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Speech-Driven Academic Records Delivery System

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ABSTRACT

An Interactive Voice Response System (IVRS) is a computerized system employing pre-recorded or dynamically synthesized voice for interaction with users via speech recognition or DTMF (Dual-Tone Multi-Frequency) input offered through a phone keypad. In this project, we have a robust automation system for the issuing of academic records and certificates through IVRS technology. The users can place orders and pay for academic documents through simple voice commands or keypad inputs. The system conveys live academic information and intelligently forwards the caller to the appropriate department or service depending on their input. DTMF tones uttered over telephone keypads and speech recognition systems are utilized to accurately interpret user decisions and instructions. Furthermore, text-to-speech (TTS) technology is employed to render complex and dynamic text-based academic information into voice. This IVRS system reduces human effort to a significant extent while enhancing the user experience by making sure the callers reach exactly what they need. Once configured, the system operates without human intervention and can deliver 24/7 service to the users. Overall, this voice system is an affordable, effective, and scalable means for schools to provide a personalized and automated service experience.

1. INTRODUCTION

Voice-based delivery for educational credentials is a revolutionary technological solution that represents a contemporary and modern way of accessing educational transcripts and other records of academic achievement. This innovative technology utilizes speech recognition software and natural language processing to allow users to track and access their records, revolutionizing the traditional approach to handling educational credentials. Now students and graduates can access their records through voice commands anywhere, anytime without the hassle of complicated logins or numerous webs, making it convenient and time-efficient. Furthermore, it could potentially also increase accessibility for people who may have found it difficult to access student records online or in physical format, making education more accessible for everyone.

Additionally, delivering university academic records via a voice-based medium can provide higher education institutions with a streamlined administrative delivery process. When distributed automatically, academic records can alleviate workload for colleges and universities, improve efficiency and customer satisfaction in record retrieval, and enhance the academics of all stakeholders.

Furthermore, the role of voice as a communication medium between humans and computers has resurged as a significant topic of research and examination in recent years - and this technology is simply taking the next step. IVR banking systems are based on cost savings, customer satisfaction, and new and better service delivery. This shows how useful IVR can be to manage academic credentials more effectively and efficiently. The widespread adoption and utilization of IVR phone systems in recent years has made interfacing with a virtual assistant by phone commonplace. Using the medium of voice, we are currently investigating new ways to deliver students' academic credential records such as transcripts and certificates to their front doors.

In the common course of things, final year or semester marks cards, degree or diploma certificate, and other academic records are printed and shipped to colleges a few months after students leave the institution. Then students must visit the institute again to collect their records, which causes a lot of unnecessary inconvenience and friction. We want to remove this hassle and avoid all unnecessary friction.

Through IVRS technology, we want to partner with educational institutions, boards, and universities to develop a smooth and effective solution to communicate and deliver academic records to students. Through our system and platform, students can receive their academic records at a location of their choice, anywhere in India, within a maximum of five days, depending on priority mode.

This application will assist students by eliminating the need for students to visit their institutions multiple times to obtain certain important documents and enable students to concentrate on other significant matters pertaining to their education. In utilizing technology to develop more accessible and efficient ways to deliver academic records, we want to enhance the availability and convenience of recorded documents to students to create a better educational experience overall.

2. THE CONCEPT OF IVR

Interactive Voice Response (IVR) is technology that has changed how businesses and organizations manage their telephone calls. An IVR is an automated telephony system that lets callers interact with a computer system through voice or touch-tone input. This technology utilizes pre- recorded voice prompts and menus to relay information or provide a service to the caller without human intervention The IVR process begins with an introduction or welcome message that tells the caller what to do to navigate the system; after the introduction, the caller will hear a menu with options - like account information, transaction history, payments, or to speak to an agent. Based on the options selected, the IVR may provide additional menus or instructions to navigate the service.

