International Journal of Engineering Research & Technology (IJERT)

Smart and Automated College Placement System

K. Priyanga[1], A. Divakar[2], A.S.E. Vyshnavee[3], S.Ibrahim Basha[4], D.Harsitha [5]

Computer Science and Engineering Department, Kangeyam Institute of Technology, Kangeyam, Anna University

***Abstract*—** Academic institutions within the modern digital academic domain rely on campus placements to establish their students' future careers in the workplace. The current manual placement methods show inefficiencies and errors which cause businesses to miss recruitment opportunities together with consistent problems. The project delivers an advanced Smart Automated College Placement System which manages recruitment stages from job notification to candidate selection through contemporary web systems alongside automated functions.

The system architecture was built with web-based elements that include React.js for frontend elements and Laravel (PHP) for backend functionality served by MySQL/PostgreSQL relational databases together with Firebase/Auth0 authentication security. AWS cloud deployment enables stakeholders to access services while offering scalability benefits. The system implements transparency and accuracy through automated Excel upload processes for result processing and it controls offer limitations and eligibility-based filtering.

The placement coordinator's decision-making capabilities benefit from a data-driven support system which produces real-time analytics and departmental reports using smart filters to conduct candidate-recruiter academic qualification and placement history-based matches. Students can access daily aptitude test modules besides getting real-time job notifications while their placement journey is tracked through a personalized dashboard.

The automated system streamlines manual coordination duties while keeping the process fair and transparent while delivering operational efficiency as a result. This system drives better recruitment outcomes by decreasing cost expenditures and strengthening partnership alliances among stakeholders with its modern platform for corporate recruitment on campuses.

Keywords

The platform features Campus Placement Automation together with Eligibility Filtering, Web Portal functionality, Laravel development, React.js

scripting and MySQL structure and Firebase architecture, Cloud Deployment technology and Real- Time Notifications system, Placement Analytics assessment, along with Offer Limit Enforcement and a Decision Support System and Digital Recruitment modules and College ERP Integration.

I. Introduction

A. Overview

The placement process exists as the most essential element for student academic progress within educational organizations. Colleges persist with traditional and out-of-date methods to run placement drives although this process is essential to their operations but it produces major hurdles including non- transparent execution and laborious management and operational inefficiency. Job drives get communicated through student emails or notice boards as well as WhatsApp messages while students apply without any specific requirements being defined or eligibility testing. Report generation without automation tools extends the time requirement of the process.

The proposed Smart & Automated College Placement System resolves existing problems by automated placement processes and by boosting communication along with efficiency and transparency among placement coordinators and students and recruiters.

B. Existing Solution

- Most educational institutions continue to conduct their placement operations manually through traditional human methods.
- All students receive job announcements through email and board postings because no qualifications exist for eligibility assessment.
- The absence of automated eligibility criteria filters leads to student notification confusion since those students without the required conditions can still view listings.
- Students face challenges when monitoring their job offers and application status because they can submit unlimited applications.
- External placement testing takes place on external platforms such as TCS iON and AMCAT yet these systems do not connect to institutional systems.
- Presence of manual reports requires placement coordinators to produce and maintain updates through a time-consuming manual preparation process.

This traditional system leads to **delays**, **human errors**, **miscommunication**, and **lack of data analysis capabilities**. It also lacks features like automated alerts or notifications, resulting in missed opportunities for students and recruiters.

C. Proposed Solution

- The Smart & Automated College Placement System addresses existing system pitfalls through the following features:
- The application should filter eligible students directly to prevent sending unnecessary notifications.

- The system enables direct management of placement test scheduling and conducting.
- The system tracks student offer numbers automatically and blocks additional applications when limits are met.
- The system delivers immediate notifications that contain employment openings and interview times and placement outcomes for students and placement team members.
- The system capabilities include automatic report creation for both department statistics and placement metrics which reduces workload for placement coordinators.
- The system's automation functions aim to simplify administrative work and makes placement data more accurate while streamlining all processes.

D. Logic

- The core processing framework of The Smart & Automated College Placement System consists of the following fundamental elements:
- Recruiters can establish academic and skill-related eligibility standards for student profile assessment through the system. The system sends notification alerts about job drives to students who fulfill specific academic criteria.
- The system handles test placement scheduling by providing important information including test timing as well as subject matter and format specifications to students.
- The system implements an offer limitation feature to block students from applying for extra organizations when they accept three to four job offers.
- Real-Time Notifications function through automated email systems which deliver immediate updates about job drives as well as test outcomes and placement offers to all participating parties.
- The system generates automatic reports about placement status alongside student performance and job offer data which provides placement coordinators with real-time information at all times.

