Gen AI-Powered Placement Assistant Chatbot with Automated Communication

Prof. Nomitha Chawla [1], Rahul Chandayya Gaddadamath [2], Rithasha R Vernekar [3], Priyanka G M [4], Nayana B S[5]

Bapuji Institute of Engineering and Technology, Davanagere, Karnataka, India[1]
Assistant Professor, Department of CS&E, Bapuji Institute of Engineering and Technology, Davanagere, Karnataka, India[2]
U.G. Student, Department of CS&E, Bapuji Institute of Engineering and Technology, Davanagere, Karnataka, India[3]

ABSTRACT: This paper introduces an AI-powered chatbot designed to revolutionize campus placement procedures through automation and intelligent communication. By incorporating Generative AI and Natural Language Processing (NLP), the system facilitates real-time interactions between students and placement cells. It automates the resume screening process, provides job recommendations, and handles communication via WhatsApp and email. A robust placement dashboard is integrated to centralize functionalities for both students and recruiters. Testing indicates enhanced engagement, reduced manual workload, and significant time savings, marking a step forward in educationtechnology integration.

KEYWORDS: Generative AI, NLP, Placement Automation, Resume Parser, Chatbot, Email Notification, KNN Algorithm.

I. INTRODUCTION

The traditional campus placement process, though essential to bridging academic learning and professional careers, is often burdened with inefficiencies. A significant challenge lies in the lack of timely and effective communication between students, placement officers, and recruiters. Students frequently miss critical updates due to outdated institutional portals or physical notice boards, while placement officers struggle with manually coordinating interviews, managing resumes, and matching student profiles with appropriate job openings. This one-size-fits-all communication approach fails to address the diverse academic backgrounds and career aspirations of students, leading to missed opportunities and administrative overload.

To address these issues, this project proposes the development of a Generative AI (GenAI)-Powered Placement Assistant
Chatbot with automated communication features. Leveraging technologies such as Natural Language Processing (NLP), Machine Learning (ML), and AI-driven automation, the chatbot

offers instant, intelligent, and personalized responses to student queries related to placements. Integrated with popular communication platforms like email, it delivers real-time alerts and proactive updates, eliminating the need for students to repeatedly check portals. This system ensures roundthe-clock support, enhances student engagement, reduces manual workload, and ultimately improves the efficiency and success rate of campus recruitment drives.

II. LITERATURE SURVEY

[1] **M. Monica et al. (2024)** adopts a candidate-focused perspective to examine job seekers' experiences with AI-powered recruitment chatbots. It highlights that many candidates value the speed and round-the-clock availability of chatbots, which help streamline the early stages of the application process by providing instant responses and timely updates. Notably, the study cites an industry survey indicating that approximately 58% of job seekers are comfortable engaging with AI chatbots during the initial phases of job applications.

[2] **G. Logeswari et al. (2024)** presents an AI-based system called "Resume Parser and Ranker" that automates the screening of job applicants' resumes using Natural Language Processing (NLP) and Machine Learning techniques. The system leverages a Named Entity Recognition (NER) model to extract key information from unstructured resume text with approximately 93% accuracy, nearing human-level performance. It then uses heuristic algorithms to evaluate and rank candidates based on their qualifications and alignment with job requirements, producing a shortlist of the most suitable applicants for recruiters.

[3] **Humaid Al Naqbi, Zied Bahroun, and Vian Ahmed (2024)** offers a comprehensive overview of how Generative Artificial Intelligence (GAI) enhances institutional performance and work productivity across various sectors, including technology, agriculture, government, and business. It emphasizes GAI's role in automating routine tasks, supporting data-driven decision-making, and improving overall operational efficiency, positioning it as a transformative tool for boosting productivity and performance in diverse organizational contexts.

[4] **Espinoza et al. (2024)** explores the use of AI chatbots in real recruitment processes, highlighting their role in automating routine tasks like handling initial applicant queries and screening, which boosts efficiency in the early stages of recruitment. Recruiters reported that chatbots provide consistency and speed, enabling them to manage large volumes of candidates, ultimately reducing hiring time and enhancing the company's image to applicants. However, the research also underscores the importance of human involvement in later stages, such as assessing a candidate's emotional intelligence, cultural fit, and complex problem-solving abilities, which are better handled by human recruiters.

