An Intelligent Cash Machine Computational Methodology Based on Iris Scanners

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Abstract**—** Iris recognition is a robotic biometric identification system that uses fine pattern-recognition techniques on videotape images of either one or both of a person's iris, which have complex patterns that are distinct, stable, and visible up close. These patterns can only be seen by someone who is very close to the individual. A biometric system is able to identify an individual or entity only on the basis of some distinguishing feature or characteristic that the individual or entity has. The security system is very important to day-to-day life and plays a key part in it. As security systems continue to advance and become more sophisticated, iris recognition is quickly becoming one of the most important forms of biometrics-based identification systems. Individual identification and authentication have been dramatically bolstered thanks to the development of biometric technologies, which has had a major impact not only on national security but also on international security and notably on public safety. The iris pattern becomes increasingly stable with age, and the primary attributes that define it are accuracy, sufficiency, and unity. Iris recognition is deployed in high-security areas because to its great dependability and practically perfect identification rates. This is because it can almost always correctly identify a person. This design provides an explanation of the many security methods that are implemented by ATMs, as well as the benefits of iris recognition systems in comparison to more traditional biometric systems. In this configuration, MATLAB software is used to recognise the user's irises, and an Arduino UNO is implemented to facilitate communication between the computer and the mobile device.

Keywords— Biometrics, Iris, ATM, Arduino, MATLAB.

I. Introduction

Iris recognition is a kind of automated biometric identification that involves the examination of unique patterns in a ring-shaped area that surrounds the pupil of each eye. It is a method of identification that is very reliable, precise, and has an extremely low percentage of incorrect matches overall. Iris scanning is the process of photographing each eye's unique patterns, which are not apparent to the naked eye and need the use of infrared light, which is not noticeable. A specialised camera records the location of the pupil, iris, eyelids, and eyelashes. This information may be used to diagnose eye diseases. It just takes a few seconds to utilise the counterplotted, recorded, and saved information about an individual's iris for any future matching or verification that may be necessary. An algorithm is a series of instructions that tells a biometric system how to interpret a certain problem. These instructions are given to the system by the user. In order to determine whether or not a biometric sample and record are a match, the biometric system employs algorithms. A wide number of applications are possible for the use of algorithms. Iris patterns are very complex, hold an incredible quantity of information, and consist of more than 200 separate places. Iris check technology is one of the few biometrics that is undeniably resistant to fraud and false matching because a person's right and left eyes have different patterns and patterns are easy to photograph. This makes iris check technology one of the few biometrics that is considered to be a "gold standard." The false acceptance rate for iris recognition systems is 1 in 1.2 million, which is statistically lower than the rate for the traditional point recognition approach. The genuine advantage lies in the reduction of the false-rejection rate, which is a statistic that measures the percentage of drug users who are denied access while they are being verified. In contrast to point scanners, which have a three percent error rate, iris scanning technologies guarantee a rejection rate of zero percent for false positives. Iris scanning is an example of a technology that has a great deal of appeal since it is essentially accurate.

The primary argument for using any biometric is, of course, to increase security.

II. Literature Survey

[11] discussed the several disorders that may affect the voice and used Deep Neural Networks (DNN) in order to diagnose voice pathology. The German corpus Saarbruecken Voice Database, which includes recurrent Long-Short-Term-Memory (LSTM) layers, is used in the diagnosis of voice disease. It was revealed that there is a high degree of accuracy on testing files as well as the training data set. This was discovered in conjunction with sensitivity and specificity. The amount of time required to distinguish between healthy persons and sick patients was successfully cut down by the use of this method. In conclusion, the construction of a system that is capable of reliably recognizing speech disorders is a demanding effort that spans the whole dataset. This work must be completed. As a result of this research, we have been motivated to utilise the Saarbruecken Voice Database for pathology detection by making use of the many elements that contribute to quality of service. [12] carried out studies to investigate the auditory symptoms of various illnesses and disorders. Not only does it lay a focus on the running, but it also places an emphasis on the prolonged sounds of the vowels. Researchers often use perturbation techniques, SNR methodologies, and nonlinear dynamic methods while attempting to investigate the characteristics of diseases. And mark individuals with laryngeal pathologies as having a low-dimensional rate, while labelling normal voice as having a high-dimensional rate. Those with pathologies in their larynx will have a lower dimensional rate. As a component of the processing voice analysis, a nonlinear dynamic analysis is carried out at the very end for the sustain and flowing vowels. As a consequence of this modification to the perturbation analysis, the handling of the pathologic voice identification process was made simpler.

