VIVABOT

Major Project submitted in partial fulfillment of the requirement for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

Under the esteemed guidance of

Dr. A. Sree Lakshmi
Professor

By

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This is to certify that the B.Tech Mini Project report entitled **"VIVABOT"** is a bonafide work done by **A Praneeth Kumar Reddy(21R11A05L6), Badugu Jessy (21R11A05M0)**, in partial fulfillment of the requirement of the award for the degree of Bachelor of Technology in "**Computer Science and Engineering**" from Jawaharlal Nehru Technological University, Hyderabad during the year 2024-2025.

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We, **A Praneeth Kumar Reddy, Badugu Jessy**, bearing Roll Nos. **21R11A05L6, 21R11A05M0**, hereby declare that the project report entitled **"VIVABOT"** is done under the guidance of **Mrs. Dr. A. Sree Lakshmi, Professor, Head Of Department**, Department of Computer Science and Engineering, Geethanjali College of Engineering and Technology, is submitted in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology in Computer Science and Engineering**.

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ABSTRACT

Vivabot is an intelligent system designed to automate viva sessions, making the process seamless, fair, and efficient. The platform leverages cutting-edge facial recognition technology to identify students and ensures the correct allocation of questions based on their proficiency levels. By integrating a question bank categorized into various difficulty levels, Vivabot selects appropriate questions dynamically during viva sessions. The system also automates question assignment, ensuring a consistent and unbiased assessment experience for students and faculty alike. Vivabot enhances the traditional viva process, replacing manual evaluations with an efficient AI-driven alternative.The platform utilizes the power of the ChatGPT API to evaluate the students' answers in real-time, offering accurate and impartial grading. Attendance management is streamlined with automated tracking of students who participate in the viva. Marks are instantly updated in an Excel sheet, providing a smooth and organized record-keeping process for academic staff. This innovative solution is geared towards educational institutions seeking to improve the viva assessment process. By incorporating artificial intelligence, Vivabot minimizes human error, reduces the workload on faculty, and creates a more standardized evaluation procedure. The system can be customized according to institutional needs, making it a versatile tool for modern academia.

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1. INTRODUCTION

1.1 ABOUT THE PROJECT

VivaBot is an innovative and intelligent platform designed to automate and enhance the viva voce examination process in educational institutions. By leveraging cutting-edge technologies such as facial recognition, natural language processing, and automation tools, VivaBot aims to revolutionize the traditional viva process, making it more efficient, transparent, and scalable.

This platform eliminates manual intervention by automating key steps such as student identification, question assignment based on proficiency, real-time answer evaluation, and result generation. It empowers faculty and students with a streamlined approach to conduct and participate in viva exams, ensuring a smooth, fair, and effective process.

With facial recognition technology, VivaBot ensures accurate student identification, enabling attendance management and avoiding impersonation. The platform uses a centralized question bank categorized by difficulty levels and subjects, assigning questions tailored to each student's proficiency. The integration of ChatGPT for answer evaluation ensures objectivity and consistency in marking.

VivaBot also simplifies administrative tasks by automating attendance tracking, generating detailed viva performance reports, and providing real-time updates on exam progress. This ensures that faculty members can focus on engaging with students, while the platform handles the operational complexities.

Ultimately, VivaBot seeks to redefine the viva voce process, fostering a more collaborative, efficient, and technologically advanced educational environment.

1.2 OBJECTIVES

- **Automation of Viva Examination Process:** Eliminate manual efforts in conducting viva exams by automating key processes such as student identification, question assignment, answer evaluation, and result compilation.
- **Facial Recognition for Attendance:** Use facial recognition technology to ensure accurate and seamless student identification and attendance tracking.
- **Proficiency-Based Question Assignment:** Fetch and assign questions dynamically based on each student's subject knowledge and previous performance.
- **Integration with ChatGPT:** Evaluate students' answers using the ChatGPT API to provide consistent and unbiased grading.
- **Centralized Question Management:** Maintain a categorized question bank by subject and difficulty level to enable efficient question retrieval and assignment.
- **Real-Time Marks Update:** Automatically update marks in an Excel sheet after evaluating each student's answers.
- **Transparent Tracking:** Provide students and faculty with real-time updates on viva progress, including marks, attendance, and question details.
- **Enhanced Communication and Collaboration:** Facilitate seamless communication between students and faculty through a user-friendly web interface.
- **Streamlined Administrative Tasks:** Reduce the workload of faculty and administrative staff by automating attendance, marking, and report generation.
- **Improved Efficiency:** Optimize the viva process by ensuring swift response times, accurate evaluations, and effective resource utilization.

