An Approach to Ensure Security using Voice Authentication System

Rohit Tanwar, Kulvinder Singh, Sona Malhotra

Abstract: *With the increasing use of digital platforms for government as well as private services deployment and in the race of financial firms to make banking simple and easier, there comes in picture the need of a similar strong and leak proof authentication technology with negligible chances of failure. The market is already in a transition from traditional password authentication process to password less authentication technique. Because of its unique feature to identify every individual with different traits, voice recognition is gaining speed as authentication technique; however, it comes with some inherent limitations. In this paper, voice recognition is hybridized with behavioral authentication technique and a framework is proposed in expectation of overcoming some of the issues of voice recognition.*

IndexTerms: *Speech Recognition, Passwordless authentication, voice samples, verification and identification, secure banking, behavioral authentication, impersonation attack.*

I. INTRODUCTION

It is the identification and authentication arm of the vocal modalities[3]. In this innovation, an expression talked by a man is caught by a system and is then compared with a voiceprint that is already stored in the system. This happens at the same time while a man is talking. Recognizing a man by voice is not an easy job. This is on the grounds that the voice is impacted by so many components, which can be physical or behavioral. The voiceprint is algorithmically inferred and this calculation creates a voiceprint making utilization of various estimations. The physical and behavioral attributes results in a unique representation of voice through digital means[5].

However Voice UI is not a newly innovated technology, but rather the enhanced accuracy of this innovation has raised its profile significantly, especially when combined with the news that telephonic fraud is on the expansion. In the wake of this, banks have willingly volunteered go about as vanguards for voice biometric verification[1].

Voice Recognition is studied under following two sub-categories:

Revised Manuscript Received on 30 January 2019.
* Correspondence Author
   Rohit Tanwar*, Research Scholar (Computer Engineering.),UIET, Kurukshetra University,Kurukshetra, India .
   Kulvinder Singh, Asst. Prof.(Computer Engineering),UIET, Kurukshetra University,Kurukshetra, India.
   Sona Malhotra, Asst. Prof.(Computer Engineering),UIET, Kurukshetra University,Kurukshetra, India.

A. Speaker Recognition

It is the process that locates or identifies a person on listening a phrase from that person in its voice. It is done on the basis of some characteristics of the voice (voice biometrics)[6].

B. Speech Recognition

However, speaker recognition identifies a person but do not deal with the understanding of words or phrases being uttered by that person. Speech recognition enables a devise to recognize the words uttered by human and then proceed with them accordingly
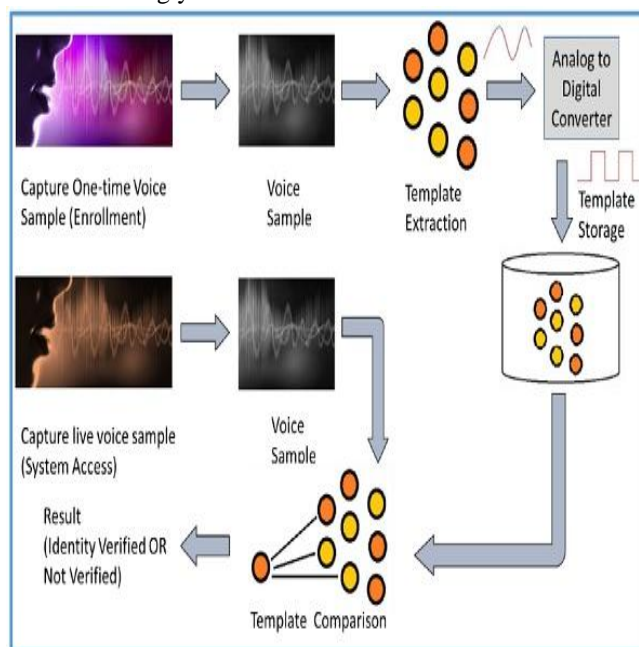

Fig1.Voice Recognition System[11]

II. TYPES OF VOICE RECOGNITION AUTHENTICATION

Voice recognition authentication is broadly of two types: Verification and Validation which are discussed below:

A. Verification

It is the process that authenticates a person who he or she claims to be. While beginning the communication, the person raises the claim using specific identity. Now it is the task of second party to do the verification task on the basis of that specific ID used for raising claim. [7].