Objective

Main functions of the Smart & Automated College Placement System include:

1. The system will display job drives only for appropriate candidates to reduce unnecessary applications from ineligible students.
2. The system uses predefined educational criteria to automatically verify eligible student enrollment before proceeding to the next stage of verification.
3. Students should receive no more than three or four job offers to maintain fair placement selection.
4. System users can schedule and manage placement tests through the platform without depending on separate platforms.
5. The system delivers live notifications through email to keep students updated about job openings and interview sessions and placement outcomes.
6. The automatic report generation system provides placement statistics by department which helps coordinators effectively track program progress.

2. System Architecture

The **Smart & Automated College Placement System** (SACPS) utilizes a multi-tier architecture to ensure scalability, performance, and seamless communication between different modules. The system's architecture is designed to handle various functions such as student registration, job drives, eligibility filtering, placement tests, and real-time notifications. The architecture consists of the following layers:

2.1 Overview of Architecture

2. System Architecture

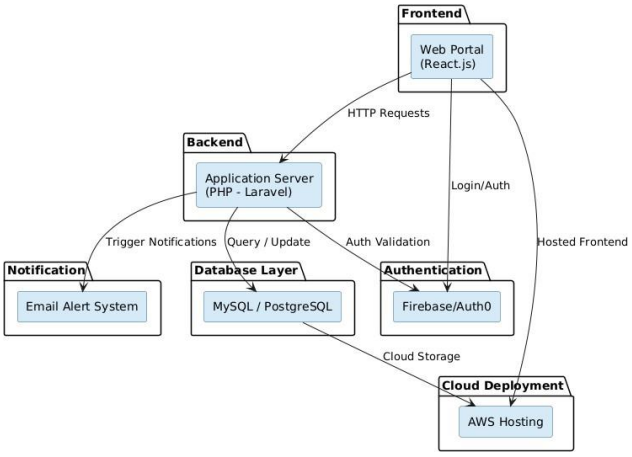
SACPS implements a multi-tier architecture that combines features for scalability with performance capabilities to enable communication functions in its separate system modules. The system includes an architecture design with modules to perform student registration and job drives as well as eligibility filtering placement tests and real-time notification capabilities. The system bases its design on three distinct layers which together form the architecture.

2.1 Overview of Architecture

The system follows a three-layered architectural design.

- Frontend Layer (Client-Side)
- Backend Layer (Server-Side)
- Database Layer

User (students along with placement coordinators and recruiters) experience smooth service interactions through the real-time functioning of these three system components. The system takes advantage of cloud deployment to improve security while enhancement of availability is achieved through authentication services.



2.2 Frontend Layer (Client-Side)

All users starting from students to recruiters and placement coordinators interact with the Frontend Layer that provides the interface functions of the application through a smooth user experience. The application depends on modern web technologies that primarily implement React.js to create dynamic content rendering with responsive interface performance.

- This system layer presents the following essential characteristics to student's recruiters and placement coordinators:
- Student Dashboard presents job drives together with student eligibility information and placement test schedules and shows active notifications.
- The recruiter dashboard enables recruitment teams to post jobs through the system while they manage reviewed applications alongside their candidate screening processes.
- The Coordinator Dashboard allows placement coordinators to check placements and manage student information while generating reports.
    - Interactive Features: Includes real-time notifications, interactive charts, and placement statistics.
- REST APIs enable communication between frontend and backend components which ensures both seamless operation and scalability of interface-server logic interactions.

2.3 Backend Layer (Server-Side)

The Backend Layer fulfills its responsibility by managing all business operations within the placement system. The system consists of three main components that include the server component along with application logic and APIs that communicate with the database. A PHP platform called Laravel drives the backend development because of its famous strength and its capability to grow.

