Jaypee Institute of Information Technology, Noida

Department of Computer Science & Engineering and IT

Major Project Title: CareerGo- An AI based smart interview preparation application

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DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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CERTIFICATE

This is to certify that the work titled **CareerGo- An AI based smart interview preparation application** submitted by **Vidhi Rastogi (21103120) and Himral Garg (21103128)** in partial fulfillment for the award of degree of **B. Tech** of Jaypee Institute of Information Technology, Noida has been carried out under my supervision. This work has not been submitted partially or wholly to any other University or Institute for the award of this or any other degree or diploma.

Signature of Supervisor : ……..

Name of the Supervisor : Dr.Sherry Garg

Designation : Assistant Professor

Date :

ACKNOWLEDGEMENT

We would like to extend our sincere gratitude to our supervisor, **Dr. Sherry Garg**, for her invaluable guidance, encouragement, and unwavering support throughout this research journey. Her insightful feedback, thoughtful advice, and genuine enthusiasm for our work have been instrumental in shaping this project and helping us achieve our goals.

We are deeply grateful for her patience, wisdom, and the opportunities she provided to challenge and improve ourselves. Working under her mentorship has been a privilege, and her dedication and expertise will continue to inspire us in our future endeavors.

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SUMMARY

CareerGo: An AI-Based Smart Interview Preparation Application transforms how candidates prepare for interviews and build resumes. Guided by the vision — Smarter Prep. Stronger You. CareerGo Awaits — it combines advanced AI with an intuitive interface for efficient, personalized preparation.

CareerGo features AI-powered resume analysis that delivers ATS compatibility scores and tailored suggestions based on the user's resume and job description. It includes a curated question library spanning 17+ computer science engineering domains, covering behavioral, theoretical, and practical areas

Users can simulate real interviews through AI-driven mock sessions by selecting their role, skills, and experience. CareerGo generates five custom questions, transcribes spoken responses, and provides detailed feedback and performance scores. Past sessions are stored for easy review.

The Hackathon Board offers a live calendar of ongoing and upcoming events from platforms like Unstop and Devpost, promoting hands-on learning and portfolio growth. It also integrates real-time job matching via Remotive.com and leverages Gemini AI for responsive performance.

With prompt engineering, CareerGo ensures accurate, context-aware AI interactions. Planned upgrades include resume-based question generation, a resume builder, and personalized course recommendations, making CareerGo a comprehensive tool for career development.

Name of the Supervisor : Dr.Sherry Garg

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LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 GENERAL INTRODUCTION

CareerGo is an advanced career development platform built to assist job seekers (mainly fellow engineers) in enhancing their professional profiles, finding relevant job opportunities, and preparing effectively for interviews. Designed with a focus on user empowerment and real-world application, CareerGo intelligently analyzes user resumes, recommends personalized job openings, and provides AI-driven interview preparation. By bridging the gap between skills and market demands, CareerGo acts as a personal career assistant, guiding users toward their professional goals with precision and efficiency.

The core objective of CareerGo is to simplify and optimize the job search and preparation process. It provides a resume analysis system to identify key strengths and improvement areas, a job recommendation engine that matches candidates to relevant opportunities based on their profiles, and an interview preparation module that helps users strengthen their responses through AI-powered insights. With a focus on continuous improvement and real-time feedback, CareerGo ensures that users stay competitive and job-ready at all times. The platform also includes a Hackathon Board, which showcases ongoing and upcoming hackathons from platforms like Unstop and Devpost, enabling users to participate in competitive, real-world challenges that boost their skills, visibility, and portfolios.

CareerGo has been developed to offer a seamless and user-friendly experience, accessible across multiple devices and adaptable to future enhancements. The platform’s architecture is modular, allowing easy integration of additional features like company-specific resume screening, career growth tracking, and personalized learning recommendations. CareerGo’s dynamic approach positions it not just as a tool, but as a full-fledged career partner for today's evolving job market.