2. SYSTEM ANALYSIS

2.1 EXISTING SYSTEM

The current viva voce process in most educational institutions relies heavily on traditional, manual methods. This includes manual attendance marking, question assignment, answer evaluation, and result compilation. Faculty members conduct viva exams in a one-on-one or small group setting, often using printed or verbal questions, which are evaluated subjectively. While this system has been the standard for years, it suffers from several limitations that reduce its efficiency and accuracy. The lack of automation and technology integration makes the process time-consuming and prone to inconsistencies, ultimately impacting the overall experience for both students and faculty.

Drawbacks of the Existing System

1. **Manual Processes:** Attendance marking, question assignment, and answer evaluation are conducted manually, leading to inefficiencies, delays, and the potential for human error.
2. **Subjective Answer Evaluation:** Faculty evaluate students' answers subjectively, which may lead to inconsistencies and a lack of standardized marking criteria.
3. **No Proficiency-Based Question Assignment:** Questions are assigned randomly without considering the student's past performance or proficiency levels, reducing the effectiveness of the evaluation process.
4. **Time-Intensive Procedures:** Manual processes prolong the time required to conduct and complete viva exams, making it difficult to scale the process for larger groups of students.
5. **Lack of Transparency:** Students often lack visibility into their performance or the evaluation process, leading to uncertainty and dissatisfaction.
6. **No Centralized Management:** The absence of a centralized platform makes it difficult to manage attendance, questions, and results efficiently, creating additional administrative burdens for faculty.

2.2 PROPOSED SYSTEM

VivaBot is a cutting-edge, automated platform designed to address the shortcomings of the existing viva voce process. By incorporating advanced technologies such as facial recognition, natural language processing, and automation tools, VivaBot streamlines and enhances the entire viva process, ensuring efficiency, consistency, and transparency.

Benefits of the Proposed System

1. **Automated Attendance Management:** VivaBot uses facial recognition technology to automate attendance marking, ensuring accuracy and eliminating the need for manual intervention.
2. **Proficiency-Based Question Assignment:** The system dynamically assigns questions based on each student's previous performance and proficiency level, enabling a more personalized and effective evaluation.
3. **Automated Answer Evaluation:** Integration with ChatGPT allows VivaBot to evaluate student answers objectively, ensuring consistency and reducing the workload on faculty.
4. **Centralized Viva Management:** VivaBot provides a single platform for managing all aspects of the viva process, including attendance, question assignment, answer evaluation, and result tracking, improving overall efficiency.
5. **Time Efficiency:** By automating key steps, VivaBot significantly reduces the time required to conduct viva exams, making it scalable for larger groups of students.
6. **Comprehensive Data Analytics:** The platform provides detailed performance insights and analytics, enabling faculty to identify patterns, track progress, and make data-driven decisions for curriculum improvement.

2.3 FEASIBILITY STUDY

2.3.1 Details

The feasibility study for **VivaBot** evaluates its practicality across technical, operational, and economic dimensions. The study assesses the availability of required technologies and expertise, ensures the system aligns with user needs, and evaluates the cost-benefit ratio. VivaBot's design focuses on leveraging existing tools like facial recognition, natural language processing, and automation APIs, ensuring a robust and implementable solution.

2.3.2 Impact on Environment

The environmental impact of **VivaBot** is minimal. By digitizing the viva voce process, it reduces paper usage for attendance sheets, question papers, and result documentation, thereby decreasing paper waste and contributing to a reduced carbon footprint. However, the feasibility study acknowledges the energy consumption associated with running servers and hardware, emphasizing the importance of using energy-efficient systems and practices.

2.3.3 Safety

VivaBot incorporates advanced safety measures to ensure the security of user data. Features such as data encryption, multi-factor authentication, and regular vulnerability assessments safeguard sensitive information. The system adheres to stringent security protocols to protect against unauthorized access, ensuring the integrity and confidentiality of data for all stakeholders.

2.3.4 Ethics

The ethical considerations for **VivaBot** revolve around data privacy and responsible usage. The platform is designed to handle user data with utmost care, ensuring transparency in how data is stored, processed, and used. Students' personal and academic records are protected from misuse, and the system complies with ethical and regulatory standards for data security and privacy.

2.3.5 Cost

The cost analysis for **VivaBot** includes initial development expenses, integration of technologies like facial recognition and ChatGPT API, server hosting charges, and periodic maintenance costs. Despite the upfront investment, the platform is cost-effective in the long term due to automation, reduced administrative workload, and improved operational efficiency. The feasibility study confirms that the benefits outweigh the costs, making it a viable investment for educational institutions.

2.3.6 Type

VivaBot is categorized as an intelligent, automated viva voce management system. It integrates various features such as facial recognition for attendance, proficiency-based question assignment, automated answer evaluation, and result tracking into a single, web-based platform. The system is scalable, making it adaptable to different institution sizes and requirements.

