

1.3.3 Biometrics Mini Project



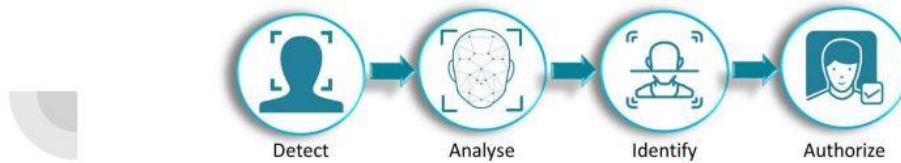
Introducing Double Wall. The all new protection system for hospitals interested in a better way to link new mothers and fathers with their newborn babies. With not one but TWO forms of identification we are able to ensure that children are always placed with their correct parents.



The Plan

As the mother is inducted into the hospital, we will scan her face and take her fingerprint, and put it into our database. We will do the same with the father. As the baby is brought into this world we will also take their face scan and fingerprint and attach them to their parents in our database. With this we limit the amount of people allowed to take the baby and ensure they get the right one. When going into the delivery room to get the baby, people will be required to scan their face. If they are accepted the door will then open revealing the babies. However, to get your child you will be required to use your fingerprint to open the container and get your child. To leave you must scan your face again, opening the door and allowing you to leave with your child.

Facial Recognition What is it and how does it work?



Facial recognition is a way of identifying or confirming an individual's identity using their face. Facial recognition systems can be used to identify people in photos, videos, or in real-time.

Step 1: Face detection: The camera detects and locates the image of a face. The image may show the person looking straight ahead or in profile.

Step 2: Face analysis: An image of the face is captured and analyzed. The software reads the geometry of the face. Key factors looked at include the distance between eyes, the depth of eye sockets, the distance from forehead to chin, the shape of cheekbones, and the contour of lips, ears, and chin.

Step 3: Converting the image to data: The face is then transformed into a data based on the person's facial features. The face analysis is turned into a mathematical formula. The numerical code is called a faceprint, and each person's is unique.

Step 4: Finding a match: The faceprint is then compared against a database of other known faces. If the faceprint matches an image in a facial recognition database, then a determination is made.

Advantages of Facial Recognition



Increased security: Facial recognition can help to identify terrorists or other criminals. It also can be used as a security tool for locking personal devices and for personal surveillance cameras.

Reduced crime: Face recognition makes it easier to track down burglars, thieves, and trespassers. Companies can use face recognition technology as a substitute for passwords to access computers.

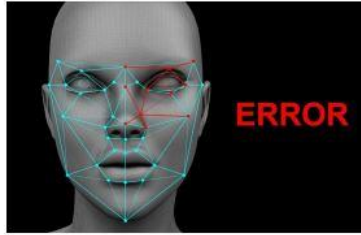
Removing bias from stop and search: By singling out suspects among crowds through an automated rather than human process, face recognition can help reduce potential bias and decrease stops and searches on law-abiding citizens.

Greater convenience and faster processing: Facial recognition offers a quick, automatic, and seamless verification experience. It enables a quick and efficient verification of a person's identity.

Integration with other technologies: Most facial recognition solutions are compatible with most security software, and is easily integrated. This limits the amount of additional investment required to implement it.

Accuracy: In ideal conditions, facial recognition systems can have near-perfect accuracy. Verification algorithms used to match subjects to clear reference images can achieve accuracy scores as high as 99.97%. Leading algorithms identifying individuals walking through a sporting venue had accuracies ranging between 36% and 87%, depending on camera placement.

Disadvantages of Facial Recognition



Surveillance: It is a violation of privacy and could also allow them to track down ordinary and innocent people at any time.

Scope for error: Facial recognition data is not free from error, which could lead to people being implicated for crimes they have not committed. A slight change in camera angle or a change in appearance, such as a new hairstyle, could lead to error.

Breach of privacy: The question of ethics and privacy is the most contentious one. Governments have been known to store several citizens' pictures without their consent.

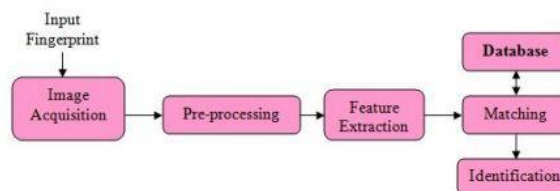
Massive data storage: Facial recognition software relies on machine learning technology, which requires massive data sets to deliver accurate results. Such large data sets require robust data storage. Small and medium-sized companies may not have sufficient resources to store the required data.

Fingerprint Analysis What is it and how does it work?



Fingerprint recognition and biometrics can replace passwords and ID cards and is one of the most widely available biometric solutions in the market. Fingerprint biometrics can pick up minute details such as orientation, ridges, arches, loops, whorls and pores, helping to use these points to confirm the user's identity.

Capacitive scanners: We have decided to use capacitive scanners as they are not easy to fool and the only way to forge a fingerprint with the capacitive scanner is to hack the controller hardware or software. They use an array of hundreds of small capacitors to detect capacitance between finger ridges and valleys for capacitor plates. Wherever there's a ridge, its distance with the capacitor plate is small, resulting in slightly less capacitance. Wherever there's a valley, its distance with the capacitor plate is greater with an air gap in-between. This results in larger capacitance. The capacitance from each capacitor in the array is passed to the operational amplifier and recorded with analog-to-digital converters' help. This produces a digital scan of the fingerprint according to the capacitive touch sensing.