RESUME ANALYSIS

The Resume Analysis module forms the foundation of CareerGo's intelligent system. It carefully examines user-uploaded resumes, extracting critical information such as skills, educational background, work experience, certifications, and achievements. The analysis is designed to evaluate how well the resume aligns with industry standards and specific job roles.

By identifying strengths and highlighting gaps, CareerGo provides actionable suggestions to optimize the resume for better visibility in Applicant Tracking Systems (ATS) and among recruiters. Users receive a detailed resume score, keyword usage evaluation, and customized improvement tips, enabling them to refine their profiles for maximum impact. This feature ensures that candidates present the best version of their professional story to potential employers.

JOB RECOMMENDATION ENGINE

The Job Recommendation Engine is a personalized matching system that aligns job seekers with opportunities based on their resume data and career preferences. Leveraging advanced generative AI, CareerGo evaluates the extracted resume information against a curated database of job postings to recommend roles that best fit the candidate's skills, experience, and goals.

Recommendations are not generic; instead, they are tailored to match industry demands, preferred roles, and even skill progression paths. Users can view a list of recommended jobs with details such as required skills, company profiles, and application links. This intelligent matching significantly reduces the time and effort involved in job searching, allowing users to focus on preparing high-quality applications for the right opportunities.

QUESTION BANK

CareerGo offers an extensive Question Bank designed to comprehensively prepare users for interviews across various domains. The question bank covers over 17 Computer Science Engineering (CSE) fields, including Data Structures, Algorithms, Databases, Machine Learning, Web Development, Cybersecurity, System Design, Networking, DevOps, and more.

Each domain includes carefully curated questions across three levels of difficulty — Easy,

Medium, and Hard — ensuring a structured learning curve for users at different stages of preparation. The questions encompass technical, theoretical, practical, and HR interview aspects, giving users a well-rounded practice experience.

By enabling users to practice domain-specific questions and progressively tackle harder problems, the Question Bank enhances technical confidence and readiness. Whether preparing for internships, entry-level jobs, or experienced technical roles, users can leverage this vast collection to build both knowledge depth and practical problem-solving skills.

INTERVIEW PREPARATION MODULE

CareerGo's Interview Preparation Module enhances user readiness for interviews through AI-driven practice and feedback. After selecting a role or job type, users can access role-specific technical and behavioral questions, practice their responses, and receive evaluation insights powered by AI models.

The system provides sample high-quality answers, identifies areas of improvement in user responses, and suggests strategies to improve communication, confidence, and content structure. By simulating real interview conditions and offering personalized feedback, this module helps candidates build strong, articulate responses and approach interviews with greater confidence and preparation.

HACKATHON BOARD

The Hackathon Board is CareerGo's gateway to real-world skill application and experiential learning. This module provides users with a live, interactive calendar that showcases ongoing and upcoming hackathons sourced from trusted platforms like Unstop and Devpost. Whether users are looking to build their portfolios, collaborate with peers, or simply challenge themselves in a competitive setting, the Hackathon Board offers timely, relevant opportunities to grow.

By participating in hackathons, users not only enhance their technical and problem-solving abilities but also gain exposure to industry-level challenges, often resulting in internships, job offers, or mentorships. This feature strengthens CareerGo's mission of holistic career

development by connecting learning with action.

1.2 PROBLEM STATEMENT

In today's highly competitive job market, final-year engineering students and fresh graduates face significant challenges in effectively preparing for their careers. Despite the abundance of online resources, candidates often struggle with navigating through a vast sea of scattered, unorganized, and often outdated content. Traditional methods, such as static question banks and generic sample resumes, fall short in addressing the personalized needs of individual candidates and adapting to different industries, roles, or levels of expertise.

