

TECHNOLOGY

I Recognize Your Walk

By Judge Herbert B. Dixon Jr.

Did you ever think that a computer would be able to recognize someone by the way she walks? Well, that is one of the future biometric measurement technologies that judges and juries may have to consider in future trials.

Gait recognition technology is the name applied to computerized identification of persons based on their manner of walk. I thought the idea of a computer identifying a person by the way she walks was something out of a futuristic comic magazine until I remembered a local criminal jury trial that was the subject of intense publicity. An elderly street vendor, affectionately known as Grandma, was physically assaulted and robbed one afternoon at a rarely used entrance to the apartment building in which she lived. There were no witnesses other than a video camera. The camera produced a very grainy video of the attacker waiting and pacing at the location as if he were preparing for the assault. The video also showed the resulting assault and robbery. The facial features of the assailant were unrecognizable; and the video provided law enforcement with few clues as to the identity of the perpetrator. The grainy video was released to local television stations, and they ran the story and the video during high profile news spots. Several viewers responded

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to law enforcement's request for public assistance to solve this crime. Some viewers reported that they recognized the assailant, among other reasons, "by the way he walked."

There was nothing unique about the way the assailant walked that could be described in this column for a reader's understanding. That is, there was no limp or other characteristic that viewers described. They simply felt able to identify the way the defendant walked.

There was other evidence presented at trial pointing to the guilt of the defendant. That evidence included, for example, proof that the defendant had a desperate need that day for money to avoid a pending eviction, of a vending transaction between the defendant and Grandma a few hours before and a few blocks away from the robbery, and of a statement made by the defendant during his post-arrest interview that the prosecution characterized as a tacit admission of guilt.

However, the primary identification evidence at trial was testimony by the video viewers that they knew the defendant and recognized the defendant as the assailant in the grainy video by the way the defendant walked. Obviously, other physical characteristics in the video aided the viewers in their identification; these physical characteristics included body shape and head size and arm length to body ratio.

After reflecting on this trial and hearing about gait recognition technology, I thought, "Wow, why not? If a computer can match fingerprints, palm prints, voiceprints, and DNA, why couldn't a computer recognize a person by the way he walks?" The answer to this question lies within the field of gait recognition technology, one of numerous biometric measurement technologies drawing sub-

stantial interest in both the scientific and law-related communities.

Biometrics

Biometrics is the science of measuring and analyzing biological data. Biometric measurements are taken of behavioral and physical biological attributes. The oldest known biometric measurement is a system originally known as anthropometry (from the Greek word meaning "measurement of humans") that consisted of multiple body measurements. The system was created as a method for identifying criminals in the late 1800s by a French anthropologist, Alphonse Bertillon, who worked for a French police agency. Later, the system became known as "bertillonage" in honor of the system's creator. Bertillonage is no longer used by law enforcement due to its obvious disadvantage: body measurements can and do change over time. Bertillonage was replaced in the early 1900s by another biometric measurement that is well known in today's courtrooms—fingerprint patterns.

The most well known biometric measurements are fingerprints, palm prints, voiceprints, DNA, and, more recently, facial features. Nevertheless, there are other biometric measurement technologies in current use and undergoing research.

Vascular Patterns. Vascular pattern biometrics provide a picture and analysis of the veins in a person's hand or face. Because of the varying thickness and pattern of individual veins, current belief is that this biometric is unique to every individual, even individuals who are identical twins. In addition, this biometric is very secure because the vein pattern and thickness are not visible without special equipment, making it impossible

for others to read or copy without the knowledge of a conscious subject.

Iris Scanning. Iris scanning involves measuring and recording points of comparisons in the colored tissue that surrounds the pupil. This technology is used in some correctional facilities for prisoner identification and as a method of identification by some employers and airports.

Retinal Scanning. Retinal scanning is an analysis of the blood vessels at the back of the eye. It is a biometric that has existed since the 1930s and is primarily used for high security applications. It has been said that retinal scans are among the most accurate and reliable biometric measurements currently available.

Hand Geometry. Hand geometry is a biometric that identifies a person by the shape and measurement of her hand. It is considered less reliable than fingerprints because the measurements are not uniquely individual.

Body Odor Identification. Body odor identification is a measure of the chemicals, known as volatiles, that your body gives off. Current belief is that this biometric measurement is unique and recognizable regardless of the subject's use or non-use of personal hygiene products. This biometric poses a privacy concern because it is possible to diagnose an existing disease or recent activity (e.g., sex) by analyzing the body odor.

Gait Recognition. Gait recognition technology is in its infancy and is the subject of research at numerous institutions. It is a biometric measurement of a person's leg motion—the way she walks, runs, and moves her feet. Whether you have Beyonce's bounce in your step or General Patton's swagger in your stride, gait recognition technology involves a computer analysis of video or radar imagery of the way you walk translated into a biometric template (a digital representation of the biometric measurement) for comparison with the same biometric template of other persons.

Because gait biometric measurements are normally taken at a distance, within radar or camera range, it is possible for database collectors to record and catalog gait biometrics without a person ever knowing that her personal biometric information has been captured. If this technology is ever perfected, a person of interest could be located in a large crowd and tracked by computer without ever being the wiser. Supporters of gait recognition technology believe that this technology is capable of using low-resolution cameras such as those used for security purposes on street corners, in parking lots, and in isolated exterior parts of buildings. Skeptics of gait recognition say that the reliability of this technology has yet to be proven.

Conclusion

Considering the biometric identification techniques that already exist or are being researched, it does not take much imagination to think of other possibilities. Ear structure comes to mind. That is, does the person have uniquely identifiable Mickey Mouse ears, or a uniquely identifiable Pinocchio nose, or even uniquely identifiable flat feet? The extent to which biometric identification of an individual is possible seems limited only by the number of body parts and other human features.

Think about the possibilities of some of the known technologies. Take, for example, a combination of facial- and gait-recognition technologies. Video cameras of persons at a sports stadium, in a mall or airport, or in the parking lot of your favorite fast food facility would record and store your facial and gait biometric information for future review. If your facial and gait biometric measurements were not already in a database, that information could easily be obtained surreptitiously so that the computer could search for you among the crowd. If your information were already in the database, Big Brother would have proof of your presence at the scene. In addition, if we add body odor identification technology, the computer watchdog's detection of your presence would be, not an insult, but just a scientific fact. ■