Fig.1 IVR

IVR systems can be designed to allow for various input styles, such as touch tone keypad entries, speech recognition, or both! As speech recognition permits the caller to verbally convey their commands to the IVR system, this can be easier and more convenient for the caller as they can communicate with the IVR in a less rigid manner. Touch tone keypad entries permit the caller to select a series of digits from their phone's key were entries to select the expected input. An IVR system can also include extra functions such as voice biometrics, system integration etc. Voice bios can treat the caller's voice like a way of verification thus providing an even more secure and convenient way for the caller to access their account. System integration can permit the IVR systems to access information from related external systems so that the IVR service is more tailored to the caller.

IVR systems have a few benefits to organizations and companies, such as cost savings and efficiency. Organizations can save on labor costs and not hire more employees by replacing repetitive work with automated processes, as well as controlling a greater volume of calls per hour. In addition, IVR systems will provide organizations with accessibility to services and information 24/7, leading to greater customization for consumers and possibilities to minimize wait time and customer satisfaction.

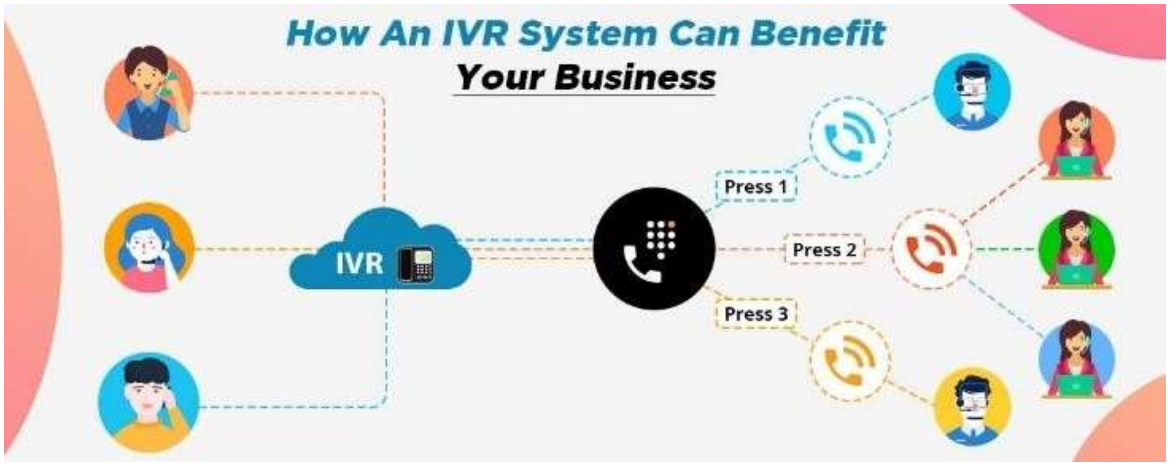

Fig.2 IVR uses

It is crucial, then, to design IVR systems with the experience of the user in mind as well as test the systems thoroughly to ensure they are easy to use with easy access to the information or services requested by the caller. A well-designed and optimized IVR platform can enable companies to deliver value to their customers while providing efficient, affordable, and personalized service experience that contributes to the overall level of customer satisfaction.

A. TWILIO

Twilio is a cloud-based communication platform that provides developers with a framework of APIs with which to implement voice, video, and messaging applications. Twilio has APIs with which developers can build IVR systems (Interactive Voice Response), allowing users to create phone-based applications that interact with callers using voice or touch-tone inputs. IVR systems can complete many tasks, such as answering frequently asked questions, providing details of the caller's account, routing calls to the appropriate department, and collecting information from callers. Twilio allows developers to implement advanced IVR systems by providing features such as call queuing, text-to-speech, speech-to-text, and call recording. The scalable and reliable nature of Twilio's platform allows them to process a lot of phone calls and scale services appropriately for changes in demand. There are redundant servers and failover services provided by Twilio so that users are always able to access its services; there is always a potential risk if just one server is being used for any important phone application. If you are going to implement an IVR system using Twilio, you are expected to follow professional practices. Twilio provides documentation and many other developer development resources including code libraries, SDKs, support and training resources, etc. Using Twilio for IVR allows businesses and organizations to create tailored and effective systems that meet their specific needs. The platform is flexible and powerful, offering a broad range of features and resources to simplify the development and management of IVR systems

