



# International Journal of Engineering Research and Science & Technology

[www.ijerst.org](http://www.ijerst.org)

ISSN : 2319-5991

Vol. 22 No. 3 (2026)



[ijerst.editor@gmail.com](mailto:ijerst.editor@gmail.com)  
[editor@ijerst.com](mailto:editor@ijerst.com)

*Research Paper*

# An Inclusive Voice-Interactive Examination and Automated Evaluation System for Vision-Impaired Learners

Rohit Sharma<sup>1</sup>, Dr.G.Purna Chandar Rao<sup>2</sup>

<sup>1</sup>MCA Student , Dept of MCA , Ellenki College of Engineering and Technology , Hyderabad

<sup>2</sup>Assistant Professor , Dept of MCA , Ellenki College of Engineering and Technology , Hyderabad

**Abstract**— Ensuring equal access to educational assessments remains a significant challenge for visually impaired students, as conventional examination methods often require human assistance, limiting independence and privacy. This paper presents an accessible voice-based examination and evaluation system that enables visually challenged candidates to complete multiple-choice examinations without the support of a scribe. The proposed system combines text-to-speech technology, keyboard-based response input, and automated evaluation to provide an independent and user-friendly examination environment. Administrators can securely manage student registration, create examination questions, monitor candidate information, and generate performance reports through an integrated web interface. During the examination, each question and its corresponding options are read aloud, allowing candidates to respond using predefined keyboard keys. The submitted answers are evaluated automatically, and the results are stored for further review and analysis. The developed application minimizes manual intervention while improving examination accessibility, efficiency, and transparency. Experimental evaluation indicates that the system provides reliable voice-guided navigation, accurate automated assessment, and responsive performance using standard computer hardware equipped with a microphone and keyboard. The proposed solution offers a practical, scalable, and cost-effective approach for conducting inclusive digital examinations in educational institutions and competitive assessment environments, promoting greater independence and equal opportunities for visually impaired learners.

**Keywords**— Voice-Based Examination System, Accessible E-Learning, Visually Challenged Candidates, Text-to-Speech (TTS), Automated Evaluation, Multiple Choice Examination (MCQ), Speech-Assisted Assessment, Digital Examination

System, Assistive Technology, Inclusive Education, Human-Computer Interaction, Accessibility, Web-Based Assessment, Educational Technology, Intelligent Examination System.

## 1.INTRODUCTION

The rapid advancement of information technology and assistive computing has created new opportunities for developing accessible educational systems that support individuals with visual impairments. Digital learning platforms, speech processing technologies, and intelligent human-computer interaction have significantly improved the way visually challenged students access educational resources and participate in academic activities [8]. Among these advancements, voice-assisted examination systems have emerged as an effective solution for enabling visually impaired candidates to complete assessments independently while ensuring equal learning opportunities and improved accessibility [3].

Traditional examination methods often require visually challenged candidates to depend on human scribes or assistants for reading questions and recording answers. Although this approach enables participation, it introduces several limitations, including reduced privacy, dependence on another person, possible communication errors, and inconsistent examination experiences [4]. Furthermore, arranging qualified scribes for competitive examinations and academic assessments can be difficult, leading to delays and additional administrative challenges. These limitations have encouraged researchers to develop technology-driven examination platforms that provide greater independence and fairness for visually impaired students through automated speech-based interaction [4].

Recent developments in text-to-speech technology, web-based applications, and intelligent evaluation systems have enabled the creation of accessible

examination environments using standard computer hardware. Modern voice-guided examination systems can read questions and answer choices aloud, allowing candidates to respond using simple keyboard inputs without requiring specialized assistive devices [3]. The integration of automated evaluation and digital result management further enhances examination efficiency by reducing manual effort, minimizing human errors, and providing immediate performance analysis [3].