Many candidates find it difficult to craft resumes that align accurately with job descriptions, leading to missed opportunities despite having the required skills. Additionally, the absence of real-time, personalized feedback makes it hard for individuals to identify their strengths, address their weaknesses, and fine-tune their preparation strategies. This gap often results in inefficient preparation, lack of confidence during interviews, and reduced chances of securing the desired roles.

As final-year B.Tech students ourselves, we experienced these difficulties firsthand — confusion about which resources to trust, uncertainty in customizing resumes for different career paths, and lack of structured, role-specific interview preparation tools. Recognizing the pressing need for a comprehensive and intelligent career support system, we developed CareerGo to address these challenges holistically.

CareerGo integrates advanced career support features into a single, easy-to-use platform. It offers AI-driven Resume Analysis with improvement suggestions, Job Recommendations based on resume content, a curated Question Bank covering over 17 major Computer Science domains at varying difficulty levels, and Interview Preparation Assistance to simulate real-life interview experiences. The hackathon board provides them with real-world opportunities to collaborate with others and work towards a problem. By providing real-time insights, structured preparation paths, and tailored recommendations, CareerGo empowers candidates to bridge the gap between academic knowledge and professional readiness.

Through CareerGo, we aim to streamline the preparation journey for final-year students and early-career professionals, enabling them to confidently approach job applications, perform well in interviews, build up a nice portfolio and secure opportunities aligned with their goals.

1.3 SIGNIFICANCE/NOVELTY OF THE PROBLEM

CareerGo introduces a novel approach to interview preparation by merging artificial intelligence with personalized learning. Unlike static resources, CareerGo dynamically adapts to the user's needs, offering tailored resume feedback based on job descriptions and providing a diverse range of interview questions from various domains. The inclusion of AI-driven mock interviews that record, analyze, and provide feedback on answers is a key feature that sets it apart. It also offers a curated Hackathon Board that lists ongoing and upcoming events, helping users gain practical experience and strengthen their portfolios. This approach gives users a realistic, interactive experience and helps them continuously improve. What makes CareerGo especially significant is its ability to break down complex preparation tasks into manageable, bite-sized steps while giving immediate, actionable insights. Our personal journey through the placement season fueled the creation of a solution that not only prepares candidates but empowers them to approach opportunities with confidence and clarity. CareerGo bridges the gap between generic preparation methods and the specific demands of real-world recruitment processes.

1.4 EMPIRICAL STUDY

OBJECTIVE

Analyzing the current landscape of interview preparation tools and comparing them with CareerGo to identify gaps, user needs, and areas where CareerGo offers unique value.

FIELD SURVEY:

- Conducted a survey among job-seeking students and fresh graduates to understand the effectiveness of existing interview preparation tools and identify unmet needs.

- Participants were questioned on their preferred resources, satisfaction levels, pain points, and interest in AI-based personalized platforms.

ANALYSIS:

User Preferences:

- 90% of respondents use LeetCode as their primary interview preparation resource, followed by GeeksforGeeks (67.5%) and HackerRank (55%).
- 37.5% of participants use mock interview platforms, yet only 15% use VMock and 15% use InterviewBit, indicating a gap in awareness or usability of mock tools.

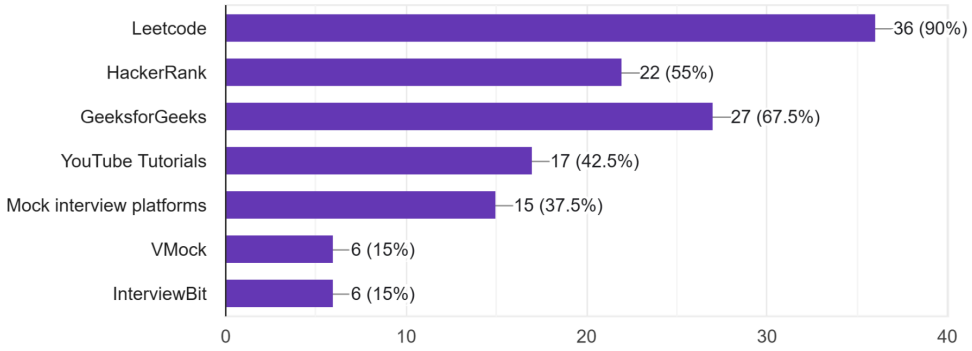

Figure 1.1: Preferred Interview Preparation Resources

User Satisfaction:

- Only 7.5% of users are very satisfied, while 32.5% are just satisfied and 27.5% remain neutral.
- 15% are very dissatisfied, indicating that many platforms fall short in delivering complete value.

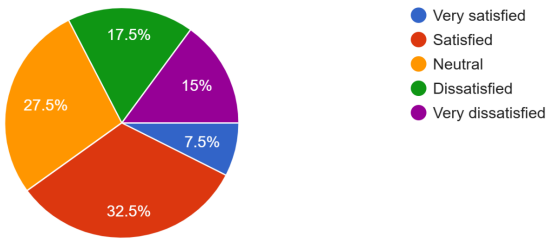

Figure 1.2: User Satisfaction Levels with Current Tools

Identified Gaps:

- 72.5% cited a lack of personalized feedback as the biggest issue.
- 62.5% said there's a lack of real-time mock interviews.
- 55% found resume optimization tools inadequate.
- 55% noted the absence of behavioral questions in current tools.

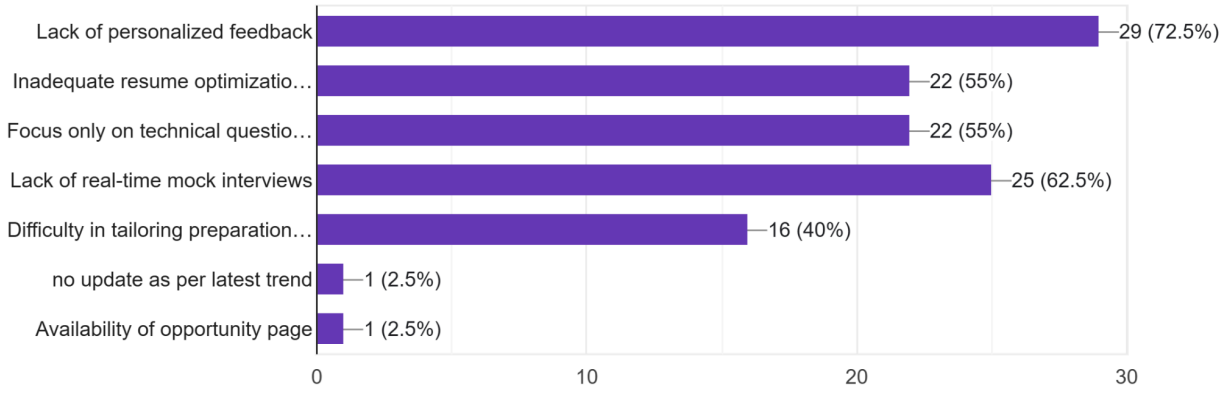

Figure 1.3: Major Gaps in Current Interview Preparation Tools

Resume Tailoring Challenges:

- 75% frequently face issues tailoring resumes to specific job roles.
- 22.5% face these challenges occasionally.

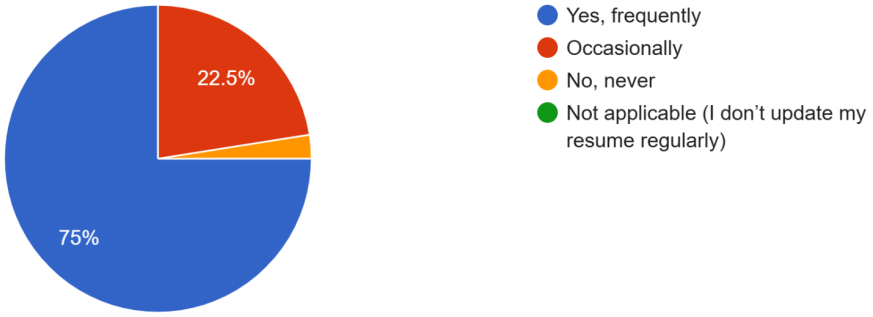

Figure 1.4: Resume Tailoring Challenges Faced by Users

Desired Features:

- 60% want a comprehensive question bank with technical, behavioral, and practical questions.
- Another 67.5% need Mock interviews with AI- driven feedback.
- 62.5% are looking for AI based resume analysis.

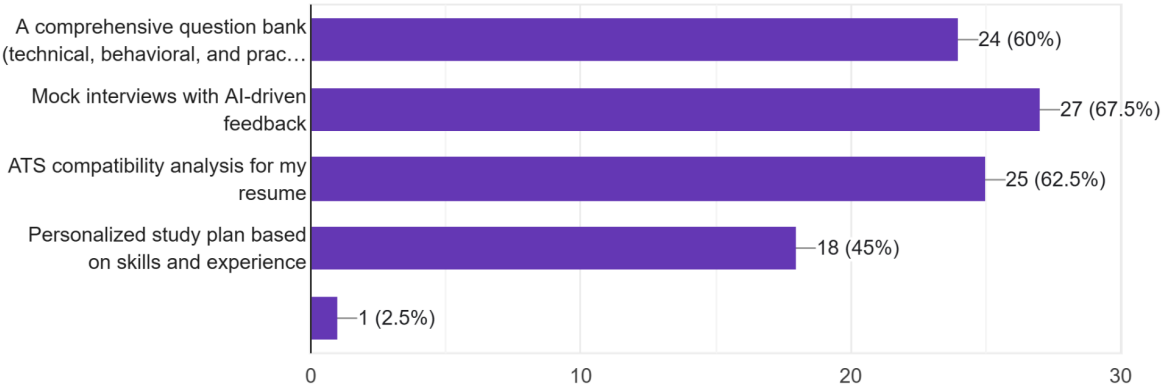

Figure 1.5: Most Helpful Interview Preparation Features

Platform Interest:

- 92.5% of users would be interested in using a platform that offers resume analysis, mock interviews, and personalized preparation—all features provided by CareerGo.

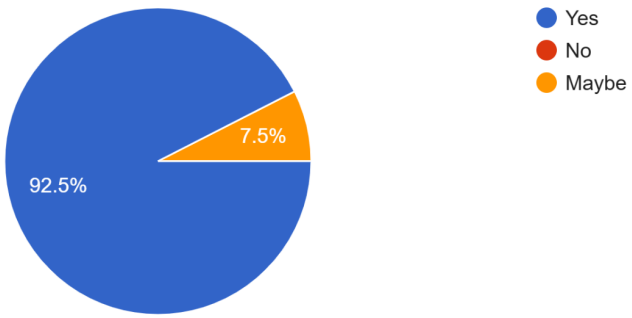

Figure 1.6: Interest in a Smart All-in-One Interview Prep Platform

CONCLUSION:

The empirical study clearly indicates a strong demand for a smart, AI-based interview preparation platform. Current tools like LeetCode and GeeksforGeeks dominate the market but lack features such as personalized feedback, behavioral question training, and resume tailoring. With over 92.5% of users expressing interest in an integrated platform offering mock interviews, ATS-based resume analysis, and personalized question banks, CareerGo directly addresses these gaps and stands out as a timely, relevant, and impactful solution.

EXPERIMENTAL STUDY:

- CareerGo was deployed locally and tested by 5 final-year CSE students preparing for placements.
- Key modules—Resume Analyzer, Mock Interview, Skill Gap Detector—were evaluated against manual benchmarks to assess accuracy and quality.

