Implementation of Voice Biometric System in the Banking Sector

Amjad Hassan Khan M. K [1, 2*], & P. S. Aithal [2]

[1.] Faculty, Department of Electronics, Kristu Jayanti College, Bengaluru, India and Research Scholar, Srinivas University, Mangalore, India,
Orcid ID: 0000-0003-4299-7948; E-mail: itzamjad@gmail.com

[2] Faculty, Institute of Engineering & Technology, Srinivas University, Mangalore, India,
Orcid ID: 0000-0002-4691-8736; E-mail: psaithal@gmail.com

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Orcid ID: 0000-0003-4299-7948; E-mail: itzamjad@gmail.com
[2] Faculty, Institute of Engineering & Technology, Srinivas University, Mangalore, India.
Orcid ID: 0000-0002-4691-8736; E-mail: psaithal@gmail.com

ABSTRACT

Purpose: *The voice biometric system for verification and authentication of the user is a more advanced version. The technology is slowly grabbing the attention of researchers and industrialists for customer verification. This method allows users to use a voice instead of any code-based password which can be hacked or forgotten easily. The present research work proposes and describes the voice biometric system that can be implemented in the banking sector. The key of this entire research work is to convert the input voice into a waveform in a multifrequency range and store it in the bank server. During the authentication and verification, a customer will repeat a random phrase given by the voice assistant and then the bank server will match the voice availability.*

Design/Methodology/Approach: *In this study, we are defining the speech biometric system architecture, which will provide rapid client authentication regardless of language. This technique generates a random word and asks the user to repeat it, rather than asking numerous questions like name, account number details, etc. The banking server will match, recognise, and authenticate the clients' voices by repeating a certain phrase, after which it will determine which customers have access.*

Findings/Result: *This process will decide the access/denial of the usage of the banking facility to the customer. The overall results conclude that this system will help to enhance the accuracy level of recognition.*

Originality/Value: *The conceptual framework of the speech biometric system in the banking industry is described in this research study. The system's architecture will assist the banking industry in building a robust voice biometric identification database.*

Paper Type: *Conceptual Research.*

Keywords*: Voice biometric, Banking sector, false acceptance rate, multifrequency*

1. INTRODUCTION :

In this generation authentication and security is very important for any sector. There are many sectors which always in the stack of insecurity one such sector is banking. To solve the insecurity concept there are many strategies have been implemented by the experts such as e-commerce, biometric authentication, access control to computers, etc [1, 2]. There are some methods used for identifying individuals in the banking sector: a) Knowledge-based method which requires a PIN code that allows to activate through mobile phones and (b) possession of the token which can be in any form [3]. These two methods are complementary to each other to obtain security in the banking sector. In the first method, there is a possibility of forgetting the password or any being cracked by the third person, and in the second method, the badges can be misplaced or can be used by any other person. The disadvantages of these two conventional methods can be overcome by using the biometric features as a security solution. The usage of a biometric system is advantageous as its can be unique and can be used universally. The usage of biometrics eases the life by avoiding fraud. In the last few years, major research has taken place in the area of the biometric system including eye, face, and voice [4]. Among many other biometric systems, voice biometrics is an interesting and upcoming generation technology that is the future for baking security [5, 6]. The knowledge-based method of authentication

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is well effective if it's done by using advanced methods. If it is used properly by using multiple permutations and combinations, it becomes difficult for hackers to crack the security [7]. To keep this in mind, many leading banks in the world have started implementing voice assistance and voice biometric systems at various rates of success. The voice biometric system depends on the built-in characteristics of the used devices for banking purposes. There are some technical difficulties that do not allow the voice biometric in its current state for endorsements in the banking system. The voice biometric system in banking offers a secure way for identification and authentication of the user which does not resist threats. The modern advancements in machine learning technology, synthetic speech, and recording methods enhance the quality of voice and avoid the threat of fraud [8, 9].

In this research work, we are basically describing the usage of the voice biometric system and its implementation. The current implantation describes the basic architecture to enhance the usage of voice biometric systems in the banking sector.

2. RELATED WORKS :

There are two stages to the voice recognition method: the training phase and the testing phase. The analogue human voice recording is transformed into digital signals in the first stage. The digital signal has a complicated structure that the system must parse in order to extract the necessary voice characteristics. The table given below shows some research works based on voice biometrics.

Table 1: Review of related work along with focus and outcome.