The Backend Layer contains these main characteristics:

- User Authentication and Authorization: Integrated with Firebase/Auth0 for user login, registration, and role-based access control (students, recruiters, coordinators).
- The system has a feature for job drive management which builds job drives by matching eligibility criteria with student profiles.
- The platform manages student placement testing through execution of scheduling functions alongside examination development features and score assessment procedures.
- The system delivers present-time alerts through email to both students and coordinators regarding job offers together with interview booking events and assessment results.
- The system maintains a system to monitor and restrict accepting multiple offers for students to a maximum of 3-4 options.
- The system produces automated placement reports through a process which analyzes student data with job statistics.
- The communication between the backend component and the Database Layer enables a proper recording mechanism for user actions and data storage functions.

2.4 Database Layer

All data relating to students and job drives together with recruiters and placement tests and reports falls under the purview of the Database Layer. The system implements MySQL/PostgreSQL as its database management systems because these are relational database management systems (RDBMS) which provide high performance alongside scalability and secure data storage.

The Database Layer exists with these main functional characteristics:

- Student Data: Stores student profiles, eligibility criteria, academic records, and application status.
- The database layer includes a section which contains job drive-related information alongside recruiter profiles and all available positions together with their specifications.
- The placement test data contains scheduling information and student outcome information including performance analytics.
- The system maintains placement statistics by department and tracks offer acceptance performances together with career history through Placement Report Data.
- The database implementations use tables with defined relationships that maximize database performance by enabling quick access and efficient data processing.

2.5 Cloud Deployment

AWS (Amazon Web Services) provides the hosting platform which ensures high availability together with

scalability and reliability for the system. All components of the application and supporting services have flexible deployment capabilities through AWS' infrastructure. Customer benefit from AWS global infrastructure because they can use the system from any location while experiencing low delay times.

Key features of Cloud Deployment:

- Traffic distribution through Elastic Load Balancing enables multiple servers to handle incoming traffic thus ensuring system high availability along with overload prevention.
- User needs determine server activation through Auto Scaling which maintains peak performance periods by scaling the active servers accordingly.
- The system's data backup mechanism with security features enables automated encryption and backup of redundant data.
- The system features integrated cloud storage for document storage which includes resumes and interview feedback and content delivery networks enhance static content loading times.

2.6 Authentication and Authorization

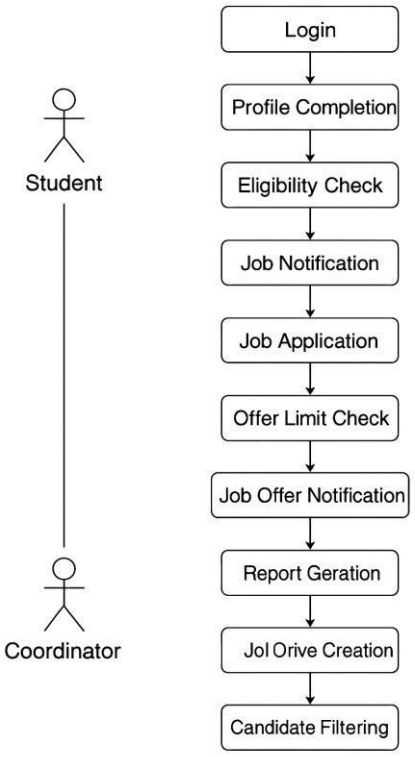
- A secure authorization system utilizes Firebase and Auth0 for protecting user access to specific sections of the application.
- The system relies on Firebase Authentication for its simple solution to implement user registration and authentication features alongside password protection functions.
- The Auth0 service implements role-based access control (RBAC) to remain the system provides students recruiters and placement coordinators permissions for their designated areas.
- The system design combines secure access features with role-based data access controls to ensure users reach only their authorized portions in the system.

2.7 System Flow

1. The system enables student enrollment by permitting access to frontend registration pages to complete profile setup. The system puts the student information in its database before conducting verification checks for candidate qualifications.
2. Job Drive Notification enables the backend system to send real-time alerts within system notifications after it filters appropriate students for job postings.
3. Students should use their available time slots to arrange their placement tests. After completion the program automatically processes and stores test results.
4. Students must use an application system to submit job applications according to their eligibility criteria. Students cannot accept more than their specified offer limit because the system both records the applications and enforces this restriction.
5. The platform produces placement reports automatically which contain placement activities summary alongside statistics about students.

2.8 System Flowchart

The placement system includes the following steps from registration through offer acceptance as shown below.