[5] **Deore et al. (2023)** presents a Placement Automation System for educational institutes that manages job postings, student registration, application tracking, and the automatic filtering of eligible students for job openings. The system integrates a built-in chatbot powered by Natural Language Processing (NLP) and machine learning to assist students with placement-related queries and guide them through the preparation process, acting

as a virtual placement assistant. Key advantages include easier management of student data, faster communication of relevant opportunities, automated interview scheduling, and recommendation features that help students better prepare for placement drives.

[6] **Akram et al. (2023)** gathered insights from both recruiters and job seekers to explore the acceptance of AI chatbots in recruitment. Both groups recognized the key benefits of chatbots, particularly in terms of efficiency and time-saving. Chatbots help streamline tedious tasks for recruiters while enabling candidates to quickly access relevant job information. Job seekers, in particular, appreciated the convenience of using chatbots to discover new job openings and receive instant answers about company hiring criteria, eliminating the wait for human responses.

[7] **Sameh Abdelhay et al. (2023)** examines the impact of generative AI tools, such as ChatGPT, on recruitment efficiency and candidate quality. Based on a survey of 469 HR professionals and analysis using Structural Equation Modeling, the study found that the integration of generative AI in recruitment led to significant improvements in efficiency, particularly in the candidate screening and shortlisting processes.

III. PROPOSED SYSTEM

The AI-Powered Placement Assistant Chatbot streamlines the placement process by automating communication and recruitment tasks. It uses an NLP-based chatbot to handle student queries and sends job updates and interview schedules through email and WhatsApp. A placement dashboard helps students with personalized job recommendations, resume building, and application tracking, while recruiters get organized candidate profiles and an easy-to-use interview scheduling system. Real-time updates reduce delays, improve transparency, and make the entire placement process more efficient through automation.

VI. METHODOLOGY

ARCHITECTURE OVERVIEW

This diagram illustrates the architecture of an AI-powered recruitment system. It shows the different components of the system and how they interact with each other to streamline the hiring process. Let's break down each component and their connections:

1. User Interface (Chatbot/Web App):

This is the front-facing component where users such as recruiters and candidates interact with the system. It can be in the form of a chatbot for quick, conversational interactions or a web application for more detailed tasks like resume uploads and job applications. User inputs from this interface are sent to the Backend API Layer for processing.

2. Backend API Layer (Flask/FastAPI):

This layer serves as the middleman between the user interface and the system's core logic. Built using frameworks like Flask or FastAPI, it handles incoming requests, processes them, and

routes them to the appropriate modules such as the GenAI Module, NLP Engine, and Database for further action.

3. GenAI Module (Chatbot):

This component is responsible for enabling conversational AI features in the chatbot. It generates intelligent, context-aware responses to user queries. It relies on the NLP Engine to understand the user's intent and to enhance the quality of the generated responses.

4. Resume Parser:

The Resume Parser extracts structured information from resumes uploaded by candidates. It uses NLP techniques to identify key details like skills, work history, and education. After parsing, the extracted information is saved in the Database for use in candidate evaluation.

5. NLP Engine (BERT/GPT/Spacy):

This is the central processing unit for natural language tasks. It uses advanced models like BERT, GPT, or Spacy to understand and analyze text. Tasks include entity recognition, sentiment analysis, and text generation. It supports the Resume Parser, GenAI Module, and Candidate Matching Engine by providing meaningful insights from raw text.

6. Candidate Matching Engine:

This module matches candidate profiles with job descriptions to find suitable candidates. It leverages processed data from the NLP Engine and retrieves candidate and job information from the Database. The output of this engine is used for shortlisting candidates.

7. Database (Candidate Profiles, Jobs):

The database is the central repository for all system data. It stores candidate profiles, parsed resume data, job descriptions, and more. Various components of the system interact with the database to read or write data, ensuring smooth functionality across the platform.

8. Admin Panel (Job Posting, Reports):

This interface is designed for administrators to manage job postings and generate reports. Admins can create new job listings and track system performance or recruitment metrics. All admin actions are logged and stored in the Database.