B. Dual Tone Multi Frequency

DTMF or Dual Tone Multi-Frequency is a signaling system utilizing two different tones mixed to transmit signals or numbers over a phone line. It was utilized as an alternative to the rotary dial system and is still in widespread use in touch-tone phones and telephone systems today. DTMF works by pressing a key on the phone keypad, transmitting a single signal made up of two tones at the same time. Each key is associated with a pair of two tones representing a particular digit or operation. For example, the "1" key is associated with tones 697 Hz and 1209 Hz.

DTMF has numerous applications besides touch-tone phones, including security systems, automatic teller machines (ATMs), and IVR systems. IVR systems utilize DTMF to allow users to choose menu selections or input numeric data like their account number or PIN number. DTMF signals are used to control telephone switches so users can forward a call, place a call on hold or perform other call management functions.

DTMF is a proven and effective signal transmission technology over a telephone line and is today an integral part of telecommunications. It is, however, occasionally susceptible to noise or interference over the telephone line, which causes signal transmission errors. To avoid this, new systems prefer to employ error correction methods to transmit data error-free.

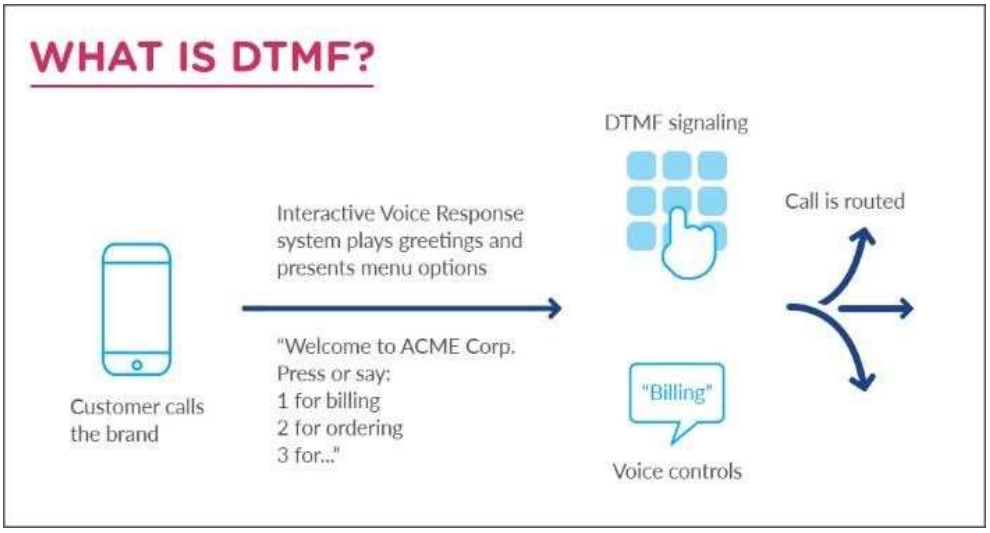

Fig.3 DTMF

C. TEXT-TO-SPEECH AND SPEECH TO TEXT

Speech-to-text (STT) and text-to-speech (TTS) are two advanced technologies through which users can interact with their devices in more convenient and user-friendly ways. TTS technology, for example, can be utilized to create audio versions of written content such as books, articles, and emails to allow users to access information on-the-go. TTS technology can also be integrated into a variety of devices such as smartphones, navigation devices, and smart home assistants to provide audio feedback and alerts.

Speech-to-text technology, on the other hand, has a variety of applications in customer service, language translation, and transcription. STT technology can be utilized to transcribe audio recordings into text documents, which can be useful to journalists, researchers, and legal professionals. STT technology can also be utilized in call centers to automatically transcribe customer calls to allow agents to understand and respond to customer queries better.