In simple words, if a speaker claims that he or she is having a specific identity and uses its voice in support of its claim, then it is called verification. Verification is further of two types:

Retrieval Number: E2035017519/19©BEIESP
Journal Website: www.ijrte.org

161

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

- *Text Dependent Verification*
- *Text In-Dependent Verification*

Verification

Fig.2.Voice Verification and Identification Process[7]

B. Identification

It is the case when voice of some known speaker is encountered and the task is to identify the speaker without any claim raised by the speaker. . Generally it is very difficult as the sample voice is to be matched with so many voice prints stored in the voice database. Some environment condition like improper equipment might help in the task comparatively difficult. [7].

Identification is the process of determining identity of an unknown person by listening to its voice.

III. STATISTICS OF VOICE RECOGNITION AUTHENTICATION MARKET ANALYSIS

Voice recognition is on the ascent as it has gradually been enhancing its precision rates and addressing clients' requirements for applications. The market analyses experts expects that due to these utilization cases a huge development in growth rates for this technology in cell phones in coming years will be noticed.

Tractica estimates that local voice recognition will develop from 45% of every single cell phone in 2014 to 82% by 2020. In the interim, voice authentication, which distinguishes voiceprints of every person and might be used for different biometric ID and confirmation uses, will develop to agrowth rate of 36% by the year 2020, despite the fact that for all intents and purposes no cell phones have such capacity today[9].
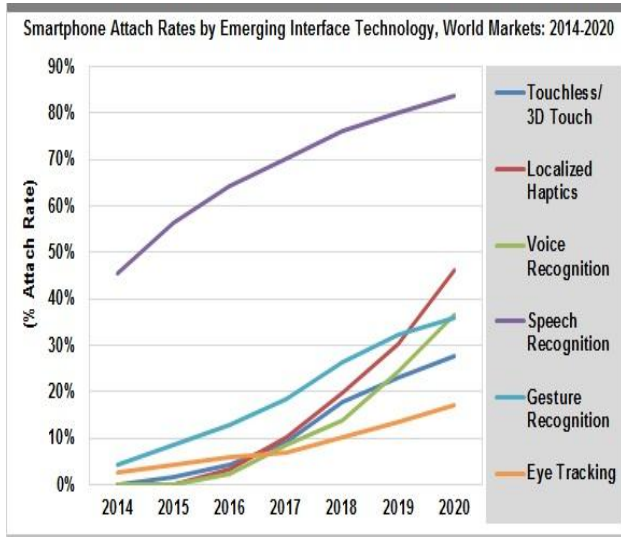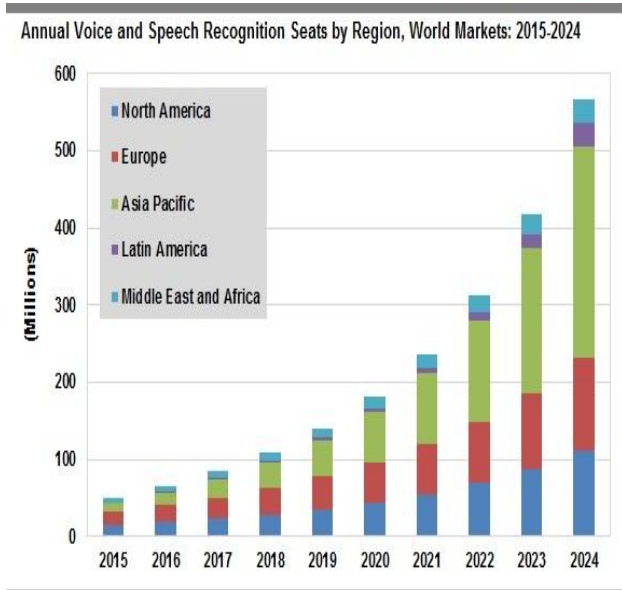