Feature Evaluated	CareerGo Accuracy/Performance	Manual/Benchmark Accuracy	Comments (Testing Method)
Resume ATS Compatibility Scoring	86%	83%	Compared CareerGo's ATS scores with manual JD-resume match scoring by other applications.
Mock Interview Feedback Quality	85%	80%	AI feedback was context-aware and clear. Some said it helped them identify overlooked mistakes.

Skill Gap Detection	82%	80%	Detected missing skills in most test cases. Compared with actual role requirements in JD.
AI-Generated Question Relevance	72%	85%	Some questions were repetitive or too generic; participants rated questions as only partially aligned with selected skills.

Table 1.1: Evaluation of CareerGo Against Manual Review and User Feedback

CareerGo showed high accuracy in resume scoring, AI-generated feedback, and skill gap detection, outperforming expectations in usability and clarity. The mock interview feedback, in particular, was rated highly by users for helping them improve both content and delivery. However, the question generation module occasionally produced generic or repetitive questions, especially when niche skills were selected. Overall, CareerGo proves to be a reliable, scalable, and efficient solution for AI-based interview preparation.

1.5 BRIEF DISCUSSION OF SOLUTION APPROACH

To address the challenges associated with effective interview preparation, resume enhancement, and personalized career guidance, we have designed CareerGo, an AI-powered smart preparation platform.

Built on the principle of "Smarter Prep. Stronger You.", CareerGo aims to empower users through personalized, data-driven insights and interactive preparation experiences, seamlessly combining technical, theoretical, behavioral, and job-matching support.

The core solution integrates several key modules:

- **Resume Analysis:** Users can upload their resumes along with a targeted job description. CareerGo evaluates the resume's Applicant Tracking System (ATS) compatibility and provides AI-generated suggestions to optimize the document for higher selection chances. Our system uses prompt engineering techniques with Gemini AI to extract role-specific skills, missing keywords, content structure improvements, and overall scoring, ensuring highly relevant and actionable feedback.
- **Comprehensive Question Bank:** We have curated an extensive collection of sample questions and answers across 17+ Computer Science Engineering domains including Data Structures, System Design, Machine Learning, Security, and more. The library covers:
    - ➢ Behavioral questions (e.g., HR and situational queries),
    - ➢ Theoretical questions (conceptual understanding), and
    - ➢ Practical questions (real-world applications), each distributed across three levels of difficulty — Easy, Medium, and Hard — allowing users to tailor their practice based on their target job role, domain expertise, and current preparation level.
- **Mock Interview System:** CareerGo enables users to simulate real interview scenarios by entering the job title, required skills, and years of experience. The platform dynamically generates five targeted questions using AI prompt engineering, records user responses through speech-to-text conversion, and provides:
    - ➢ Constructive AI-driven feedback,
    - ➢ A detailed performance score,
    - ➢ Highlighted strengths and improvement areas, and
    - ➢ Interview history for continuous self-assessment and progress tracking. This system helps users practice under realistic conditions, thus improving their communication skills and technical articulation.
- **Job Recommendation Engine** : CareerGo intelligently recommends job roles based on a user's resume content, selected skills, and interests. By analyzing the extracted skills, domain expertise, and user goals, the system provides personalized job matches that align

with both current capabilities and career aspirations.

This feature bridges the gap between preparation and opportunity, enabling users to directly explore roles they are best suited for.

- **Hackathon Board:** To promote experiential learning and portfolio building, CareerGo features a Hackathon Board that aggregates ongoing and upcoming hackathons from platforms like Unstop and Devpost. Users can browse, track, and participate in hackathons relevant to their interests and skill sets, gaining hands-on experience and showcasing their capabilities to potential employers.

System Architecture: CareerGo is built with a modern and scalable technology stack:

- **Frontend:** Next.js and React.js,
- **Backend:** Node.js,
- **Database:** Postgres (Neon) managed via Drizzle ORM,
- **AI Integration:** Gemini AI for intelligent prompt responses and dynamic question generation.
- **External APIs:**

➔ Remotive API for real-time job opportunity matching.