Overall, STT and TTS technologies have revolutionized how we interact with technology, and it is more convenient and accessible to everyone. With the development of these technologies still in progress, we can expect even more exciting and creative applications in the future.

D. Natural Language Processing

NLP stands for Natural Language Processing, a branch of artificial intelligence that deals with developing computer systems that can comprehend, process, and generate human language. NLP utilizes algorithms and models to process and analyze various forms of language, ranging from text to speech. NLP makes it feasible for machines to speak and interact with humans in the same way as humans do.

NLP technology utilizes artificial intelligence, machine learning, and computational linguistics to analyze and process human language. This includes language translation, text summarization, sentiment analysis, and speech recognition. Through learning from massive amounts of human language, NLP systems can recognize patterns as well as predict the meaning as well as the context of a word or a phrase.

NLP has numerous applications across numerous industries such as e-commerce, healthcare, and finance. For example, NLP can be employed to analyze customer reviews and feedback to enhance products and services or help medical professionals make correct diagnoses. NLP is also employed in chatbots and virtual assistants to improve user experience and deliver more natural and intuitive interactions.

Despite its advancement, NLP also has several challenges, including understanding and interpreting the subtlety of language, handling ambiguity and context, and creating models that are invariant to language variation and dialects. Nevertheless, ongoing research and development in NLP have the potential to revolutionize the way we communicate and interact with machines, resulting in more efficient and effective communication across industries.

II. VOICE-BASED DELIVERY OF ACADEMIC RECORDS

Voice-based academic record transmission is a new technology that employs voice recognition and artificial intelligence to provide students' academic records using voice commands. The process involves students registering and verifying themselves to ensure the security and confidentiality of the records. Once registered, students retrieve their academic records using their voices, which are then transmitted in a suitable format. The benefits of technology are convenience, speed, and

accessibility, making it easier for students to submit their records to prospective employers, schools, or government agencies. Technology, however, has possible dangers in terms of data privacy and security, accuracy, and abuse. This needs to be addressed and closely monitored to ensure the technology is secure and reliable for all the parties involved.

A. Need of voice-based delivery of academic records

Voice-based delivery of academic records has the potential to revolutionize the way students and institutions access and manage academic records. It can provide a more convenient, accessible, efficient, and secure way for students to access their records, while also streamlining the process for educational institutions and potential employers. By eliminating the need for written requests and complex online portals, voice-based delivery can save time and effort for all parties involved. Additionally, with the use of biometric authentication, it can ensure the security and privacy of academic records, which is critical for preventing fraud or misuse. Overall, voice-based delivery of academic records can improve the efficiency and competitiveness of educational institutions and job candidates, while also enhancing accessibility and security for students.

B. Possibilities of voice-based delivery of academic records

Voice-based delivery of academic records also has the possibility of reducing the use of paper and ink, thereby promoting a more sustainable approach to managing academic records. Additionally, the technology can provide educational institutions with valuable insights into how students interact with their academic records, such as which records are accessed most frequently or which types of records are most in demand. This can help institutions to improve their services and better meet the needs of their students. Furthermore, voice-based delivery of academic records can also provide students with the opportunity to interact with their academic records in a more engaging and interactive way, such as through voice-activated virtual assistants that can answer questions or provide additional information about the records.

C. Data collection in an IVR

Interactive Voice Response (IVR) systems have become increasingly popular as a way to collect data from callers. Data is gathered when a caller interacts with the system through voice prompts or enters information using their phone keypad. There are several methods used to collect data in an IVR, including voice recognition technology, touch-tone inputs, speech-to-text, and caller ID. For instance, voice recognition technology identifies the caller by processing their name or personal information. The most common way to collect data is through touch-tone inputs, where callers enter information like their account number or zip code. Caller ID technology can also identify the caller based on their phone number. Once collected, the data is stored in a backend system and can be used to fulfil the caller's request or analyze caller behaviour to improve the IVR system and enhance the caller experience.