The proposed work presents an Accessible Voice-Based Examination System for Visually Challenged Candidates that combines candidate registration, examination management, voice-guided question delivery, automated answer evaluation, and result generation within a single web-based application. The system enables administrators to manage students, create multiple-choice question banks, monitor examination activities, and generate reports, while visually impaired candidates can independently complete examinations through audio-guided navigation and keyboard-based responses [4]. The developed application provides a simple and intuitive interface that supports secure authentication, accessible examination delivery, and automated performance evaluation, making it suitable for educational institutions and competitive examination environments [3].

The proposed system improves the accessibility and efficiency of digital examinations by eliminating dependence on scribes and providing a reliable platform for independent assessment. By integrating speech assistance, automated evaluation, and centralized examination management, the system offers an inclusive, scalable, and cost-effective solution for conducting examinations for visually challenged candidates [8]. Its ability to provide equal access, accurate evaluation, and user-friendly interaction makes it suitable for schools, colleges, universities, training organizations, and government examination authorities seeking accessible and technology-enabled assessment solutions [10].

## II. RELATED WORK

S. Khan, S. Verma, and S. Agarwal developed a voice-based online examination system to provide an accessible examination environment for physically challenged candidates, particularly those with visual impairments [3]. Their work focused on reducing dependence on human scribes by integrating speech technology into the examination process. The proposed system reads examination questions aloud and allows candidates to submit answers through simple user interactions, making the examination process more independent and efficient. The authors emphasized that voice-guided examinations can improve accessibility while maintaining fairness and transparency during assessments. The study also discussed the

advantages of digital evaluation, including automatic result generation and reduced administrative workload. Experimental observations showed that integrating speech assistance into online examinations enhances user experience and encourages independent participation. The research demonstrated that voice-enabled educational applications can significantly contribute to inclusive learning environments and serve as an effective solution for conducting examinations for visually challenged students in educational institutions and competitive examinations [3].

J. Kanimozhi, A. Karkuzhali, and K. Suresh Kumar proposed an online examination system specifically designed to meet the educational needs of visually challenged candidates by incorporating assistive technologies into the assessment process [4]. Their system provided audio support for reading examination questions and enabled users to answer independently through a simple interface. The research highlighted the importance of accessibility in digital education and emphasized that visually impaired students should be able to participate in examinations without relying on external assistance. The authors discussed how automated examination systems improve efficiency by reducing manual effort while ensuring accurate evaluation and timely result generation. The proposed framework also simplified examination management for administrators by maintaining question banks and candidate records digitally. The study concluded that voice-assisted online examination platforms promote equal educational opportunities and improve the overall examination experience by providing an accessible, secure, and user-friendly assessment environment for visually impaired learners [4].

S. B. Kallara, M. Raj, R. Raju, and N. J. Mathew introduced Indriya, a smart guidance system developed to improve the mobility and independence of visually impaired individuals using intelligent assistive technologies [5]. The system combined sensing techniques with user-friendly interaction methods to help users navigate safely in different environments. The authors focused on providing real-time guidance while minimizing user effort and increasing confidence during movement. The study demonstrated that assistive technologies can significantly enhance the quality of life for visually impaired people by supporting independent navigation and reducing dependence on others. The proposed solution also highlighted the importance of integrating modern computing technologies into accessibility applications. Experimental results indicated that intelligent guidance systems improve obstacle awareness and navigation accuracy while maintaining ease of use. The research concluded that future assistive systems should continue integrating

advanced technologies to provide more reliable, efficient, and practical support for visually challenged individuals in their daily activities [5].

D. P. Khairnar, R. B. Karad, A. Kapse, and G. Kale presented PARTHA, an assistive system designed to improve mobility and environmental awareness for visually impaired users through intelligent sensing and obstacle detection techniques [6]. The proposed framework was developed to identify nearby obstacles and provide appropriate guidance, enabling users to travel more safely and independently. The authors discussed the importance of combining modern hardware with intelligent software algorithms to create reliable assistive solutions for visually challenged individuals. The research emphasized that assistive technologies should provide accurate and timely information while remaining affordable and easy to use. Experimental evaluation demonstrated that the system successfully detected obstacles and assisted users in avoiding potential hazards during navigation. The study concluded that intelligent assistance systems can greatly improve independence, confidence, and safety for visually impaired people while encouraging further research into accessible technologies that support everyday activities and improve overall quality of life [6].