Pathological Voice was looked at by [13], and their results were published thereafter. It is able to differentiate between healthy voices and those affected by illness based on the acoustic measures. Recording sustained vowels and continuous speech is required in order to get reliable acoustic readings. In order to extract speech signals, sustained vowels and continuous speech are used, with the fundamental frequency, amplitude perturbation, spectral measurements, and glottal noise all being taken into account. According to the results of the research, differentiating between a normal voice and a diseased voice may be done with the use of acoustic measures that have higher isolation and classification thresholds on continuous speech. Our investigations into the acoustic measures of the pathological voice were motivated, in large part, by the findings of this research. [14] made the suggestion that acoustic and perceptual characteristics of voice changes in patients suffering from reflux laryngitis should be studied. Consolidating the multidimensional subjective and instrumental acoustic metrics of speech data

was the goal of the study that was conducted. Only individuals diagnosed with laryngitis will be included in the research that is currently being conducted (RL). A hoarseness scale is utilized to analyze the comparative analysis, and the patients whose values on the Jitter, Shimmer, Noise Energy, Voice Handicap Index, and Phonautogram are on the lower end of the scale are examined.

The results of this research have shown to us that multidimensional voice assessments are a very useful instrument for assessing the vocal skills of RL patients whose voice quality has deteriorated. This was discovered as a result of the outcomes of this investigation. In the study that was carried out by [15], the acoustic voice discrimination of normal and abnormal voices in connection to the acoustic pathological voice measurements was investigated. Pitch as well as glottal noise are measured in order to categorize patients as either belonging to the afflicted group or the normal group. If the measurement of Normalized Noise Energy (NNE) is high, this suggests that the patients have a condition that is pathological; on the other hand, if the measurement of NNE is low, this suggests that the patients have a condition that is normal. In conclusion, the optimal parameter of the perceptual and auditory analysis demonstrates that normal speakers were able to differentiate between the patient's pathologic voice and the documentation of such sound. This was demonstrated by the fact that normal speakers rated the sound of the documentation as more unpleasant than the pathologic voice. On the basis of acoustic and perceptual data, it is feasible, with the assistance of this research, to ascertain whether or not a group is affected by a disease or is healthy. Research conducted by [16] looked on the acoustic properties of a sick voice. Acoustic analysis was done on each of the different types of patients, with a focus on the vocal fold paralysis and nerve paralysis specifically. An investigation into the acoustic phenomena was carried out, specifically looking at pitch perturbation, amplitude perturbation, and noise energy. Conditions as diverse as cancer, hoarseness, and stroboscopy are broken down and analysed in this particular research project. In the course of this inquiry, the key areas of focus will be the noise energy, the pitch, and the amplitude perturbation. Because of this capability, it is feasible to research acoustical phenomena such as hoarse voices, vocal fold vibration, and turbulent noise disorders. As a result of this study, we have been motivated to look into the possibility of using sonic features as a kind of defence against pathologic sickness.

The electroencephalogram, more commonly known as an EEG, is a technique that is used to measure the electric fields that are produced as a consequence of activity in the brain. It is possible to decipher this internal thought by extracting information from EEG data, which would result in a sort of synthetic telepathy. This would be a step in the right direction. This would be an improvement above the previous situation. The decoding of EEG signals with the goal of recognising syllables of imagined speech will be the only focus of this specific field of research. Previous work has been done on the difficult problem of identifying EEG signals that were obtained from tests in which people did only covert movements, such as imagining movement or mental tasks, as well as imagining syllabic and vowel speech. These tests were conducted on people who did not know they were being tested.

III. Materials and Methodology

The iris recognition system is comprised of seven individual parts. An iris picture may be analysed using a variety of different methods, some of which include the challenge-response test (CRT), iris segmentation, iris normalisation, iris enrichment, iris point garbling, and iris discriminator design. The proposed iris recognition system is shown here by a block diagram, which may be seen attached as Figure 1. In an iris recognition system, the process of image acquisition is an essential and challenging step. In particular for Indians, the iris is rather small and appears black in colour. Taking images that are crisp requires some level of expertise. There is a risk of fraud and unauthorised usage when using biometric characteristics. This is the most significant limitation of the biometric technology. This module's objective is to verify that the input photographs originate from genuine persons, as opposed to phoney iris or eye images or other artificial sources.