9. Shortlist and Send Email:

This final step compiles a shortlist of suitable candidates, based on matches identified by the Candidate Matching Engine. It then sends out email notifications to the selected candidates or recruiters using the information retrieved from the Database.

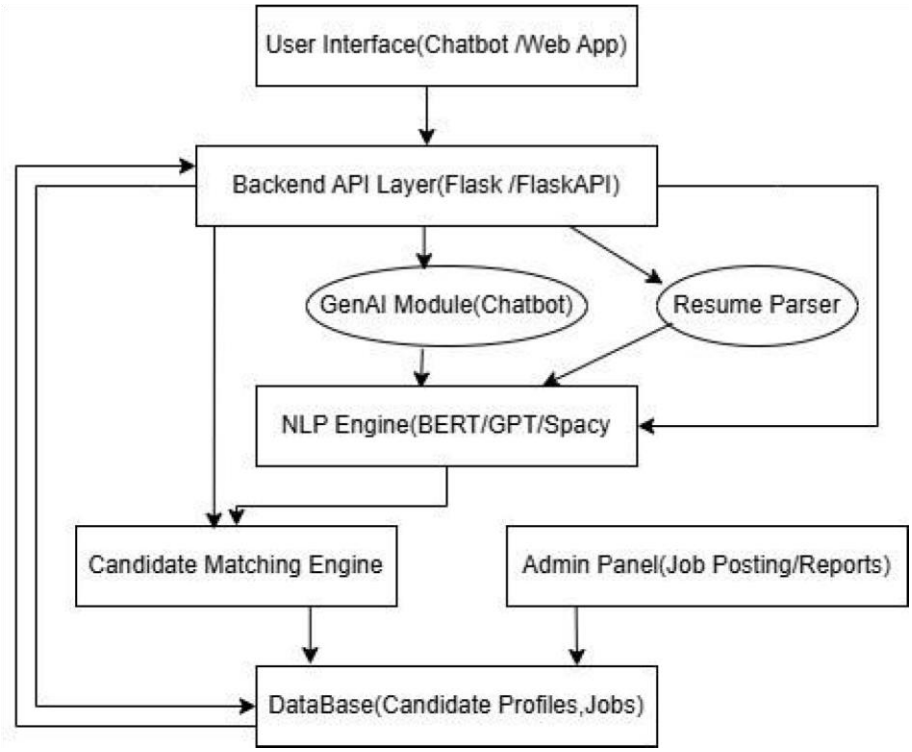

Fig1. System Architecture

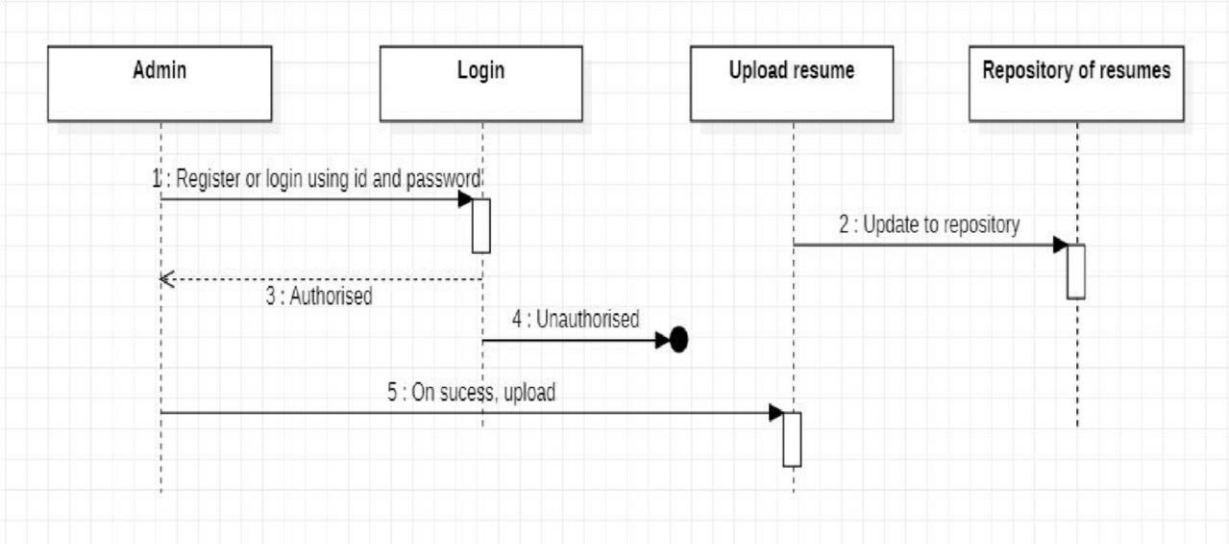

Fig 2. Methodology Diagram

V. PSEUDO CODE

The core process flow is as follows:
Step 1: Authenticate user via dashboard or chatbot.
Step 2: Accept resume upload or textual query.
Step 3: Preprocess input using NLP (Spacy, BERT models).
Step 4: Extract features from resume and classify using KNN.

Step 5: Generate personalized response using GPT-based model. Step 6: Dispatch communication via email server.
Step 7: Update backend and display data in student/recruiter dashboard.