2.9 Execution Screenshots of the Placement System

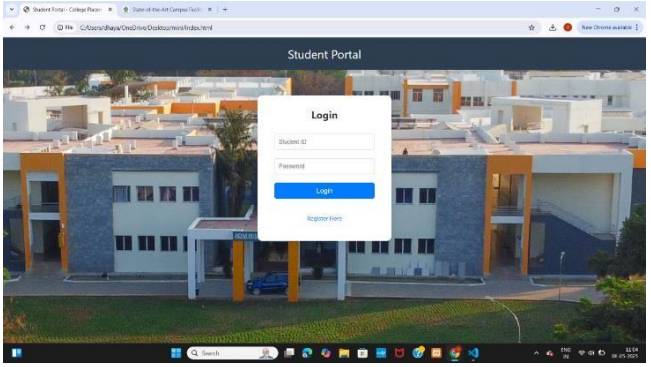
The below figures show the working interfaces and main functionalities of the Smart & Automated College Placement System.

These images give a complete overview of the user interactions, backend operations, and the streamlined placement process:

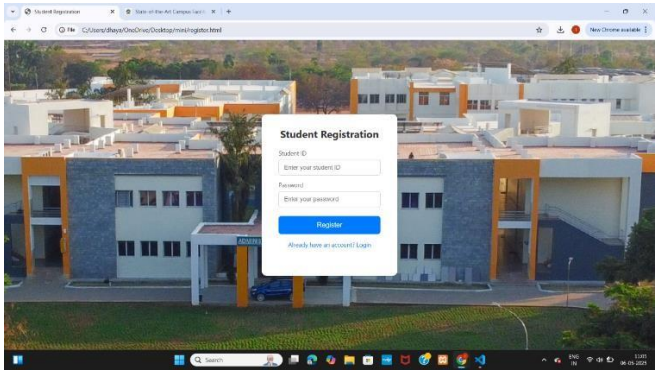
1. Student Login Interface:

A secure login page allowing students to view their customized placement dashboard.

Integrated with Firebase/Auth0 for real-time user authentication.



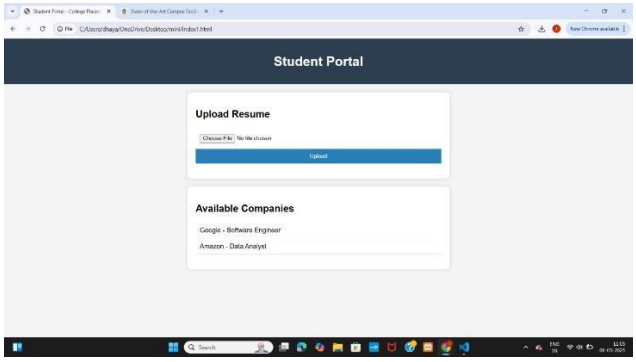
2. Profile Completion & Eligibility Status:
Students are asked to fill in their academic and personal information.
The system auto-calculates eligibility based on CGPA, department, and company-specific parameters.



3. Job Drive Notification Panel:
Shows active and future job drives specific to eligible candidates.
Filters out non-relevant drives to reduce information overload.

4. Placement Test Interface:
A daily aptitude and coding test module on the dashboard.
Assists students in pre-drive preparation and skill development.

5. Job Application Page:
Students can apply interest for eligible companies.
The system imposes offer-limiting logic to prevent multiple concurrent offers.



6. Admin/Coordinator Dashboard:
Allows coordinators to publish new drives, track applications, and view student offers.
Gives access to analytics and auto-report generation.

7. Offer Notification & Email Trigger:
Instant notifications and auto-email triggers sent to chosen candidates.
Facilitates instant communication with stakeholders.

8. Placement Report View:
Departmental and student-wise reports are generated.
Reports can be downloaded in Excel format for institutional records.

3. LITERATURE SURVEY

A. INTRODUCTION

A literature survey serves to deliver detailed descriptions of research works and development activities in a specified field of study. The literature survey about the Smart & Automated College Placement System focuses on investigating current technological solutions and their challenges as well as existing educational placement systems that have contributed to institutional placement system development.

- The survey focuses on newest technologies which enable efficient process control during placement operation.
- The current placement management systems encounter issues because of manual job drives and inadequate tracking of eligibility criteria and insufficient real-time notification systems. Modern technological elements including data analytics and AI together with cloud computing enable substantial system upgrades that reduce routine work while offering fair candidate selection programs along with advanced decision protocols.
- The literature review examines placement management system trends through their adoption of automated processes and cloud-based systems and analytical capabilities for reporting and decision support.