S. No	Area & Focus	Outcome	Reference
1	The Investigation into Mobile Device Biometric Authentication	Physical biometric verification uses an individual's fingerprint, face, retina, and iris, among other personal characteristics, since each person's unique features are impossible to replicate or even share.	Silasai et al. (2020). [10]
2	Methods and instruments utilised in the development of voice recognition systems	The biometric system's voice features are a crucial component. The extraction and selection of these feature vectors improves the voice recognition system's quality. Features taken from the owner's voice should stand out from others, be resilient to noise and distortion, and be simple to extract.	Duraibi, S (2020). [11]
3	Voice Biometrics: A Voice-Based Authentication System	The field of voice biometrics is quite new. An outline of the procedure for identifying individuals using biometric information is given in this study.	Singh N et al. (2018). [12]
4	An analysis of biometric automatic authentication techniques	Aims to give a high-level overview of the field of biometrics and a synopsis of the advantages and disadvantages of the different biometric authentication techniques.	Kataria et al. (2013). [13]
5	Artificial Intelligence Voice Biometric Verification for Online Proctoring	Three-tier architecture comprising a data layer, application tier, and presentation tier can be used to achieve Voice Biometric Authentication (VBA).	Sathish et al. (2002). [14]
6	Voice and facial recognition fusion is used in a multimodal biometric method for human authentication.	Voice and face biometric systems are combined into a single multimodal biometric system using features fusion and scores fusion. The Computer simulation experiments show that Eigen face and SVM trials produce better results for face recognition, while cepstral coefficients and statistical coefficients perform better for sound recognition.	Abozaid et al. (2019). [15]

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7	Voice biometric authentication facilitates the accurate recording of an individual's voice with numerous pieces of data.	In order to improve system accuracy, speech biometric authentication helps the administrator to accurately capture the voice of each person who provides numerous sets of data. Additionally, it has been noted that the software has the ability to stop more false data from being presented.	de Krom G. (1994). [16]
8	Implementation of Voice biometrics in banking facilities	The service sectors make sure to offer a top-notch, safe financial service system that can be utilised to stop fraud of any kind. Voice biometrics authentication can be implemented to achieve this task.	Tanwar et al. (2019). [17]
9	Voice biometrics in performance, customer services, and security for consumers.	Voice biometrics is used in performance, customer services, and consumer security. Additionally, this works in conjunction with call centres to connect and authenticate both customers and agents by matching voice and security questions.	Miller et al. (2012). [18]
10	The use of biometric systems in logistics, defense, transportation, and home security	In order to maintain the security system and convenient access to authentication, the biometric system is gaining traction with all consumer electronics, including home security, vehicles, transit, logistics, and defense.	Khamis et al. (2016). [19]

3. OBJECTIVE AND IMPLEMENTATION :

The voice biometric in the banking sector works by loading the voice of the customer/individual whose identity should be stored in the server. This fetched input voice will be considered as a referral for the person's authentication. For better implementation, the voice of the user will be stored in different frequencies to avoid fraud. At this stage, all the behavioural characteristics such as voice quality, age, and atmosphere work together to get the input voice. This above stage will make each and every input unique and does not allow any duplications of individuals. At the same time, another text-independent recognition will concentrate on matching the not recognised voices with the database.

The overall voice biometric system is divided into text-dependent and text-independent recognition methods. In the text independence method, a server does not keep any prior stored audio which can be compared to the recent one [20]. This is a live recognition and does not require any pre-defined voices. Whereas, the voice-dependent method depends on the repetition of the previously stored voice. It means for authentication it compares the input voice with the pre-stored voice. As banks are already urged to implement the Artificial intelligence support of voice, this voice biometric system will be an add-on for the banks as well as customers. The remote access will be a turnaround advantage for this implementation. For implementing this system can be installed in the existing software of the banks. The users have to say the phrase which will be asked randomly to create a sample. The sample will be matched with the existing database. If the match is not found, access will be denied.

There are many ways of implementing voice biometrics in the banking sector:

(a) *Public service sector:* The Bank provides many facilities to the customers including insurance, fixed deposits, and pension. In this scenario, the people do not have to visit the bank in person but can authenticate by using the voice biometric. The voice biometric system allows to identification of almost 140+ voice characteristics of the human.

(b) *Contact Service Centres:* The Bank sector deals with 100 calls in which agents must spend their initial time calling for the verification. The voice biometric system will be able to shorten the time for auto-authenticating the existing customers of the bank.

(c) *Increasing KYC Process*: This is most beneficial for multilingual states such as India. The proposed voice biometric architecture will help to include all the people and connect across the world to get done their banking issues irrespective of the language.