This system evaluates the reaction of the pupil's perimeter by subjecting it to a variety of lighting situations while maintaining the same distance from the eye. The algorithm for this system was developed in the manner that is described here.

The first thing you need to do is photograph the eyes of the same individual in a variety of lighting settings.

Step 2: Measure the perimeter of the pupil by referring to the photographs of the eye that were taken.

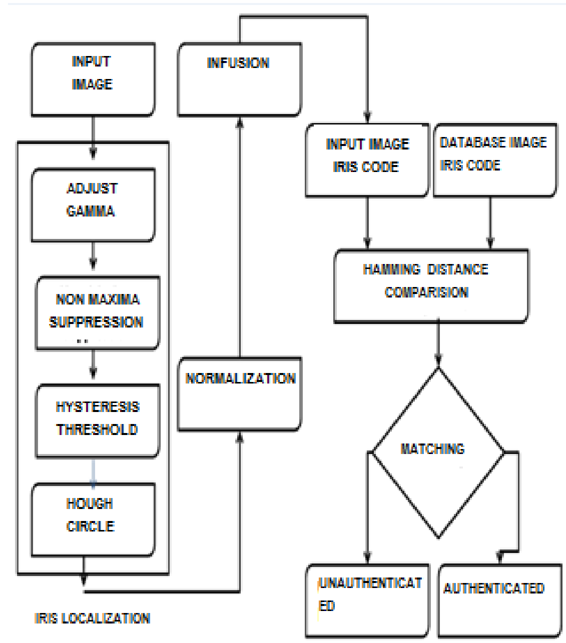

Fig.1. Block diagram of existing system

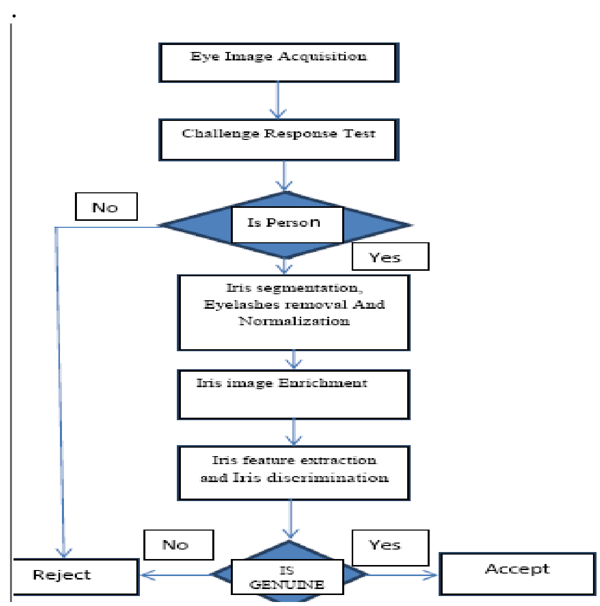

Fig.2. Flowchart of existing system

This method verifies that an input comes from a real sequence and not from images or any other source that was created by humans. The biometrics-capturing device has to be able to verify that it is looking at actual stoner features (as opposed to those from an image or video), and it also needs to be able to check that the relationship signal is not being substituted. This is used to assist renewal assaults retrieved from videotape-signals, for instance, by linking a videotape archivist to the frame-theft.

LIMITATIONS OF EXISTING SYSTEM

One of the limitations of the current ATM system, which is dependent solely on the presence of the account holder, is that the system requires an IR detector and cannot make use of a regular camera.

2. Preserving the camera on a regular basis is required.

3. Iris scanners have a somewhat high price tag when compared to the costs of other types of biometric modalities.

PROPOSED SYSTEM:

There are two choices that may be made at the automated teller machine. One of the bones is for tone, while the other is for the others. A schematic representation of the proposed system may be seen in the following graphic.

If the user chooses the first option, iris recognition may be carried out by making use of the MATLAB picture set, and information on cash withdrawal will be provided if the approved image is uploaded from MATLAB. When the user has entered the necessary quantity into the cash motor, the cash motor will begin to run. In the event that MATLAB is used to load an unauthorised photo, the buzzer alert will sound.