Advantages of Fingerprint Analysis



Accuracy: Fingerprints change very little over a lifetime, helping to ensure the longevity of the personal data, and are also cost-effective in helping to set up small hand-held scanners with a high level of accuracy. The best system was accurate 98.6 percent of the time on single-finger tests, 99.6 percent of the time on two-finger tests, and 99.9 percent of the time for tests involving four or more fingers.

Simple, less intrusive testing: A DNA sample is needed for mapping and matching. A fingerprint is much easier to get than saliva or a strand of hair and can just as easily identify an individual.

Reduce innocent convictions: DNA fingerprinting can reduce the number of innocent convictions. In a crime scene, forensics can collect and store samples for future reference, or directly match the samples with current data. This simplifies the identification of criminals and helps solve cases.

Help solve crimes and identity issues: Even after decades have passed, DNA samples can still be available and collected as evidence. DNA does not alter easily, so authorities can still use DNA samples gathered from a very old crime scene. DNA fingerprinting is also very helpful in identifying people during massive deaths, and in disproving or proving blood relationships.

Disadvantages of Fingerprint Analysis



Violation of one's privacy: Authorities can force certain individuals, innocent and others, to undergo DNA profiling as part of their data gathering. Aside from convicted criminals, the DNA database contains information on other innocents including asylum patients and juvenile delinquents. Once a person's DNA is mapped and stored in the database, there is virtually no way of ever removing it.

Third-party access: A number of businesses and organizations would want to have their hands upon a DNA database, including health care providers, insurance carriers, and maybe some employers. Employers with access to DNA database may use it to screen recruits and prejudicially refuse employment to those they think have genetic defects or anomalies.

Convict innocents: Since samples can be easily gathered from even mere hair strands and saliva, it is possible for authorities to obtain DNA profiles of totally innocent people who happen to be in the location prior to the crime. DNA of innocents can be purposely planted to pass the blame.

Worn out or missing fingerprints: For older adults who have a lifetime history of manual work, their fingerprints might be worn out and cannot be detected by the system. In addition, those who have lost fingers or an entire hand would also be excluded from taking advantage of this technology.

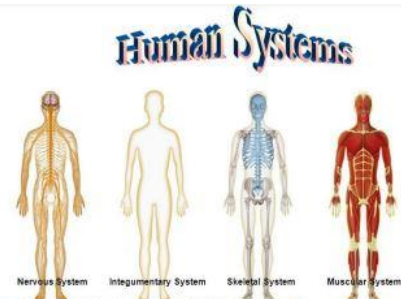
Privacy issues

While some people do not mind being filmed in public and do not object to the use of facial recognition where there is a clear benefit or rationale, the technology can inspire intense reactions from others. Having this project in a hospital makes more people apt to compiling to do it. Hospitals are a trusted site which already take so much information from you. They take your hto already so people will be mainly open to having their picture taking and stress in a database for. However, many would be hesitant to give them the information as it could hacked and the hospital will have so much information on you.

Some people may be concerned about being biometrically scanned if they had an objection to it. Many people would argue that the government is trying to gain too much information on people, which some might view as dangerous or an invasion of privacy.



Human Body Systems Involved



Integumentary system: The integumentary system which consists of skin, hair, and nails, covers the body and regulates its trade with the outside world. In both fingerprint analysis and facial recognition, skin is used to help identify an individual. For fingerprinting your finger which contains a fingerprint on the skin is analysed by its different patterns, and is unique to you. While in facial recognition it scans many part of your face such as the shape and contour of many features which are shown on the skin.

Nervous system: The nervous system allows us to sense and respond to stimuli, such as light, sound, smell, and touch from our environment. It allows rapid communication of stimuli within our body and for receiving information from the environment outside the body and bringing it to the brain for processing. Everywhere in our body contains nerves. In both fingerprint analysis and facial recognition muscles are used. In order for those muscles to move a signal is transmitting to them by nerves signaling for them to do their specific job.

Musculoskeletal system: The muscular and skeletal system work hand in hand to give the body structure and allow the body to move freely. They control movement, posture and assist the body with heat generation. Our bodies are held together by connective tissue and the skeleton provides a framework on which the human body is arranged. In order to fold your fingers out flat allowing them to be read by a fingerprint reader, the muscles have to be able to contract. In facial recognition the scanner senses facial movements of smiling, blinking, etc. These are all controlled by the bodies muscles.

Beating the System

Although we take our work and precautions very seriously at Double Wall there's always room for error and possible mistakes. We are working to make our product the most secure it can be. However, or as secure as our product is it can still be hacked and cheated. Using a hyper realistic mask, or the face of another will allow you to get in and out of the delivery room. Picking up a fingerprint from a glass or a surface could be used to get the baby. Although, stealing a person's face and fingerprint is difficult and not very realistic, we are prepared for the worst case scenario, as we know that once your biometrical data has been hacked you cannot change it.

Success Story

After the increase of baby mix ups at hospitals, our team at Double Wall came up with the idea to make taking your baby a more secure process. We have installed this product at many hospitals nationwide and have seen great progress. Since the installation of our product baby mix ups have dropped significantly and our product is in high demand.



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