3. RESULTS

Fig 4 phone call

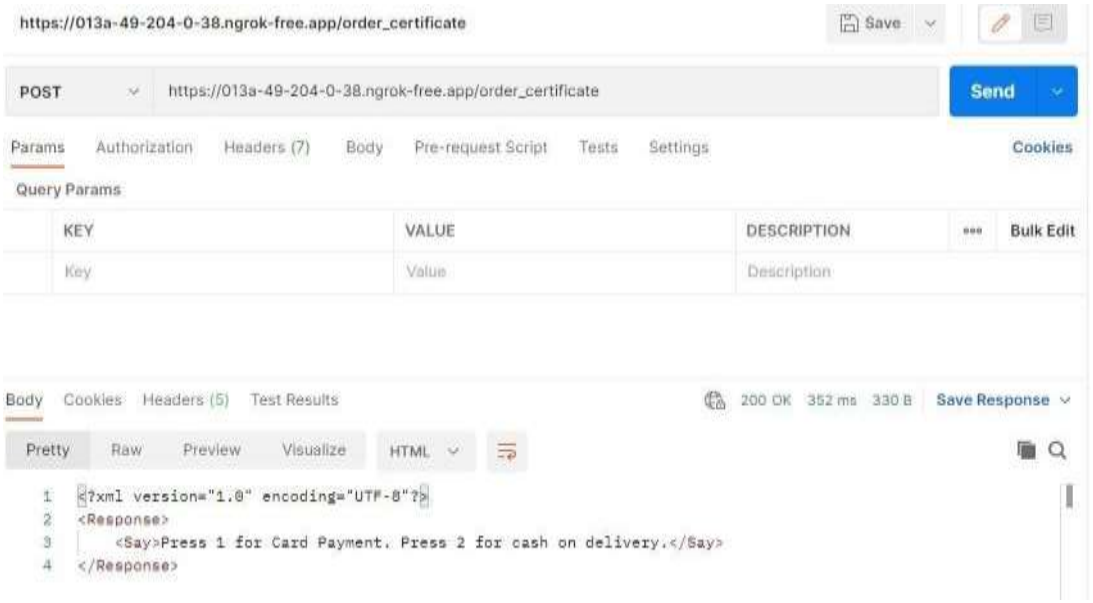

Fig 5 payment option

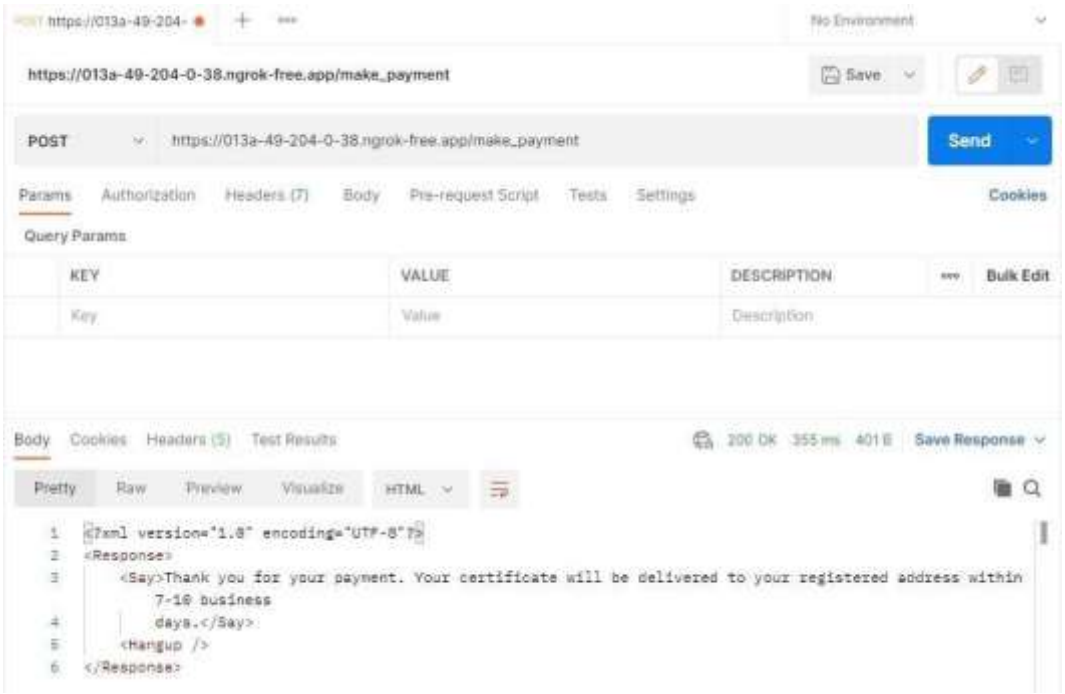

Fig 6 order confirmation

4. ADVANTAGES

Voice-based delivery of academic records offers several advantages over traditional methods of managing academic records. One of the main advantages is convenience, as students can easily access their records using their voice, without needing to navigate complex online portals or wait for written requests to be processed. Voice-based delivery can also be highly accessible, especially for students with disabilities or language barriers, as it provides a more straightforward way to access their records. Additionally, voice-based delivery is efficient, as it reduces the time and resources needed to process requests for academic records. It also offers enhanced security features, such as biometric authentication, which can help prevent fraud and misuse of academic records. Accuracy is another advantage of voice- based delivery, as it minimizes the errors that can arise from manual data entry or processing. Finally, voice-based delivery can be cost-effective, as it reduces the need for staff to manually process requests, which can ultimately save educational institutions time and money. Overall, these advantages demonstrate the potential for voice-based delivery of academic records to transform the way academic records are managed, providing benefits to both students and educational institutions.

Disadvantages

While using voice-based delivery of academic records has many benefits, there are also several potential drawbacks to consider. Technical issues, such as unreliable voice recognition software and unstable internet connectivity, can lead to delays or errors in delivering academic records. Additionally, security concerns remain a significant risk as hackers could potentially gain access to sensitive student data, even with biometric authentication. Privacy concerns also arise due to the potential for conversations between students and the software to be recorded and stored. The exclusion of students who do not have access to the necessary technology is also a concern, as is the reliance on third-party providers, which could lead to additional costs or limitations in functionality. It is crucial to address these potential drawbacks to ensure that the use of voice-based delivery of academic records is both reliable and inclusive for all students.