B. LITERATURE ON PLACEMENT MANAGEMENT SYSTEMS

Various research investigations examined multiple aspects of placement management systems by prioritizing automation elements and real-time notifications for creating more efficient placement procedures. Research on placement management systems includes important contributions which are listed below:

1. Placement Management System - A Case Study by J. Punitha Nicholine et al. (2023)

The research develops an automated placement system which unites functionality for job alerts together with candidate qualifications screening along with application status overview. The implementation system reduces human errors and placement coordinator work hours devoted to administrative tasks.

2. Smart Placement System Using Artificial Intelligence by T. Panchal et al. (2022)

This research adopts artificial intelligence and machine learning algorithms for automatic candidate-job role match making through the evaluation of their profiles and skills. Job recommendations through this system emerge from the analysis of historically collected student

placement data alongside market trend patterns that match with their profile characteristics.

3.E-Placement Management System by A. Latha Mary S. (2018)

An e-Placement management system described in this paper streamlines various operational tasks within the job placement system. The system provides users with tools including profile building and real-time job posting functions alongside tracking systems and automatic feedback processing. The system provides efficient operations for handling numerous students as well as numerous job openings.

4.Real-Time Job Placement System by M. Gayathri et al. (2021)

The research examines a genuine real-time job placement system which unifies notification functions with candidate qualifications testing and application development tracking. The system deploys cloud technology for timely distribution of placement information to all participants starting from students through recruiters up to coordinators.

C. LITERATURE ON STOCK MARKET

Stock market research fails to directly impact placement management but its analytical techniques enable powerful insights about data management and predictive modeling that serve the placement system.

1. Stock Market Prediction Using Machine Learning by R. Smith et al. (2020)

A research investigation applies machine learning algorithms to forecast stock market movements by analyzing past market historical data. The decision tree and regression model techniques are adaptable for predicting student placements using previous placement records to support improved choices for both students and coordinators.

2. Data Analytics for Stock Market Trends by A. Kumar et al. (2021)

The authors concentrate their research on stock market trend forecasting through data analytic applications while conducting real-time analysis of extensive datasets. The research method can help placement systems evolve through success prediction technology that determines student application outcomes toward particular company sectors.

3. Big Data in Financial Markets by M. Zhang et al. (2019)

The research analyzes financial market data analysis through big data while exploring methods to use these findings for predictions. Analyzed financial data techniques could work for student placement data to forecast student placement success probabilities through combining academic results with activity involvements and historical placement data elements.

4. MODULE DESCRIPTION

The Smart & Automated College Placement System contains different modules that allow both placement officer coordination and student job placement processing. The modules within the system specifically address distinct placement responsibilities aimed at achieving goal-oriented placement streamlining which depends on data-driven methods and qualification-based student and company matching.

The system contains these modules in its structure:

A. LIST OF MODULES

a) Raw Dataset

Raw Dataset serves as a module that processes and manages unorganized data collection regarding students and job placement activities. The collection methods utilize manual forms together with external information from job postings and student applications and university records. It consists of details like:

- Individual student profile contains Name along with department information and study year and academic results together with any supporting details that matter.
- The module contains company-specific information including company names alongside employment positions with specified qualifications and eligibility requirements and all needed employment specifications.
- The system tracks three important items: previous placement trends along with student applications for jobs and total received offers.
- This module functions as the first step towards any data manipulation or analysis since all system processes derive their input from it.

b) Visualization of Data

The Visualization of Data module presents raw information from the dataset using visual graphical elements that make it easier to understand. Most students alongside coordinators benefit from this visualization technique because it helps them understand important placement patterns and job application achievement statistics swiftly. This module delivers essential functionality which students alongside coordinators need.

- Job Trends: Visualizing the number of jobs available per department or per time period.
- This module presents placement data through metrics which display the number of placed students together with the average salary and other relevant placement statistics.
- The system displays eligibility distribution as a percentage which visualizes the population of students who qualify for different job drives.

- Clear visual display of data through charts including bar graphs together with pie charts, line graphs and histograms enables users to take better decisions by extracting meaningful insights.

c) Interactive Plot

• With its Interactive Plot module, the system allows users to interact with graphs and charts by providing direct control. This module has advanced features to enable users to carry out data point magnification and dataset filtering and view customization. Some of the important features include:

• Users get real-time filtering of data through the system by choosing student department and placement year and job type among other factors.

•Live adjustments make the plot current by showing latest modifications that happen to the Dataset as student and application data is altered.

•The interface allows users to hover over data points so that they can see exact data information that includes student category counts and company job provider details.

•Data exploration capabilities of the platform get improvements in this module to generate improved user interaction and improved insights.

d) Stationary Time Series & Non-Stationary Time Series

The Stationary Time Series & Non-Stationary Time Series module applies statistical techniques to review trends in the placement statistics over time. This is essential in forecasting future placement patterns and making informed decisions for future job drives.

• Stationary Time Series: This is data whose statistical characteristics such as mean, variance, and autocorrelation remain constant over time. For placements, stationary time series can be used to forecast placement success rates that do not have seasonal variations.

Example: If placements are consistent for a particular department over a number of years, the model will forecast the same trend in the future.

•Non-Stationary Time Series: Non-stationary data refers to the time series data which statistical properties vary with time. It could be because of varying trends, economic conditions, or other factors. The model can utilize sophisticated techniques to detect and factor in these variations.

Example: Varying economic conditions, industry trends, or government regulations might result in a variation in the number of placements over time, hence making it non-stationary.

e) Non-Stationary Time Series

The Non-Stationary Time Series module is a variant of the above module but is specialized in the treatment and analysis of non-stationary data. Non-stationary data needs extra statistical processes like differencing or decomposition to convert the data into a stationary state. In placement systems, non-stationary time series analysis can be applied to:

•Predict Placement Trends: Anticipate future placement trends even in situations where historical data indicates irregular patterns due to external influences.

•Detect Market Fluctuations: Identify phases of high growth or decline in placements, which can signal shifts in the job market or the impact of external influences such as economic downturns.

•Adjust for Seasonal Fluctuations: Factor in seasonal fluctuations in placements, such as high placement seasons in certain industries.

Non-stationary time series models will enable placement coordinators to modify their strategies to existing trends and make informed choices on how to spend resources on upcoming job drives.

5. CONCLUSION

The Smart & Automated College Placement System has been created with the major aim of automating and streamlining the college placement process. By combining cutting-edge technologies like data analytics, machine learning, and cloud-based services, the system enhances the effectiveness of job application tracking, eligibility filtering, report generation, and notification systems. The system is a useful tool for both students and placement coordinators, as it allows them to make informed decisions based on data and ensures the placement process is transparent and error-free.

Key Outcomes:

1. Increased Automation: The system automates various important steps of the placement process, including eligibility checks, job drive notifications, and offer tracking.
2. Data-Driven Insights: Through data visualization and analytics, the system provides useful insights to the students and coordinators about placement trends, eligibility, and success rates.
3. Increased Efficiency: By doing away with manual processes, like sending out reminders and creating reports, the system releases time for placement coordinators to engage in more strategic tasks.
4. Transparency & Accuracy: Through the automated checks of eligibility, the system sees to it that only eligible students apply for the jobs that concern them, avoiding confusion and making the process transparent and more accurate.

a) FUTURE SCOPE

The Smart & Automated College Placement System can be extended and advanced further to cater to the changing requirements of schools, students, and recruiters. Following are possible areas for future growth and improvement:

1. AI and Machine Learning Integration for Advanced Analytics

• Predictive Placement Analytics: The system may forecast future placement trends from past history, external information, and student profiles through the use of machine learning models. This would enable more

accurate forecasts of job offers and steer students to sectors with strong placement probabilities.
•Smart Matching Algorithms: AI-based algorithms may match students with organizations on more detailed criteria such as personality, skill set, and professional aspirations, enriching the hiring process beyond just academic credentials.

2. Integration with Industry-Specific Platforms
• Future releases of the system would be able to integrate directly into third-party hiring platforms employed by businesses, for example, LinkedIn, Naukri, or other bespoke hiring platforms. This would streamline the hiring process, making both the application process and selection much easier for the students and the recruiters.
• It would also be integrated with online test platforms such as AMCAT and Cocubes for automated skill testing and ranking of candidates, giving real-time eligibility certification and selection on the basis of test results.

3. Mobile Application Development
•Creating a mobile version of the platform would enable the system to be used on-the-go, and students and placement coordinators could obtain real-time updates, job alerts, and application statuses. Mobile integration would further enhance the placement process to be interactive and efficient.
•Push notifications on mobile features for application deadlines, interview timings, or job offers would improve the communication between placement coordinators and students.

4. Improved User Experience with Gamification
• Incorporating gamification strategies might improve student motivation through the use of achievement badges, leaderboards, or incentives for job applications, interviews attended, or successful placements. This would make the placement process more encouraging and push students to engage more actively in the placement process.

5. Blockchain for Credential Verification
• Incorporating blockchain technology might enable secure and tamper-proof verification of student credentials, lessening the risk of fraud or misrepresentation. Blockchain may be employed to save and verify academic certificates, internship details, and other student credentials so that there can be trustworthiness in the placement process.

6. Cloud-Based Scalability and Global Expansion
•As the system develops, it could be expanded to accommodate multiple institutions, with universities in various geographic locations being able to join collective placement drives or pool job offers. The cloud-based nature of the system would enable global reach, facilitating easy integration with overseas recruiters.
•The extension could also include support for multiple languages to address diverse student groups and accommodate different global education systems.

7. Personalized Career Guidance and Support
•The system may give career advice based on individual student profiles such as skill set, interest, and previous performance. By incorporating a career guidance module, students might be advised on career options, suggested industries, and possible work roles that suit their interests the best.
•Moreover, the system may provide ongoing post-placement guidance, like job retention techniques, skill enhancement courses, and mentoring, to enable students to excel in their profession after placement.

8. Real-Time Analytics for Placement Coordinators
•Real-time dashboards may be introduced to provide placement coordinators with a real-time view of placement statistics, student activity, application status, and company involvement. This would enable coordinators to make rapid decisions and adjustments to enhance the effectiveness of the placement process.
•Success rates in placement may be tracked continuously, and coordinators may be provided with feedback on areas of improvement, e.g., which departments or student groups are lagging behind in obtaining job offers.

9. Alumni Network Integration
• The system may enable the integration of alumni networks, enabling students to engage with alumni who can provide job guidance, mentorship, and possible employment opportunities. The alumni network may act as a gateway to industry connections and provide useful assistance to recent graduates.

6. REFERENCES

1. J. Punitha Nicholine, B. Lakshmi Priya, S. Ilakkiya, M. Kartheeswari, and D. Kethrin Malar, "Placement Management System," International Journal of Progressive Research in Engineering Management and Science (IJPREMS), vol. 03, no. 04, pp. 120-124, Apr. 2023.
2. T. Panchal, M. Wadke, and A. Sedamkar, "Placement Management System," International Research Journal of Engineering and Technology (IRJET), [Online]. Available: www.irjet.net.
3. A. Banu, M. Bargavi S. K, "A Research on Placement Management System," International Journal for Research in Applied Science & Engineering Technology (IJRASET), vol. 10, issue IV, Apr. 2022.
4. A. Latha Mary S., "E-Placement Management," International Journal of Pure and Applied Mathematics, vol. 119, no. 10, pp. 1823-1834, 2018.
5. A. Sunny, A. Felix, A. Saji, C. Sebastian, and P. V. M, "Placement Management System for Campus Recruitment," International Journal of Innovative Science and Research Technology (IJISRT).
6. M. Gayathri, D. Surya Manohar, and S. Shiva Koushik, "Placement Management System," International Journal of Current Research and Technology (IJCRT).
7. S. Gupta and R. Sharma, "An Advanced Placement Management System: An Overview," International Journal of Computer Applications, vol. 85, no. 14, pp. 6-

12, 2015.
8. A. Kumar and V. Yadav, "Automated College Placement System Using Cloud Computing," International Journal of Computer Science and Information Technologies, vol. 5, pp. 5353-5355, 2014.
9. S. Bansal, M. Aggarwal, and A. Srivastava, "A Web-Based Placement Management System: A Solution for Seamless Recruitment," International Journal of Engineering and Advanced Technology (IJEAT), vol. 8, no. 5, pp. 1663-1671, 2019.
10. D. Pandey and S. Agarwal, "Development of a Smart Placement System for Colleges Using Cloud Computing," International Journal of Advanced Computer Science and Applications (IJACSA), vol. 10, no. 8, pp. 118-124, 2019.