2.4 SCOPE OF THE PROJECT

The scope of the **VivaBot** project encompasses the development, deployment, and maintenance of a comprehensive web-based platform for automating viva voce examinations. Key functionalities include:

- Facial recognition for automated attendance management.
- Centralized question bank for dynamic, proficiency-based question assignment.
- Integration with the ChatGPT API for automated answer evaluation.
- Real-time status updates for students and faculty.
- Automated result generation and performance analytics.

The project covers the design of a user-friendly interface and efficient backend processes, ensuring a seamless experience for all users. VivaBot's scope includes continuous improvements based on user feedback, making it a robust and adaptable system for institutions.

2.5 SYSTEM CONFIGURATION

Frontend Technologies

- **HTML5**: For structuring web pages and ensuring a strong foundation for the user interface.
- **CSS3**: For creating a visually appealing and responsive design.
- **React.js**: For building a dynamic, interactive, and user-friendly interface.

Backend Technologies

- **Node.js**: For server-side scripting and handling API requests.
- **Express.js**: For routing and implementing backend functionalities efficiently.

Database

- **MongoDB**: To store dynamic data such as student profiles, question banks, viva records, and results.
- **MySQL**: Alternatively, for structured data storage and relational database needs.

Core Features Implementation

- **OpenCV (Python)**: For implementing facial recognition for automated student attendance.
- **ChatGPT API**: For evaluating student responses based on predefined answers.
- **TensorFlow/Keras**: For any machine learning models, such as predicting proficiency levels based on past data.

Hosting and Deployment

- **AWS (Amazon Web Services)** or **Azure**: For cloud hosting of the backend and database.
- **Heroku**: For hosting lightweight projects with simpler infrastructure needs.
- **Firebase**: For real-time database and user authentication if required.

Version Control and Collaboration

- **Git**: For version control and tracking project progress.
- **GitHub/GitLab**: For repository management and team collaboration.

Tools and Libraries

- **Axios**: For handling API communication between frontend and backend.
- **JWT (JSON Web Tokens)**: For secure user authentication.
- **Material-UI**: For pre-built React components to speed up the development of the user interface.
- **Pandas (Python)**: For data handling and analysis, such as processing student performance data.
- **ExcelJS**: For generating Excel-based marksheets and reports.

Development Environment

- **Visual Studio Code**: For code development with support for JavaScript, Python, and Node.js.
- **Postman**: For testing APIs during development and ensuring seamless integration.

Real-Time Features

- **Socket.IO**: For implementing real-time notifications and updates for viva status and results.

3. LITERATURE OVERVIEW

3.1 LITERATURE REVIEW

1) Automated Assessment Systems: A Review (IEEE, 2020)

The paper reviews frameworks for automating assessments using machine learning and NLP technologies. It highlights the challenges of traditional assessments, such as human bias and inefficiency, and proposes AI-driven solutions for grading, particularly for open-ended questions. This work lays the foundation for Vivabot's focus on accurate and unbiased viva voce evaluations.

2) Facial Recognition Technology for Student Authentication (ACM, 2019)

This research discusses the application of facial recognition technology for ensuring secure student identification. The paper addresses limitations such as accuracy under varying lighting conditions and demographic fairness, guiding Vivabot's authentication features.

3) Proceedings of the International Conference on Artificial Intelligence in Education (IEEE, 2020)

The conference proceedings explore the integration of AI tools into classrooms, offering insights into smart learning systems and adaptive feedback mechanisms. Vivabot can benefit from these discussions by incorporating real-time assessment and personalized feedback features.

4) TensorFlow Documentation (Facial Recognition and AI/ML)

The TensorFlow platform provides robust tools for building AI models, including those for facial recognition and natural language understanding. Its comprehensive resources will assist in the technical development of Vivabot.

5) Deep Learning by Ian Goodfellow et al. (MIT Press, 2016)

This book presents a comprehensive overview of deep learning techniques, essential for designing and implementing sophisticated AI systems. The theoretical concepts and practical insights are directly applicable to Vivabot's architecture.

6) OpenCV Documentation (Facial Recognition Implementation)

OpenCV serves as a critical tool for developing real-time facial recognition capabilities. Its extensive libraries and tutorials provide a practical approach to integrating these features into Vivabot.

7) A Machine Learning-Based Recommender System for Improving Students Learning Experiences

This paper explores how machine learning can enhance personalized learning in education. It proposes a system that recommends tailored educational content to students based on their preferences and learning history, thereby improving engagement and outcomes. This approach aligns well with Vivabot's goal of integrating AI for efficient educational assessments and interactions.

8) Chatbot: An Automated Conversation System for the Educational Domain

This study discusses the design and implementation of chatbots in educational settings. The proposed chatbot leverages AI and NLP to provide automated responses to student queries, streamline academic operations, and deliver personalized educational support. Such capabilities can be foundational to Vivabot, particularly for handling student interactions efficiently.