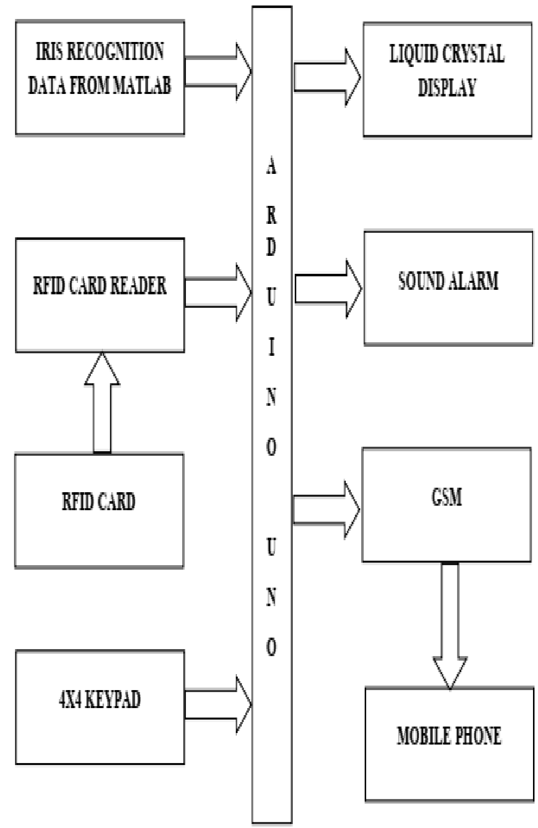

Fig.3. Block diagram of proposed system

However, if the user choose the alternative option, they will be required to swipe their card in order to continue. After examining the card, the system will issue the relevant individual with a one-time password (OTP). When the stoner enters the correct OTP, the mechanism on the cash withdrawal updates with the relevant information. They have complete discretion over whatever quantity is necessary. When that time has passed, the cash motor will begin operating. In the case that they provided an erroneous OTP, a piercing buzzer will also activate.

eISSN 1303-5150

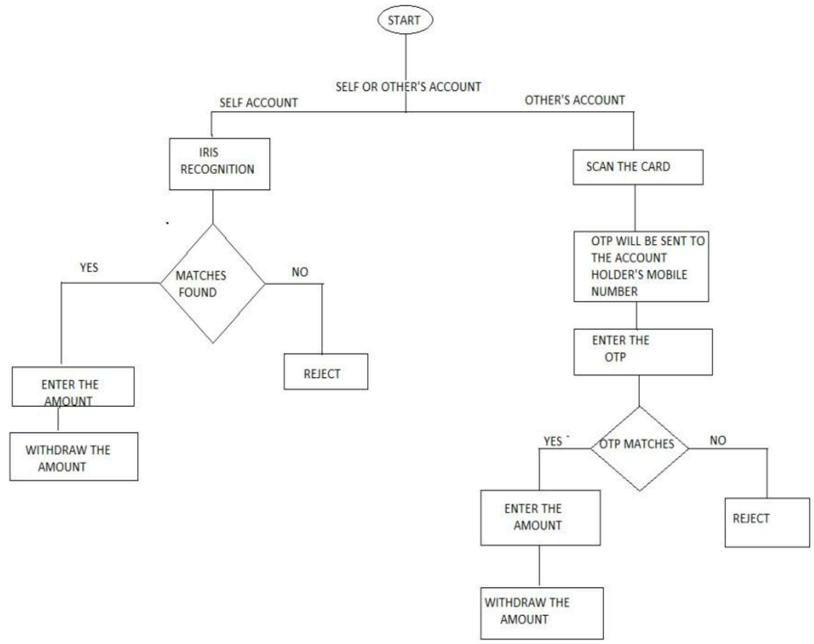

Fig.4. Flowchart of the proposed system

Tab.1: Accuracy rate of using iris scanner in the ATM

METHOD	**CODED PATTERN**	**MISIDENTIFICATION RATE**	**SECURITY**	**APPLICATIONS**
Iris Recognition	Iris pattern	1/1,200,000	High	High-security facilities
Fingerprinting	Fingerprints	1/1,000	Medium	Universal
Hand Shape	Size, length and thickness of hands	1/700	Low	Low-security facilities
Facial Recognition	Outline, shape and distribution of eyes and nose	1/100	Low	Low-security facilities
Signature	Shape of letters, writing order, pen pressure	1/30	Low	Low-security facilities