Fig.3.Growth of Voice Recognition Market[9]
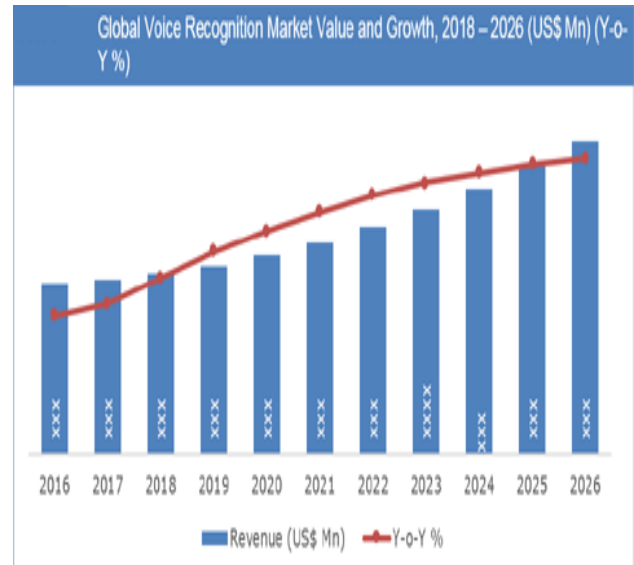

Fig.4.Growth of Voice Recognition Market[9]

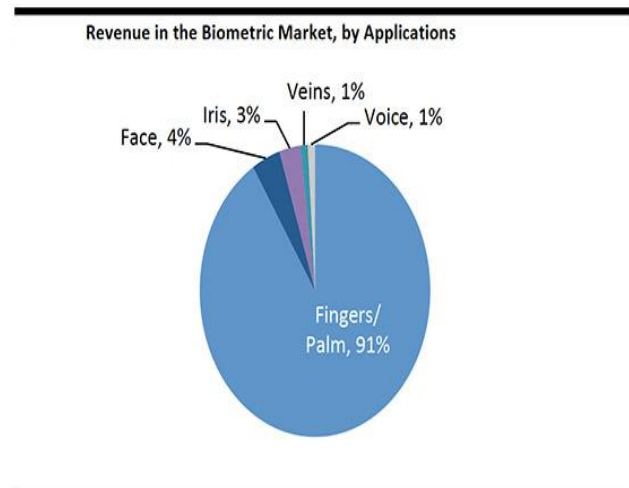**Fig.5.Growth of Voice Recognition Market[8]**

Fig.6.Growth of Voice Recognition Market[8]

IV. ISSUES IN VOICE RECOGNITION AUTHENTICATION

However, it is the most popular and widely used method of passwordless authentication but it sufferes from some inherent limitations of human voice given below[12].

1.) Low Signal to Noise Ratio, which can be caused because of background noises, low quality microphone, interference by electrical devices.

2.) Difficult to recognize and individual when in a meeting, conference, etc.

3.) A large amount of computational resources are required so as to remember so many intermediate stages incurred.

4.) Unable to identify words that have similar spelling and pronunciation but differs in their meaning.

5.) It is difficult to identify whether the voice sample submitted for authentication is presented by some machine (recorded voice) or by the individual itself.

Retrieval Number: E2035017519/19©BEIESP
Journal Website: www.ijrte.org

163

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

V. PROPOSED WORK

Getting motivated from the above discussed issues being faced in voice authentication system, a new method is proposed below. The proposed method is a hybrid of Behavioral Identification along with Voice Recognition. While registering an individual for first time, along with taking its voice samples for extracting voice prints, the behavioral parameters also get extracted and stored in a database. Whenever an individual claims its identity for authentication, then it will be first verified for its saved voice print first and then as an additional layer of security, it will be verified for its saved behavioral parameters. It will be authenticated only after successful passing both the stages.