M. Mashiata, T. Ali, P. Das, and Z. Tasneem presented a detailed review of recent developments in assistive technologies designed for visually impaired individuals and examined their current applications, challenges, and future opportunities [8]. The review covered a wide range of accessibility solutions, including navigation systems, object detection, speech-based interfaces, wearable devices, and artificial intelligence techniques that help visually impaired users perform everyday tasks independently. The authors analyzed the strengths and limitations of existing technologies and identified several challenges related to affordability, usability, real-time performance, and system reliability. The study highlighted that advances in artificial intelligence, machine learning, and computer vision have significantly improved the effectiveness of assistive systems. The authors concluded that future research should focus on developing low-cost, intelligent, and user-friendly solutions capable of providing reliable assistance in different environments, thereby promoting greater independence and improving the quality of life of visually impaired individuals [8].

### III.DATASET DETAILS

The proposed Voice-Based Examination System for Visually Challenged Candidates utilizes a structured relational database to store candidate information,

examination questions, answer options, and evaluation results. Unlike systems that depend on publicly available datasets, the proposed application generates and maintains its own examination dataset through administrator inputs. Initially, the administrator registers candidates by entering details such as name, roll number, username, email address, password, and disability category. The administrator also creates a question bank by adding multiple-choice questions along with four answer options, the correct answer, subject information, and marks allocated for each question. These records are stored in the database and can be modified, updated, or removed whenever necessary. As new candidates and examination questions are added, the database expands dynamically without affecting the overall system architecture. This organized repository ensures efficient storage, retrieval, and management of examination-related information while supporting secure authentication and smooth execution of the examination process.

During examination, the stored dataset is used to authenticate candidates and deliver examination content through a voice-guided interface. After successful login, the system retrieves questions from the database sequentially and converts each question and its corresponding answer choices into speech using text-to-speech technology. Candidates respond by selecting the appropriate option using predefined keyboard keys, and each response is recorded automatically in the database. Once the examination is completed, the submitted answers are compared with the stored correct answers to calculate the candidate's score, percentage, grade, and examination status. The generated results are securely maintained for future reference, reporting, and performance analysis. The structured organization of candidate records, question banks, answer keys, and examination results enables the proposed application to provide reliable examination management, accurate automated evaluation, and efficient performance tracking while ensuring accessibility for visually challenged candidates.

### IV.PROPOSED METHODOLOGY

The proposed Voice-Based Examination System for Visually Challenged Candidates is developed to provide an accessible and independent examination platform for visually impaired students through the integration of voice guidance and automated evaluation. The system consists of two major modules: the Administration Module and the Candidate Examination Module, both connected to a centralized database that stores candidate details, examination questions, answer keys, and evaluation records. Initially, the administrator securely logs into the application and registers candidates by

entering their personal information, including name, roll number, username, email address, password, and disability category. The administrator then creates a question bank by adding multiple-choice questions, four answer options, the correct answer, subject details, and marks assigned to each question. These records are securely maintained in the database and can be modified whenever required. During examination, registered candidates authenticate themselves using their login credentials. The system retrieves each question from the database and converts both the question and its answer choices into speech using text-to-speech technology. Candidates listen to the audio and select the appropriate answer by pressing the corresponding keyboard key. Each response is automatically stored, and the system proceeds to the next question until the examination is completed. After submission, the evaluation module compares the candidate's responses with the stored answer key and automatically calculates the score, percentage, grade, and examination status. The generated results are securely stored and made available to both administrators and candidates through their respective dashboards.