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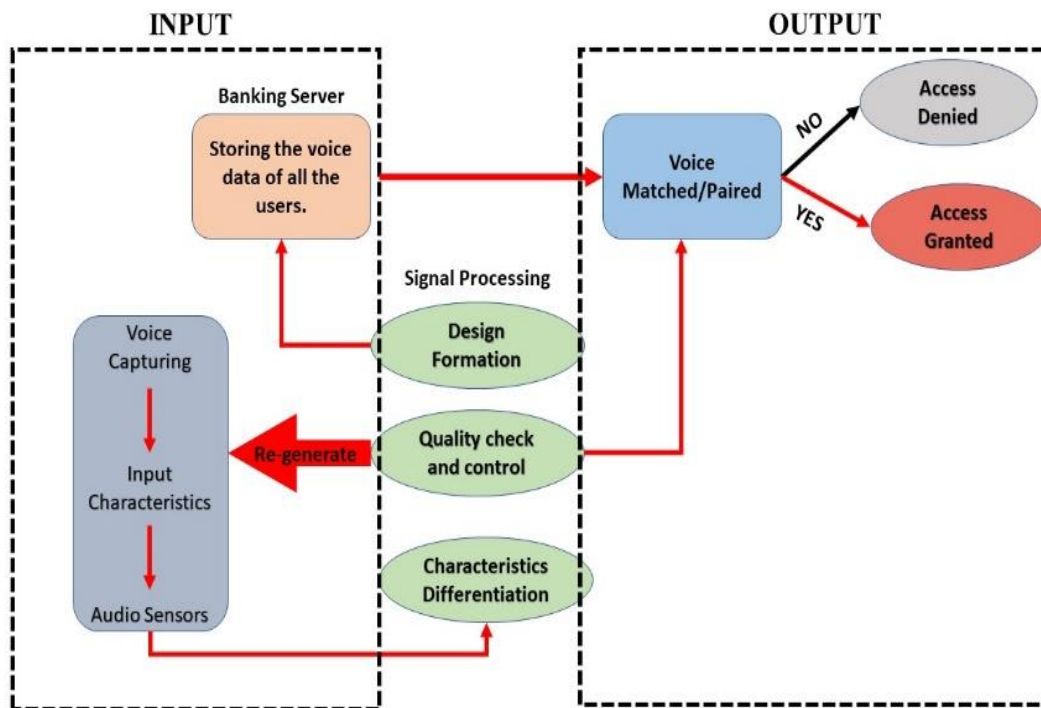
4. METHODOLOGY :

Fig. 1: Basic architecture to describe the input and output flow in the voice biometric system.

In this research work, we are defining the architecture of the voice biometric system which will help to conduct the quick authentication of the customer irrespective of the language. In this system instead of asking many questions like name, account number details, etc, the system will generate a random phrase and ask the customer to repeat it. By repeating the same phrase, the banking server will match, identify, and authenticate the voice of the customers and decide the access availability. As an individual human being has different characteristics and behaviour of voice, this will ease the security system of banking. **Figure 1** represents the basic architectural design and implemented methodology of the present research work.

5. RESULTS AND DISCUSSION :

The present research work presents the voice module system which uses basic programming to fetch the data. In banking, if this architecture is implemented, the following scenario has taken place. If a customer has to do a transaction in online banking using a voice authentication system it has been moved to the following steps:

(1) A customer has to activate voice assistance in a particular banking app.

(2) During the transaction of the amount, before transferring a voice assistance will generate the sample voice which should be repeated by the customer for authentication and verification.

(3) The customer should perform this operation in the given time. The banking app will authenticate and confirm the authorization.

(4) This will lead to the transaction, and after the successful transaction, you will also receive voice-assisted messages.