VI. RESULTS

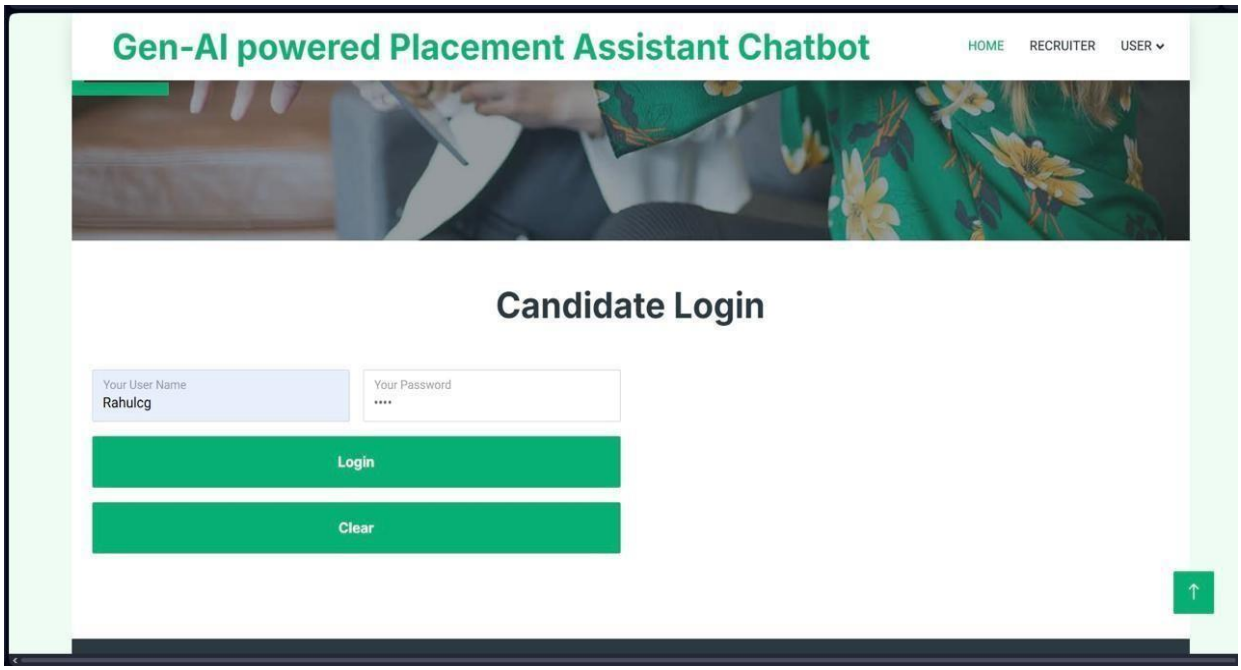

Fig 1: Candidate Login Interface

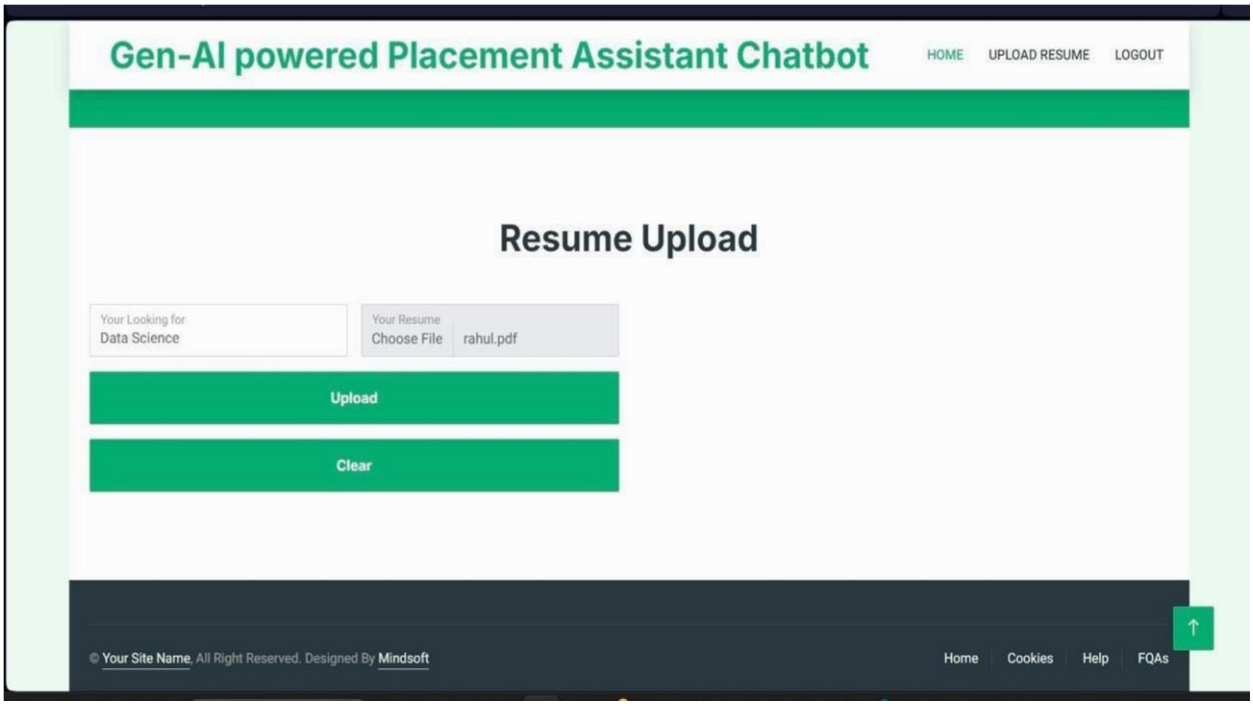

Fig 2: Resume Upload Interface for Candidates

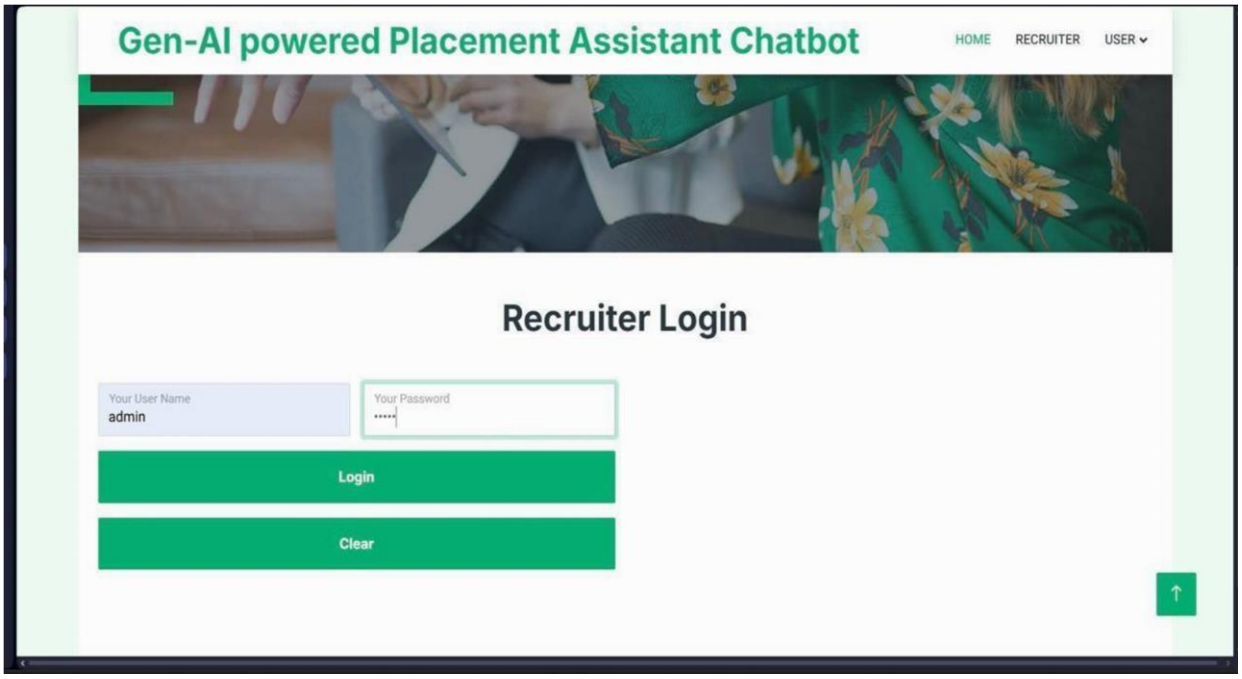