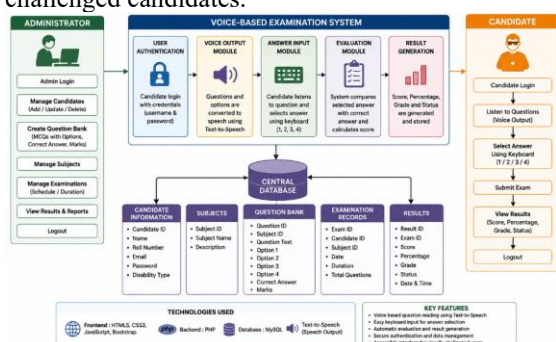
The proposed methodology eliminates the need for human scribes while ensuring fair, secure, and transparent assessment. By combining voice-assisted interaction, automated evaluation, and centralized examination management, the system improves accessibility, minimizes manual effort, and provides a reliable digital examination environment. Experimental implementation demonstrates that the application offers efficient examination management, accurate result generation, and smooth voice-guided interaction using standard computer hardware, making it suitable for educational institutions and organizations conducting examinations for visually challenged candidates.

management into a single platform. The administrator module allows authorized users to register candidates, create multiple-choice question banks, manage examinations, and monitor examination results. All candidate information, examination questions, answer keys, and result records are securely maintained in the central database. During the examination, candidates log in using valid credentials, after which the system retrieves questions from the database and converts them into speech using the Text-to-Speech (TTS) module. Candidates respond by selecting answers through keyboard inputs, and each response is automatically stored for evaluation. After the examination is completed, the evaluation module compares the submitted answers with the stored answer key and generates the candidate's score, percentage, grade, and status. The proposed architecture provides an accessible, secure, reliable, and efficient digital examination environment that enables visually challenged candidates to complete examinations independently while minimizing manual intervention and ensuring transparent result management.

## V.RESULT AND DISCUSSION

The proposed Voice-Based Examination System for Visually Challenged Candidates was successfully implemented and evaluated using a web-based platform integrated with a MySQL database and text-to-speech technology. The application successfully executed all major functionalities, including administrator authentication, candidate registration, question bank creation, secure login, voice-guided examination, automated answer evaluation, and result generation. During system testing, administrators were able to register candidates, manage examination questions, and monitor examination records through a centralized interface. Registered candidates logged into the system using their assigned credentials, listened to each question and its corresponding answer options through the integrated text-to-speech module, and submitted their responses using predefined keyboard keys. The application processed every response automatically and generated the candidate's score, percentage, grade, and examination status immediately after the completion of the examination. The results were securely stored in the database and could be accessed by both administrators and candidates whenever required.

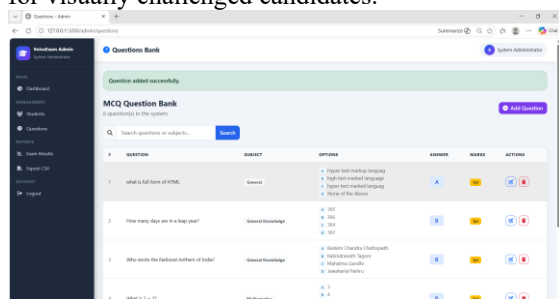
Experimental evaluation demonstrated that the proposed system provided reliable voice-guided navigation, accurate automatic evaluation, and smooth examination execution with minimal response delay. The text-to-speech module delivered clear audio output, enabling visually challenged candidates to understand examination questions



**Figure 1: System Architecture of the Proposed Voice-Based Examination System for Visually Challenged Candidates**

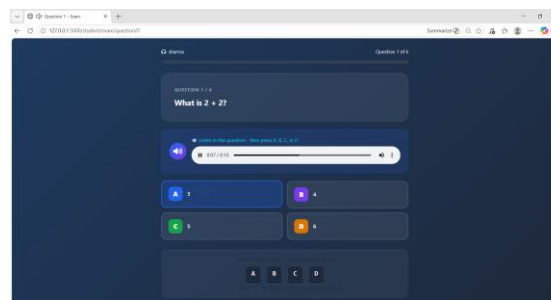
Figure 1 illustrates the architecture of the proposed Voice-Based Examination System for Visually Challenged Candidates, which integrates administrator management, candidate authentication, voice-guided examination, automated evaluation, and centralized database