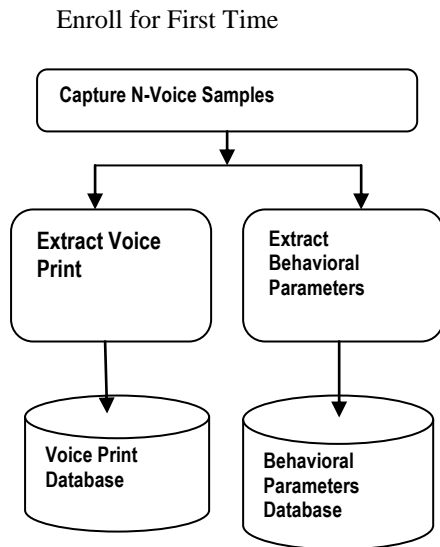It can be illustrated by following flow diagrams:

Enroll for First Time

Fig.7. Enrollment Process

The proposed method is comprised of two modules:

A. Enrollment Process

The voice samples of first time user are taken in order to extract and save its voice print as well behavioral parameters in the databases.

B. Speech Verification Process

The Voice samples are presented for extraction of voice prints and matched with the saved details in database. If the match is successful, then the match of behavioral parameters is done. If the individual qualifies both the tests, only then the access is granted otherwise rejected.

Since the proposed method is verifying the individual with an additional layer, higher security is supposed to be achieved. The proposed method may be modified to counter attacks against impersonation where in the speaker's voice get recorded and presented later on impersonating the speaker. A human is not supposed to match behavioral parameters 100% each time. There comes an obvious and slight deviation. If there is a case of impersonation of the speaker by some machine then there will be 100% match of the behavioral parameters. On the basis of this fact, mathematical model can be prepared and simulated as well to justify the intended result.
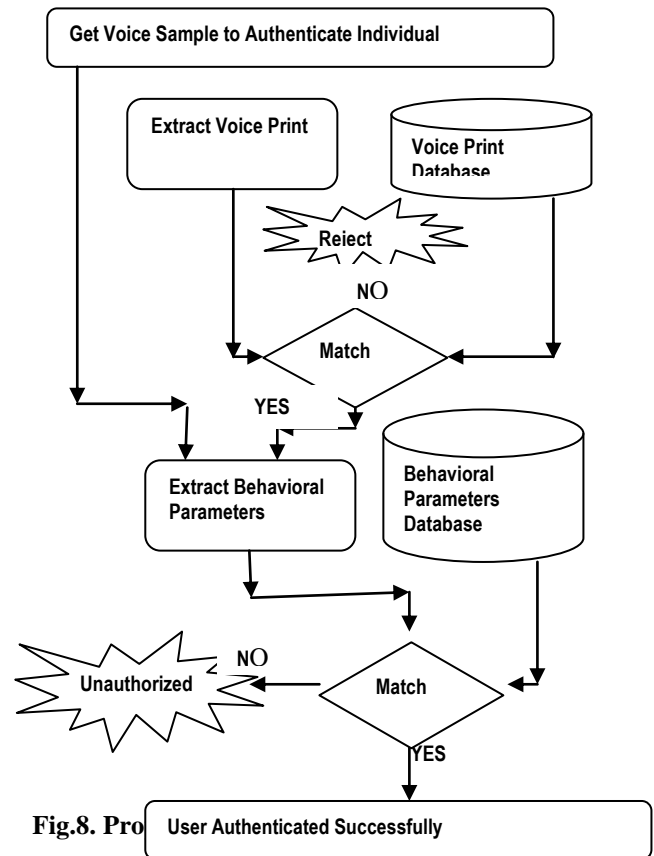
User Verification

Fig.8. Pro

VI. APPLICATIONS OF VOICE RECOGNITION\

Most of the domains where voice recognition is used are related to call answering, contact management services, security aceess control and attendance monitoring.

Few live applications are listed here[10]:

• Computer room's access are provided using voice authentication in General Motors.