(5) This voice biometric system using a banking app will be used for the identification, authentication, and verification of the customer. The identification message will be encoded into sound which will be multi-frequency. The entire model also helps to find the False acceptance rate of the voice. False rejection rate and acceptance rate (FRR and FAR respectively) are calculated by using FRR 1% @ FAR 1 / 1000 000, which has been implemented on three different samples. Figure 2. represents the FAR vs % FAR for three different samples.
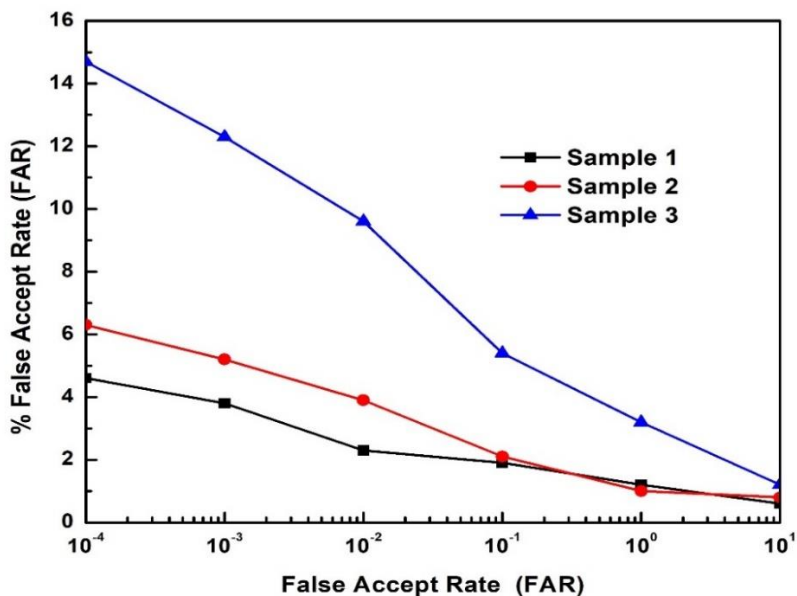
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Fig. 2: FAR vs % FAR for three different voice samples collected for the voice biometric system.

The time of authentication plays an important role in the voice biometric system. Many conventional systems describe the accuracy % with time. Figure 3 represents the comparison graph of the conventional method and the recently developed voice biometric system. This defines the accuracy % which can be obtained with the Net speech time. The time can be even shorter for more secure and specific banking purposes.
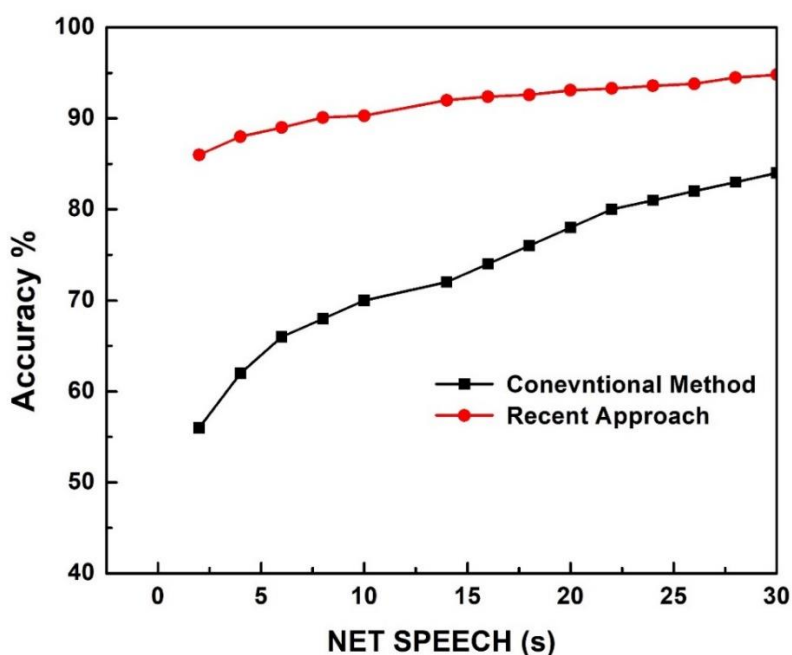

Fig. 3: Comparison of conventional approach and recent approach of voice biometric method defines time period of net speech vs accuracy.

6. CONCLUSION & FUTURE PERSPECTIVE :

This research work describes the conceptual understanding of the voice biometric system in the banking sector. The architecture design of the system will help the banking sector create a strong database for voice biometric identification. The present research work also explained the limitations of the voice biometric system which we tried to overcome through the detailed analysis method. The results related to the false acceptance rate of the voice authentication and accuracy rate define the

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validity of the proposed mechanism. The defined solution in this research work explains the viability and feasibility of taking certain samples of the voice. This will be an attractive idea for voice assistance in the digital banking system. This mechanism has having great future and will be widely used in open banking platforms [21]. The adoption of the voice biometric system in the modern era banking system will hold the attention of Z-generation customers, who are the future [22]. Also, the large amount of money spent by banks to avoid cyber-attacks can be ignored. Therefore, by implementing this technique, the banking sector can achieve secure and smooth security services at less cost.

7. ACKNOWLEDGEMENT :

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