without requiring assistance from a human scribe. The automated evaluation mechanism accurately compared submitted responses with the stored answer key and generated examination results without manual intervention. The graphical user interface simplified examination management for administrators while providing an accessible and user-friendly environment for candidates. The centralized database ensured efficient storage and retrieval of candidate information, question banks, examination records, and result details throughout the execution process. Overall, the developed system offers a practical, scalable, and cost-effective solution for conducting accessible digital examinations in educational institutions, universities, training centers, and competitive examination environments, promoting independence, transparency, and equal opportunities for visually challenged candidates.



**Figure 2: Question Bank Management Module**

The above figure illustrates the Question Bank Management module of the proposed Voice-Based Examination System for Visually Challenged Candidates. This module is accessible only to the administrator after successful authentication. It provides a centralized interface for creating, organizing, and maintaining the multiple-choice question repository used during examinations. Each question is displayed along with its subject, four answer options, correct answer, marks, and available action controls. The administrator can search for questions using keywords or subject names, making it easier to locate and manage existing records. In addition, the Add Question option allows new examination questions to be inserted into the database, while the Edit and Delete actions enable modification or removal of outdated questions. Once a question is added successfully, it is immediately stored in the centralized database and becomes available for future examinations. This module ensures efficient question management, reduces manual effort, and maintains the accuracy and consistency of examination content. It also simplifies the process of updating question banks for different subjects, thereby improving the overall reliability and flexibility of the digital examination system for visually challenged candidates.



**Figure 3: Voice-Guided Examination Module**

The above figure illustrates the Voice-Guided Examination Module of the proposed Voice-Based Examination System for Visually Challenged Candidates. After successful login, the candidate is presented with one multiple-choice question at a time through an accessible examination interface. The system retrieves the question and its corresponding answer options from the centralized database and converts them into speech using the integrated Text-to-Speech (TTS) module. The audio playback feature allows visually challenged candidates to listen carefully to the question and available options without requiring assistance from a human scribe. Candidates can submit their responses by pressing the corresponding keyboard keys (A, B, C, or D), ensuring a simple and convenient interaction mechanism. Once an answer is selected, the system automatically records the response and proceeds to the next question until the examination is completed. The interface also displays the current question number and examination progress, helping candidates track their assessment. This module provides an accessible, secure, and user-friendly examination environment while ensuring accurate response collection, smooth navigation, and efficient execution of the digital examination process for visually challenged candidates.

## DISCUSSION

The proposed Voice-Based Examination System for Visually Challenged Candidates provides an accessible and reliable platform that enables visually impaired students to complete examinations independently through voice-guided interaction and automated evaluation. By integrating candidate registration, examination management, text-to-speech technology, answer submission, and result generation into a single application, the system reduces dependence on human scribes and simplifies the overall examination process. The Administrator Module and Candidate Module work together through a centralized database to manage candidate information, question banks, examination records, and evaluation results efficiently. The use of text-to-speech technology allows candidates to listen to examination questions and answer options clearly, while keyboard-based input offers a simple and

convenient method for submitting responses. This integrated approach improves accessibility, ensures secure examination management, and provides a user-friendly environment for both administrators and candidates.

The experimental implementation demonstrates that the developed application successfully performs all major operations, including candidate registration, secure authentication, voice-guided question delivery, automated answer evaluation, and result management with consistent performance. The text-to-speech module provides clear audio output with minimal delay, allowing visually challenged candidates to participate in examinations without external assistance. The automated evaluation mechanism accurately calculates scores, percentages, grades, and examination status while reducing manual effort and eliminating common evaluation errors. Centralized storage of candidate records, question banks, and examination results enables efficient data retrieval and simplified administration. Overall, the proposed framework offers a practical, scalable, and cost-effective solution for accessible digital examinations and can be effectively implemented in schools, colleges, universities, training institutes, and competitive examination authorities to promote equal educational opportunities and inclusive assessment for visually challenged candidates.

