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MODERN INFORMATION TECHNOLOGIES IN THE UNITED STATES POLICE

Police across the world are increasingly relying on emerging technologies to make their jobs more efficient. In their daily work, they are using drones, license plate readers, body cameras and gunshot detection systems to reduce injury and bodily harm. “From drones and body-worn cameras to facial recognition software and artificial intelligence, here’s a list of 12 of the most important technologies that are equipping law enforcement agencies with new capabilities to protect and serve” [1].

Police departments determine which technologies to adopt. Technologies can be a great tool for law enforcement agencies as they infiltrate every aspect of the lives. It is no wonder that solving crimes has become almost futuristic in its advances. Actual forensic technologies are advanced at helping to solve crimes. This field is one of the fastest growing in the United States. It is seen in the increased demand for forensic science technicians.

According to the Bureau of Labor Statistics (2021), there will be a 16 percent increase in jobs for forensic science technicians between 2020 and 2030. This growth is due to new forensic science techniques that have increased the availability and reliability of objective forensic information. Below there are some of forensic technologies.

DNA Phenotyping. Forensic scientists can sequence a DNA sample and provide investigators with identifying traits of the suspect (color of hair, eyes, complexion). Newer techniques can also predict age and biological background.

Biosensors for Fingerprint Analysis. Forensic scientists can use biosensors to analyze the minute traces of bodily fluids found in fingerprints to identify the suspect. Data that can be detected include age, medications, gender, and lifestyle. Biosensors can also be used on other bodily fluids found at a crime scene.

Immunochromatography. It is a method to test for diseases by dropping a small sample onto a prepared test strip. Results are relatively quick, and common tests that use this technique include COVID, HIV, and even pregnancy tests. In forensics, immunochromatography tests are used to detect substances in subjects' bodily fluids, such as drugs and medications. A smartphone-based sensor has even been developed to evaluate a saliva sample through immunochromatography without needing to be in a lab.

Geolocating a Suspect or Victim using Stable Isotopes of Water. Isotopes vary from atom to atom and can have a unique signature. Recent forensic developments have found that scientists can determine where the sample could have originated by isolating the isotopes in a water sample found on a suspect or victim. Isotope detection through other methods can also be used to determine the number of people present.

Forensic Palynology is a relatively new area for forensic scientists. Palynology is the study of pollen, spores, grains, and seeds and can be used in forensics to identify a subject's location. Pollen and spores are minute and can be deposited on skin and clothes largely undetected. Scientists have not developed techniques to gather and compare these trace materials and use them as evidence.

Blockchain-Based Solutions: Cloud Forensics. Over 50 percent of personal and corporate data is now stored in the cloud, meaning on remote servers. Digital forensic scientists have had to develop methods for collecting, analyzing, and evaluating data that has been collected from the cloud. Digital forensic scientists have begun to use blockchain technology as it is virtually impossible to tamper with.

Digital Vehicle Forensic. Investigators gather physical evidence (fingerprints, fluid samples, and trace materials like dirt). They can physically examine the car to determine how an accident, crash, or terrorist attack occurred. Scientists and investigators can gather data such as recent destinations, typical routes, personal data, and favorite locations.

Social Network Forensics. Over 3.6 billion people are on social networks, and this number is projected to increase to 4.5 by 2025. When social media first emerged, investigators and forensic scientists didn't have as much data to comb through.

Scientists have developed models for analyzing the information gleaned from social networks [2].

3D Technology to Determine Physical Fit. Forensic scientists often receive physical evidence that needs to be pieced back together. This is called physical fit and is a well-recognized method of determining that two pieces are from the same source. This evidence can be a variety of materials, and often they can be relatively fragile such as bones. A recent study at the University of Portsmouth used 3D imaging to map the exact dimensions of some burnt bones then replicated the pieces using a 3D printer. This enabled them to determine if pieces fit together or not without having to excessively handle the fragile evidence.

Drone Forensics. In August 2021, there were over 880,000 drones registered with the Federal Aviation Administration in the United States. Over 40 percent of those drones are registered for commercial use. The increased popularity of these unmanned aerial vehicles has given criminals a new tool to smuggle drugs, perform illegal surveillance, and attack victims. Forensic scientists are developing methods and models for gathering and analyzing data from drones, SD cards, and cell phones.

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