Fig 3: Recruiter Login Interface

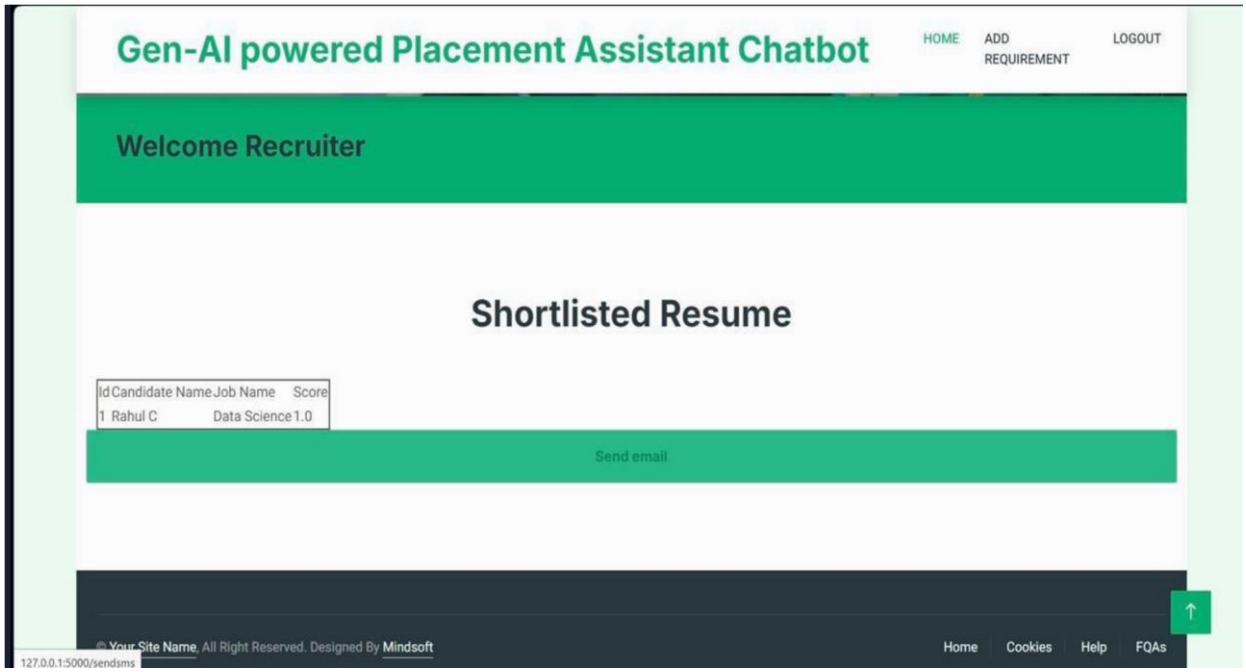

Fig 4: Shortlisted Resume View by Recruiter

Fig 5: Email Alert for Shortlisted Candidate

VII. CONCLUSION AND FUTURE WORK

The GenAI-powered Placement Assistant Chatbot marks a significant advancement in campus placement systems by automating communication tasks, providing instant and personalized support, and reducing the administrative burden on placement officers. With features like real-