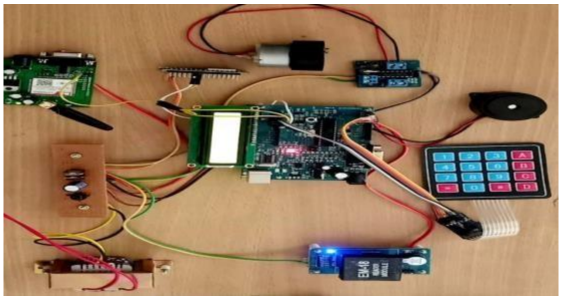

Fig.5: Hardware kit

The user must decide whether to withdraw money from his own account or from another person's account.

There are two possibilities.

1. Self \s
2. Other

Fig.6: Selection step of account holder

If the user chooses option 1, a request to scan the iris will be made.

Fig.7: Scanning of Iris

Even so, if the iris doesn't match, the process will be rejected and the buzzer will activate. Once the proper iris has been examined, it will be possible to select the quantum details. There are 4 choices that are equivalent to 100, 500, 1000, and 2000.

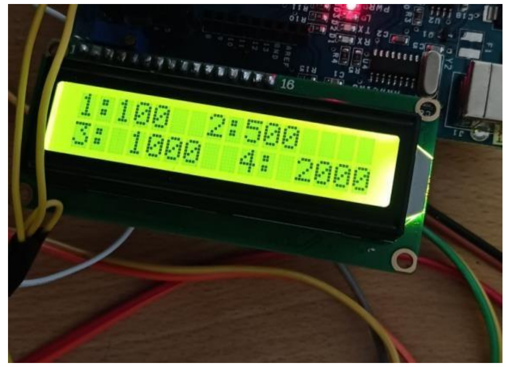

Fig.8: Selection of amount details

The evidence of the quantum that the stoner has been named will be displayed after choosing the quantum.

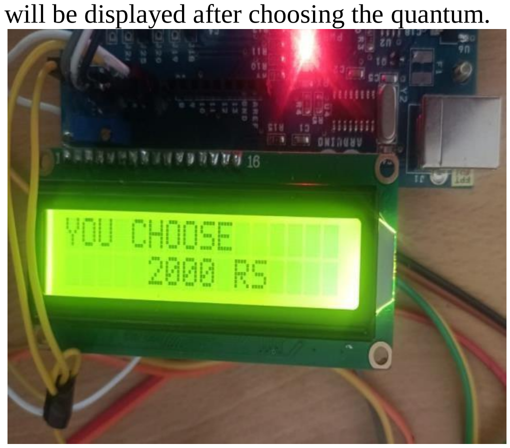

Fig.9: Confirmation of the amount selection

The cash engine will now start to work to distribute the plutocrat. Additionally, a " Thank You " message and the last step of directing the stoner to collect the money will be visible.

Fig.10: Confirmation of the amount selection

Even if the stoner choose option 2, they will be prompted to verify their RFID card, and an OTP will be provided to the cellphone number that is associated with the relevant account. The programme will make sure that you entered the correct OTP. The buzzer will sound and the procedure will be declined if the one-time password (OTP) that was entered was wrong. After you have entered the correct OTP, you will go to the following step, which is the specifics of the amount. There are four options available, and they correspond to the values 100, 500, 1000, and 2000 respectively. After the amount has been finalised, the user will be given the opportunity to see the evidence of the amount that they have selected. The plutocrat will now be distributed by the cash engine after it has finished starting up. In addition to this, a message that says "Thank You" will be shown, and the next step will consist of instructing the stoner to collect the money.

IV. CONCLUSION

The solution that we proposed is much superior in terms of the ability to incorporate more security features as it is constructed. His design will be quite helpful in giving cutting-edge and first-rate levels of safety and protection. There is a high level of security in place to prevent entry by illegal persons. The verification process typically takes less than 10 seconds on average. Both the structure and pattern of the iris are characterised by long-term stability. This kind of technology is relevant to the creation of security systems that are pleasing to the eye. This will be helpful for those individuals who do not have quick access to a bank machine. According to the outcomes of all of the experiments, the suggested procedure demonstrates promising performance. The necessity of accurate iris segmentation for iris recognition systems was brought home even more clearly by this finding. In order to achieve an even higher level of performance, sweats are still required.

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