## VI.CONCLUSION

The Voice-Based Examination System for Visually Challenged Candidates provides an accessible, reliable, and efficient solution for conducting digital examinations without the need for human scribes. The developed application integrates candidate registration, examination management, voice-guided question delivery, automated answer evaluation, and result generation into a single web-based platform. By utilizing text-to-speech technology, the system enables visually challenged candidates to listen to examination questions and answer options independently while submitting their responses through simple keyboard inputs. The centralized database efficiently manages candidate information, question banks, answer keys, and examination results, ensuring secure data storage and smooth retrieval throughout the examination process. Experimental evaluation demonstrates that the proposed framework successfully performs candidate authentication, voice-assisted examination, automatic evaluation, and result generation with reliable performance and minimal response time. Its simple architecture, ease of use, scalability, and cost-effectiveness make it suitable for educational institutions, universities, training centers, and competitive examination authorities seeking inclusive digital assessment solutions. Future enhancements may include incorporating

speech recognition for voice-based answer submission, multilingual text-to-speech support, cloud-based data storage, artificial intelligence for adaptive examination delivery, mobile application integration, enhanced security through biometric authentication, and real-time examination monitoring to further improve accessibility, usability, and the overall effectiveness of digital examinations for visually challenged candidates.

## REFERENCES

- [1] T. Ueda, H. Kawata, T. Tomizawa, A. Ohya, and S. Yuta, "Visual Information Assist System Using 3D SOKUIKI Sensor for Blind People: System Concept and Object Detecting Experiments," in Proc. IEEE 32nd Annu. Conf. Industrial Electronics Society (IECON), 2006.
- [2] P. Bhardwaj and J. Singh, "Design and Development of Secure Navigation System for Visually Impaired People," International Journal of Computer Science and Information Technology, vol. 5, no. 4, pp. 159–164.
- [3] S. Khan, S. Verma, and S. Agarwal, "Voice Based Online Examination for Physically Challenged," MIT International Journal of Computer Science and Information Technology, vol. 5, no. 2, pp. 58–61, Aug. 2015.
- [4] J. Kanimozhi, A. Karkuzhali, and K. Suresh Kumar, "Online Examination for Visually Challenged People," Asian Journal of Applied Science and Technology (AJAST), vol. 1, no. 3, pp. 40–42, Apr. 2017.
- [5] S. B. Kallara, M. Raj, R. Raju, and N. J. Mathew, "Indriya – A Smart Guidance System for the Visually Impaired," in Proc. International Conference on Inventive Computing and Informatics (ICICI), 2017.
- [6] D. P. Khairnar, R. B. Karad, A. Kapse, and G. Kale, "PARTHA: A Visually Impaired Assistance System," in Proc. 3rd International Conference on Communication Systems, Computing and IT Applications (CSCITA), 2020.
- [7] G. Jhansi Rani, T. Pradeep Kumar, S. Rama, and C. Sidhardha, "Raspberry Pi Based Programmed SMS Reader for Blind People," in Proc. International Conference on Research in Sciences, Engineering and Technology.
- [8] M. Mashiata, T. Ali, P. Das, and Z. Tasneem, "Towards Assisting Visually Impaired Individuals: A Review on Current Status and Future Prospects," 2022.
- [9] R. Sultana, R. Zaman, P. Das, and P. Mazumdar, "Vision-Based Human Action Recognition Using a CNN Model," in Proc. 5th International Conference

on Mechanical, Industrial and Materials Engineering (ICMIME), 2022.

[10] M. H. Al Omoush and T. Mehigan, “Leveraging Robotics to Enhance Accessibility and Engagement in Mathematics Education for Vision-Impaired Students,” in Proc. 5th International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), 2023.