time email updates, an intuitive dashboard, and centralized access to job listings and interview schedules, it streamlines the entire placement process for students and recruiters alike. Looking ahead, the system holds immense potential for future development by incorporating functionalities such as automatic PDF generation, role-based access, and multilingual support to improve accessibility and record-keeping. The integration of AI-driven analytics, Natural Language Processing (NLP), and adaptive learning technologies can further personalize communication and enhance user engagement. Additionally, the inclusion of Virtual Reality (VR), Augmented Reality (AR), and sentiment analysis could create more immersive and emotionally responsive experiences, positioning the platform as a comprehensive, intelligent solution for modern academic institutions.

VIII. REFERENCES

1 G. Logeswari, S. Gajendran, J. D. Roselind, N. Ahirwar, *et al*., "Language Processing and Deep Learning," in *Proc. IEEE Conf. on Language Processing and Deep Learning*, 2024.

2 G. Logeswari, S. Gajendran, J. D. Roselind, N. Ahirwar, *et al*., *Language Processing and Deep Learning*, 2024.

3 H. Al Naqbi, Z. Bahroun, and V. Ahmed, "Enhancing Work Productivity through Generative Artificial Intelligence," 2024.

4 E. Espinoza, *et al*., "Exploring the Role of Chatbots in the Recruitment Process," *Rev. Gestão Soc. Ambient.*, vol. 18, no. 1, 2024.

5 D. Ramesh and V. Sharma, “Role of Generative AI in Transforming Career Guidance Systems,” in *Proc. 2024 Int’l Conf. on Artificial Intelligence in Education*, pp. 59–65, 2024.

6 Y. Liu and T. Park, “Smart Assistants in Career Services: A Systematic Review,” *Computers & Education: Artificial Intelligence*, vol. 5, 2024.

7 P. Deore, *et al*., "Placement Automation System for Educational Institutes," *Int. J. Creative Res. Thoughts*, vol. 11, no. 5, 2023.

8 M. Akram, *et al*., "Recruitment Chatbot Acceptance in Company Practices: An Elicitation Study," in *Proc. 15th Int’l Conf. Human-Computer Interaction (CHItaly)*, 2023.

9 M. Monica, S. Patel, G. Ramanaiah, S. K. Manoharan, and T. H. Ghilan, "Job Seekers' Perspectives on the Use of AI Chatbots in the Recruitment Process," 2023.

10 R. Singh, S. K. Sharma, and A. Dubey, “AI-Powered Chatbots in Higher Education: Applications and Challenges,” *J. Educational Technology & Society*, vol. 26, no. 2, pp. 55–64, 2023.

11 L. Zhang, M. Wei, and Y. Chen, “Natural Language Processing for Intelligent Campus Services,” in *Proc. IEEE Int. Conf. on Smart Education and E-Learning*, pp. 87–92, 2023.

12 A. Kapoor, R. Mehta, and S. Nair, “Revolutionizing Campus Placements using AI and Machine Learning,” *Int. J. Engineering Research & Technology (IJERT)*, vol. 12, no. 1, pp. 112–118, 2023.

13 B. K. Patil, A. Yadav, and S. Deshmukh, “Automating Placement Cell Activities Using AI Chatbots,” *Int. J. Innovative Science and Research Technology*, vol. 8, no. 4, pp. 422–426, 2023.

14 K. Thomas and M. George, “The Impact of AI-Driven Communication Tools in Education,” *J. Modern Educational Technologies*, vol. 9, no. 3, pp. 73–81, 2023.

15 A. Jain, P. Kumar, and N. Gupta, “Enhancing Student Engagement Through AI-Based Virtual Assistants,” in *Proc. Int. Conf. on Intelligent Systems and Smart Applications (ISSA)*, pp. 138–144, 2023.