Conclusion

Interactive Voice Response (IVR) is an innovative technology that has the potential to revolutionize the delivery of academic records to students. This system offers numerous advantages to both students and academic institutions. One of the key benefits is the convenience and accessibility it provides to students who can retrieve their academic records using a simple phone call, without requiring an internet connection or specialized hardware. Academic institutions can benefit from this technology by automating the delivery of academic certificates and details, thereby saving time and resources. Additionally, the IVR system provides an added layer of security to academic records by requiring students to provide identification information, which can prevent unauthorized access and protect the confidentiality of student information. Educational institutions should consider adopting this technology to improve the efficiency and accessibility of their record management systems and provide a secure and convenient service to their students

5. ACKNOWLEDGMENT

We extend our heartfelt thanks to all the individuals and teams who have contributed to the successful completion of the voice-based delivery of academic records project. We want to express our gratitude to the students and faculty members who enthusiastically participated in the project's testing phase, providing valuable feedback that helped us refine the system and make it more user-friendly. We are also immensely grateful to the technical team who developed and implemented the voice recognition software and the user interface, ensuring the system's functionality and reliability. Furthermore, we appreciate the unwavering support and guidance provided by CH.Srujana and project cordinator Dr.D.Shanti throughout the project's implementation. Finally, we want to acknowledge the various stakeholders who supported and motivated us throughout the project, making it possible for us to achieve our objectives

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