that forensic evidence is not tampered with or altered. This would substantially strengthen the integrity of such forensic evidence and lower risks associated with chain of custody issues. But blockchain application in forensic evidence management is still in its infancy, and when applied to criminal investigations, it has technical challenges that include costs of implementation and the need for training among the forensic professionals.

### **Challenges to Legal and Ethical Frameworks:**

Forensic science, like other sciences, is plagued by emerging technologies that outpace the development of legal and ethical frameworks, posing significant challenges to regulating their use in forensic science. Issues such as informed consent, protections of privacy, fairness in data processing, and rights to fair trial must hence be taken in account when integrating into criminal justice. Perhaps overreaching and wrong use of the evidence in some cases will be witnessed for laws have probably not catered to some subtleties about new forensic technologies. Besides, the ethical issues surrounding the use of technologies that tend to unknowingly fortify biases or violate human rights require a tight leash on their use so that no individuals are harmed or justice eroded.

### **Impact on the Reliability and Veracity of Forensic Evidence:**

There are several advantages with emerging technologies that stand to surpass those of traditional forensic processes; however, novel sorts of errors and unreliability may be introduced into forensic procedures. This includes technical faults or malfunctioning, embedded prejudices, or algorithmic mistakes inherent in computer-driven systems that will become problems with the diminishment of the quality of forensic evidence and fairness of criminal proceedings. Therefore, validation, update, and review processes of these developing technologies are pertinent to prevent inappropriate application and eventual legal and ethical pitfalls.

Forensic science has been revolutionized by these emerging technologies. They come with new equipment for solving crimes and improving evidence collection and analysis accuracy and efficiency. However, they bring about new ethical, legal, and technical challenges to be met. This is where the laws, ethics, and safeguards that exist around their forensic use evolve to remain fair, just, and open so that the rights of individuals are upheld and the administration of justice is not compromised.

## **VII. CONCLUSION**

The collection, utilization, and use of forensic evidence are integral portions of modern crimes with deep ramification both within justice and in ethics. And through this particular article, it has been researched how the associated ethical dilemmas and legal repercussions with forensic evidence can be centered on the required rigorous standards and practices by which such evidence is held. From the moral obligation of the forensic experts to the chances of wrongful convictions, it can be said that integrity in forensic evidence plays a key role in having a fair outcome for criminal trials. Moreover, as new technologies carry unprecedented capabilities, they bring about new opportunities and challenges that should be handled cautiously so that these do not become unintended consequences.

This legal framework wants to safeguard individual rights and achieve a justly fair criminal legal system. At worst, inappropriate or unethical approaches to forensic matters can lead some seriously bad results in terms of legal implications-most notably, even exclusion of the evidence, the wrongful conviction-even the collapse of an entire case. Of course, regarding these new technologies, AI, DNA analysis, and digital forensics are highly complex issues regarding questions of privacy, accuracy, and bias. In this regard, the need for a framework of law and ethics accompanying more modern challenges has to be considered, along with how it can ensure responsible application of new forensic tools.

Thus, the scale of innovation and ethical responsibility in forensic science has to be very sharply balanced. The very promise of more efficiency and accuracy that the new technologies hold must be weighed very carefully so that potential misuse can be checked and the integrity of the justice system preserved. With an ever-changing definition of forensic science, discussions with regard to all the ethical and legal issues entailed by any forensic evidence or collection are critical factors in delivering and upholding fairness and transparency into justice served regarding the rights and needs of defendants and truth at criminal trial time.

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