• In Chicago Hospital, the staff is authenticated using voice before entering to the unit of new-born baby.

• Service of Immigration and Naturalization at Mexican border has been using voice authentication for the people that used to cross the border frequently.

• Telephone security-based applications are protected with this technology these days.

• Voice identification technique to deal with situations related to customer service are being used in few well known companies.

• Securing and ease to do telephone transactions and commerce as well as telephony (hands-free dialing)

• It is used by doctors to maintain patient related data when doing patient observations.

• It is a boon for disabled persons

• Few courses at Purdue University are taught using Voice identification technology.

VII. CONCLUSION

Different finance firms as well as industry are relying on voice recognition authentication for their security. With the improvement in research for NLP, speech recognition can be used used for disable person who are otherwise not able to authenticate themselves using traditional techniques. In India it can play a major role in moving the technology to the door step of a common man who is not much literate and not familiar with digital media techniques. As the current system needs to be changed for software only not specific hardware in order to deploy this technology, hence it is cost efficient and feasible to deploy too. In the current work, its hybridization with behavioral authentication technique is proposed as it would result in an additional layer of secure authentication and is expected to be withstand impersonation attack.

REFERENCES

1. Nick Gaubitch, retrieved from url: "www.infosecurity-magazine.com/opinions/voice-verification-authentication/".
2. Biometric and Traditional Mobile Authentication Techniques: Overviews and Open Issues - Scientific Figure on ResearchGate, retrieved from url: "www.researchgate.net/Voice-recognition-authentication-system_fig9_268388162".
3. Voice and Speech Recognition, available at url: "www.findbiometrics.com/ solutions/ voice-speech-recognition/".
4. Danny Thakkar," Evolution of Voice Recognition: A Tech Boon", retrieved from url: "www.bayometric.com/ evolution-voice-recognition-tech-boon/".
5. How Does Voice Biometrics Work?, retrieved from url: "www.uniphore.com/blog/2018/03/how-does-voice-biometrics-work".
6. Poddar, et.al. "Speaker Verification with Short Utterances: A Review of Challenges, Trends and Opportunities", IET Biometrics, Vol.7, issue-2,pp: 91–101, March 2018.
7. Judith A. Markowitz," Voice Biometrics", COMMN OF THE ACM, vol.-43,issue-9 Sep. 2000.
8. More than Meets the Eye,An Overview of Facial Recognition and its Applications in Retail, retrieved from url:"www.fungglobalretailtech.com/ research/meets-eye-overview-facial-recognition-applications-retail/"
9. Speech Recognition to Achieve 82 Percent Penetration in Mobile Devices by 2020, available at url: www.tractica.com/ newsroom/press-releases/speech-recognition - to-achieve-82-percent-penetration-in-mobile-devices-by-2020/
10. Voice Identification, Retrieved from url:"www.di-srv.unisa.it/~ads/corso-security/www./CORSO-9900/ biometria/Voice.htm."
11. Voice recognition, available at url: "www.tutorialspoint.com/biometrics/voice_recognition.htm".
12. ED Grabianowski" How Speech Recognition Works", retrieved from https://electronics.howstuffworks.com/ gadgets/high-tech-gadgets/speech-recognition3.htm, 8 October 2018.

AUTHORS PROFILE

Rohit Tanwar was born in Palwal, Haryana state, INDIA on 15th April 1987. Mr.Tanwar is pursuing his Ph.D in Computer Engineering from UIET, Kurukshetra Yniversity, INDIA. Mr.Tanwar has passed full time M.Tech from YMCA University of Science & Technology, Faridabad, INDIA in 2011. Mr.Tanwar passed his full time B.Tech in Computer Engineering from UIET Kurukshetra University,Kurukshetra, INDIA in 2008.

He is currently working as Asst,Prof. Senior Scale in UPES, Dehradun, INDIA. He is having more than 7years of experience in teaching. He is currently doing research in the field of Network Security.

Retrieval Number: E2035017519/19©BEIESP
Journal Website: www.ijrte.org

165

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication