CareerBridge: A Web-Based Platform for Personalized Career Guidance and Placement Preparation.

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Abstract—**Job preparation is usually scattered. A student may read about careers on one site, study on another, edit a resume in a third tool, and practise interviews somewhere else, with nothing connecting these efforts. CareerBridge is a web platform that puts all of these activities in one workspace and links them together, so each step feeds the next. A new user begins with a career assessment. Its outcome produces personalised role suggestions, and every suggested role is paired with a phased roadmap. The Learning Hub then lists study material for the skills that the roadmap requires. Progress is measured through three test types, technical, aptitude, and coding, and the results are stored as graphs and an attempt log so a student can compare current performance with earlier sessions. On the job-application side, the Resume Builder helps create a resume from scratch, and the Resume Analyzer examines it and recommends improvements. Along the way, students can type a question into the built-in chatbot, whether it concerns a job role, a missing skill, or an upcoming campus drive. Interview practice is handled by two separate modes, Technical and HR. Through the Gemini API, the platform drafts questions tailored to the chosen role and skills, assesses what the student answers, and uses that answer to decide what to ask next. Since no two sessions follow the same sequence, the experience resembles a live conversation more than a question bank. CareerBridge is implemented with React.js for the user interface, Node.js with Express.js for server logic, and PostgreSQL for storing data. The rest of this paper describes how the system is designed and built, goes through each module in turn, and shows how the modules connect to carry a student from choosing a career to facing recruiters.**

Index Terms—**Career guidance, Placement preparation, Career roadmap, Learning management, Resume analysis, Chatbot, Skill assessment, Technical/HR interview.**

I. INTRODUCTION

Making the jump from college to a first job is not easy. Students have to figure out where their strengths lie, decidewhich roles suit them, build the skills those roles demand, and get ready for campus recruitment drives. Each of these steps usually has its own website or app, and moving between them while keeping track of progress quickly turns into extra work. Researchers have already explored digital support for ca-reer guidance and placement preparation. Asmamaw and Ns-abiyumva examined an AI-driven approach to guidance, while Shanmugam et al. developed a web application aimed at placement preparation [1], [2]. Other work covers training and placement portals, recruitment preparation systems, and general guidance tools [3]– [5]. Newer studies lean on artificial intelligence and machine learning to personalise a student's growth. Chandrakumara and Silva, for example, designed a framework that predicts suitable job roles, identifies where a student's skills fall short, and suggests what to learn next. George et al., meanwhile, looked at an intelligent platform built for interview training [6]–[8]. Guo and Guintu, writing about university students, highlighted how much early career
planning and employment advice can matter [9].
Despite this progress, students still end up hopping between separate tools for assessment, learning, resume writing, and interview practice. Yet these steps are closely linked. The chosen role sets the list of skills to learn, and from there, studying and rehearsing interviews carry the student toward recruitment. Students also need a way to check their technical knowledge, aptitude, and coding ability, and to see how their scores move over time.

CareerBridge tackles this by bringing career, technical, aptitude, and coding assessments, career recommendations, roadmaps, and learning resources into a single web appli-cation. A central dashboard connects every feature, and as-sessment graphs and history let students see their progress.

The Career Roadmap lays out the preparation stages for a chosen role, the Learning Hub offers resources that match it, the Resume Builder helps students put a resume together, and the Resume Analyzer points out where it can be improved. A chatbot is also on hand to answer questions about careers, technical skills, and placement preparation.

The platform also includes an adaptive mock interview with separate Technical and HR modes. During a mock interview, the student answers a question tailored to their chosen role and skills. Each response is sent to the Gemini API, which rates it and produces a follow-up that builds on what the student just said. The system is built with React.js on the frontend, Node.js and Express.js on the backend, and PostgreSQL for data storage. In short, CareerBridge gives students one organised, easy-to-use place to explore careers, build skills, gauge their readiness, and prepare for placements.

II. LITERATURE REVIEW

Previous studies have explored the use of web-based plat-forms, artificial intelligence, and machine learning to support students in career planning and job preparation. These studies focus on different areas, including choosing suitable career paths, improving skills, preparing resumes, and practising for interviews.

Asmamaw and Nsabiyumva proposed an AI-powered dig-ital career guidance approach for connecting education with employment opportunities [1]. Shanmugam et al. presented a web application to support students in placement preparation and employability activities [2]. These studies demonstrate the use of digital platforms for organizing career and placement-related support.

Recent studies have focused on personalization through the use of AI and machine learning. Chandrakumara and Silva proposed a framework combining job-role prediction, skill-gap analysis and personalized learning-path recommendation [3]. George et al. presented AceIt, an AI-based platform for campus placement readiness which included activities such as skill development, mock interviews and resume preparation [4]. Nisanth et al. developed CareerConnect, an intelligent web-based platform focused on interview preparation for en-gineering students [5].

Previous research has also focused on placement portals and career guidance systems. Kasture et al. developed a web-based portal to support training and placement activities [6]. Danish introduced a system to help students prepare for recruitment [7]. Agashe et al. studied the use of machine learning in placement preparation and career guidance [8]. Similarly, Guo and Guintu emphasized the need for proper career planning and employment guidance for university students [9].

The existing studies show that digital platforms and AI-based systems can help students with career guidance, person-alized learning, placement preparation, and interview practice. However, these features are often available separately or are not fully connected. CareerBridge brings these features together in one web-based platform. It includes career assess-ment, role-based learning recommendations, resume creation and analysis, and adaptive mock interviews. The interview fea-ture also considers the selected job role and relevant technical skills to evaluate responses and generate follow-up questions.

III. PROPOSED SYSTEM

CareerBridge is a web-based application that integrates ca-reer guidance and placement preparation into a single platform. It includes career assessment, technical, aptitude and coding assessments, career recommendations, a Career Roadmap, Learning Hub, Resume Builder, Resume Analyzer, career guidance chatbot, and a student dashboard with assessment graphs and history. The platform also provides adaptive mock interviews through separate Technical Interview and HR In-terview modes. The Gemini API supports question generation and response evaluation based on the selected career role, tech-nical skills, and previous responses. CareerBridge is developed using React.js, Node.js, Express.js, and PostgreSQL, with the aim of providing students with a structured approach to career development and placement preparation.

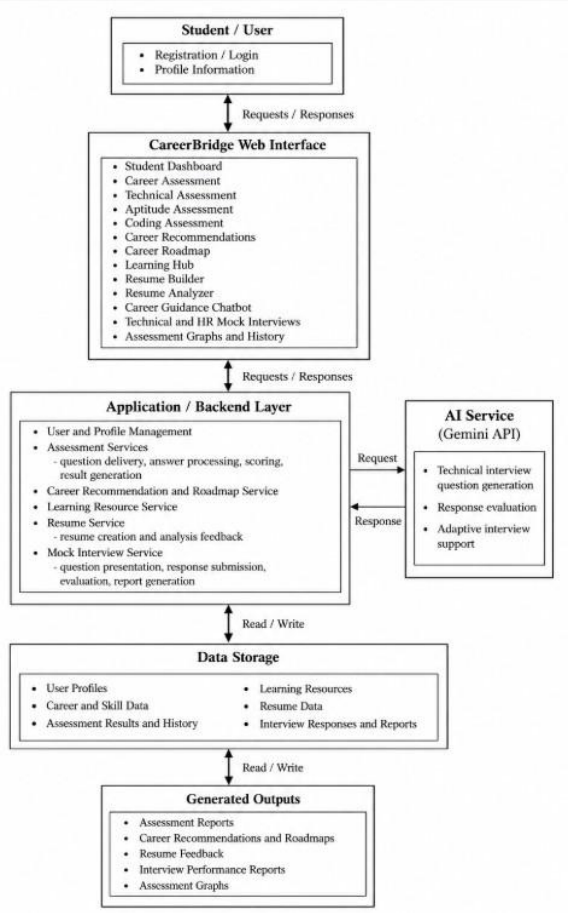

Fig. 1. System architecture of the CareerBridge platform.

IV. METHODOLOGY

CareerBridge is built as a set of connected modules that put career guidance and placement preparation in a single web application. Its features are a career assessment, technical, aptitude and coding tests, career recommendations, a Career Roadmap, a Learning Hub, a Resume Builder, a Resume Analyzer, a career guidance chatbot, assessment graphs with history, and adaptive mock interviews. React.js handles the frontend, Node.js and Express.js run the backend services, PostgreSQL stores the data, and the Gemini API powers the mock interviews.

A. Overall System Workflow

A student first registers and sets up a profile. Once logged in, they land on the dashboard, from which every prepara-tion module can be reached. From there a student can take assessments, look through recommended careers, work along a roadmap, use learning resources, build and check a resume, and rehearse interviews. Graphs and past attempts let them look back at how their results have changed.

B. User Authentication and Dashboard

Access to the modules requires registering and logging in. After that, the dashboard acts as the student's starting point and lets them move easily between assessments, career guidance, learning material, resume tools, and interview practice.

C. Career and Skill Assessments

The career assessment looks at a student's interests and answers to suggest career paths that may suit them. Sepa-rate technical, aptitude, and coding tests then check subject knowledge, logical reasoning, and programming ability.

Where an assessment is scored by counting correct answers, the percentage is obtained from:

$$P = \frac{C}{N} \times 100 \qquad (1)$$

Here C is the number of correct answers and N is the total number of questions. The results show students where they are strong and where they need more work, and the graphs and attempt history let them compare new scores against earlier ones.

D. Career Roadmap and Learning Hub

Once a student has chosen a career interest and a job role, CareerBridge suggests matching careers and lays out a structured Career Roadmap. The roadmap divides the prepa-ration into stages for the chosen career. Alongside it, the Learning Hub offers resources for building the required skills and getting ready for placements.

E. Resume Preparation and Analysis

Using ready-made templates, the Resume Builder lets stu-dents enter their education, technical skills, projects, certifi-cations, and achievements in an organised way. The Resume Analyzer then reads the resume and gives feedback on weak areas, helping students bring the document closer to their career goals.

F. Career Guidance Chatbot

Students can put questions about career options, technical skills, and placement preparation to the chatbot. It gives them a conversational way to get

guidance without leaving the platform, and it supports the work they do in the other modules.

G. Adaptive Mock Interview

Mock interviews come in two modes, Technical Interview and HR Interview. The student picks a career role and the technical skills they want to practise. A session contains 25 questions in total. The student first answers a standard intro-ductory question, "Tell me about yourself," and the Gemini API creates the questions that come after it.

Answers are assessed on criteria such as relevance, technical proficiency, communication, and completeness, following the interview evaluation process. The earlier answers and the interview context then shape the next question, so the session adapts as it progresses.

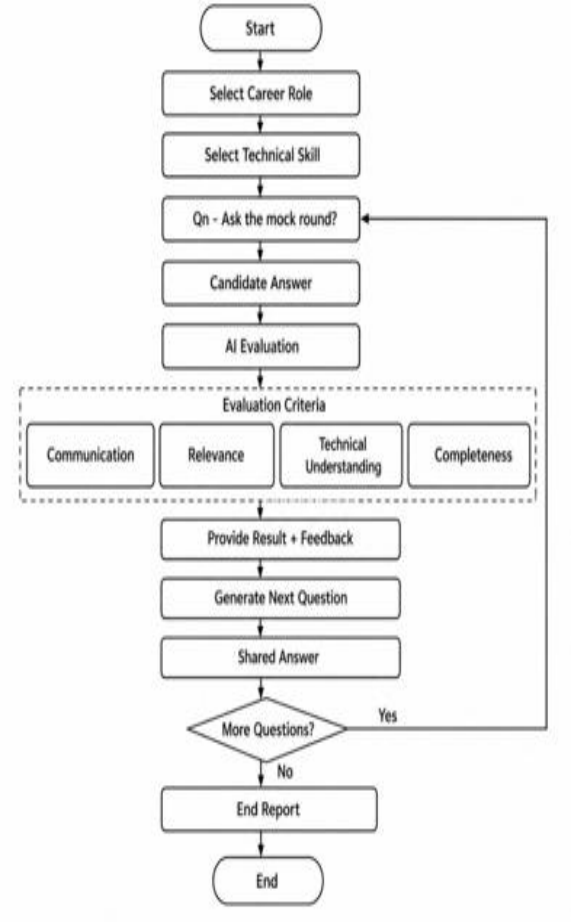

Fig. 2. Adaptive mock interview workflow.

H. System Implementation

React.js was used to build the frontend, and Node.js with Express.js provides the backend services and REST APIs. PostgreSQL holds the application data along with the as-sessment records. The Gemini API is connected to the mock interview module, where it generates questions and evaluates responses. The components exchange data through defined in-terfaces, which is how the application's features work together.

I. Module Integration

The modules are linked so that the platform feels like one continuous experience. Career and skill assessments show students their present abilities, and the recommendations, Career Roadmap, and Learning Hub guide what they study next. The Resume Builder, Resume Analyzer, chatbot, dash-board, assessment history, and mock interviews add support at different points along the way. Taken together, they take a student from exploring careers, through building skills, to placement readiness, all on one platform.

V. RESULTS AND DISCUSSION

CareerBridge was tested module by module to confirm that its main features work as intended, with the assessment module, the adaptive mock interview system, and the career guidance chatbot as the focus of the results.

After an assessment is completed, the result page reports the student's score and performance level, then lists strong topics and those needing more work (Fig. 3).

Students practise in either a Technical or an HR track, and each reply they type is reviewed by the Gemini API against criteria such as relevance and technical proficiency. The final interview report summarises this evaluation along with feedback, so a student can see where their interview skills fall short (Fig. 5).

Through the chatbot, a student can ask about careers, required technical skills, or placement preparation and receive an answer without leaving the platform (Fig. 4).

Taken together, these results show that CareerBridge com-bines skill testing, adaptive interview practice, and chatbot guidance in one place for students preparing for placements.

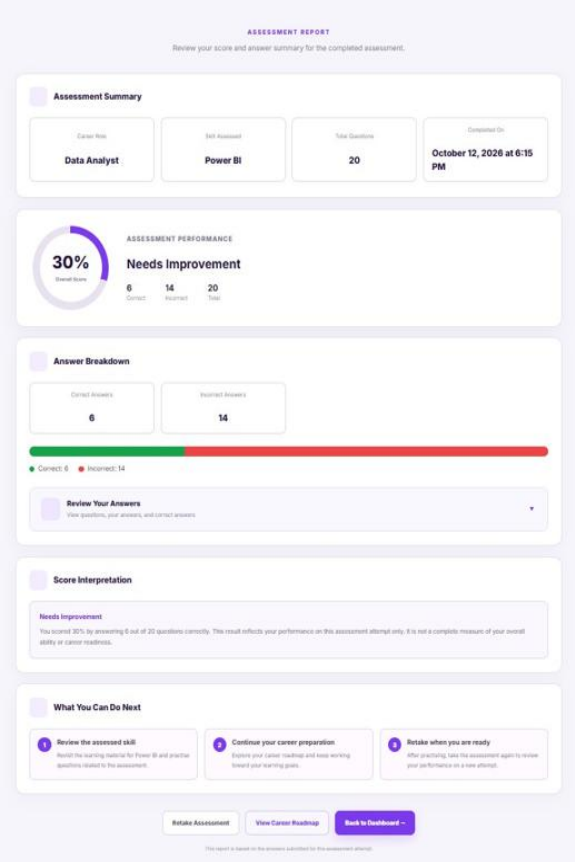

Fig. 3. Career assessment result and performance report.

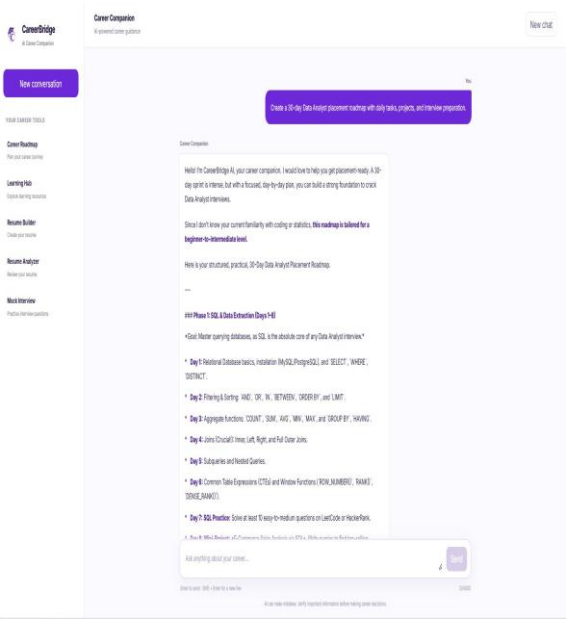

Fig. 4. Career Guidance Chatbot providing personalized career guidance and placement preparation support.

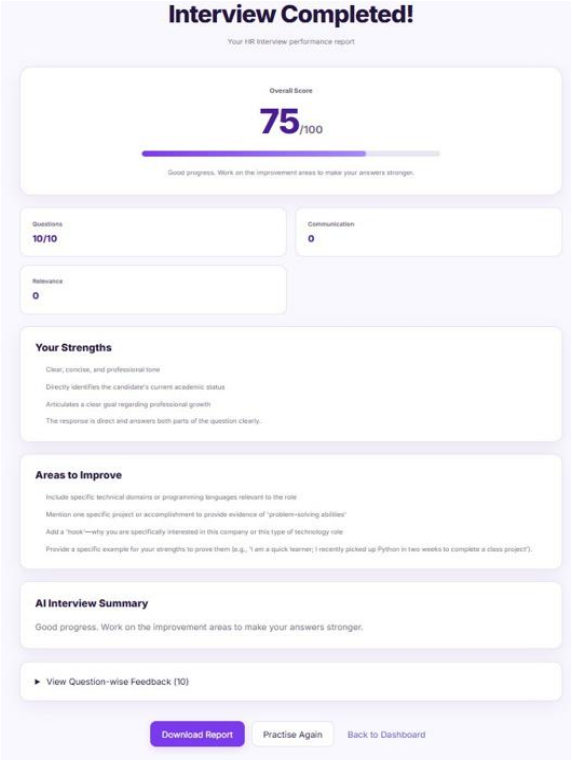

Fig. 5. Mock interview evaluation and final performance report.

VI. CONCLUSION AND FUTURE SCOPE

CareerBridge is a web-based application that integrates career assessment, career recommendations, technical, aptitude and coding assessments, learning guidance, resume prepara-tion and analysis, career guidance chatbot, and mock interview practice. The platform also provides a student dashboard, Career Roadmap, Learning Hub, and assessment graphs and history to help students organize their preparation and monitor

their progress. The mock interview module supports Technical Interview and HR Interview modes and uses the Gemini API for adaptive question generation and response evaluation based on the selected career role, technical skills, and previous responses. The developed platform provides an integrated approach to career exploration, skill assessment, learning, resume preparation, and interview practice. It aims to help students follow a structured path toward placement prepara-tion within a single application. In the future, CareerBridge can be improved by enhancing the personalization of career recommendations, expanding the number of supported job roles and

technical skills, and improving resume analysis and performance analytics. Additional job and internship sources could also be integrated to provide more opportunities for students. Furthermore, the platform could be evaluated with a larger group of students to assess its usability, effectiveness, and applicability in real-world career guidance and placement preparation.

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