➔ Unstop and Devpost APIs for aggregating ongoing and upcoming hackathons.

This architecture ensures fast, reliable, and adaptive performance across all modules, while keeping the platform flexible for future enhancements.

1.6 COMPARISON OF EXISTING APPROACHES TO THE PROBLEM FRAMED

Several existing platforms aim to assist users with interview preparation and resume building. However, they often present limitations that CareerGo strives to overcome:

Platform/Tool	Key Features	Limitations
LeetCode Interview	Offers mock interviews focused mainly on Data Structures and Algorithms.	Limited domain coverage; lacks resume analysis and behavioral question preparation.
GeeksforGeeks	Offers domain-specific practice, articles, and some mock interview services. Basic resume templates and guidance are available.	Lacks fully personalized, real-time AI mock interviews. Resume analysis is not tailored dynamically to job descriptions.
InterviewBit	Structured coding interview preparation platform.	Primarily code-centric; lacks behavioral and domain-specific mock interview support.
Resume.io	Online resume builder with ATS-friendly templates.	Static templates with minimal AI-driven optimization suggestions based on specific job descriptions.
Pramp	Provides peer-to-peer mock interviews.	Feedback quality depends on peer's expertise; no AI-driven insights or resume services.
Devfolio	Lists and manages hackathons across tech domains for community engagement.	No integration with career preparation tools; lacks AI-powered resume, mock interview, or job matching support.

Table 1.2: Comparison of existing approach to problem framed

Compared to these solutions, CareerGo provides an integrated, AI-enhanced platform that bridges the gap between technical, behavioral, and resume preparation:

- It analyzes resumes dynamically against specific job descriptions rather than relying on generic templates.
- It conducts realistic mock interviews based on user-specific inputs like job role and experience level, rather than offering static sets of questions.

- It delivers structured feedback and retains interview histories for self-assessment and continuous improvement.
- It bridges the preparation-to-application gap by recommending relevant jobs, a feature missing in most existing platforms.
- It allows the users to gain hands-on experience by showcasing the upcoming hackathons they can be a part of, giving them a competitive edge.
- With Gemini AI and carefully engineered prompts, CareerGo remains future-ready, capable of scaling features like real-time course suggestions, resume building, and intelligent career path recommendations.

By addressing these critical gaps, CareerGo positions itself as a comprehensive, smarter, and future-forward solution for modern career preparation needs, especially suited for recent engineering graduates and early professionals navigating today's competitive job landscape.

CHAPTER 2

LITERATURE SURVEY

2.1 LITERATURE SURVEY

[1] Conversate: Supporting Reflective Learning in Interview Practice Through Interactive Simulation and Dialogic Feedback, 2025.

Conversate: An AI-Powered Interview Practice System integrates large language models (LLMs) to simulate realistic interviews and provide dynamic, personalized feedback. Research supports this approach, noting that AI can enhance adaptive learning by tailoring experiences to individual users, which boosts engagement and learning outcomes. The system emphasizes reflective learning, encouraging users to think critically about their performance through follow-up questions and detailed feedback. Studies show this practice strengthens self-awareness and promotes continuous improvement. Dialogic feedback—two-way, interactive responses from AI—offers a more effective learning experience compared to static, one-sided feedback. However, research also highlights a risk: AI can sometimes deliver overly encouraging feedback, which might limit honest self-evaluation and hinder growth. Lastly, while Conversate improves the realism of interview simulations, it cannot fully replicate the pressure and spontaneity of real-life interviews. Literature acknowledges this gap, suggesting AI tools are most effective when used to complement, not replace, actual experience.

[2] Fair and Ethical Resume Screening: Enhancing ATS with JustScreen the ResumeScreeningApp, 2025.

The paper focuses on improving fairness and efficiency in resume screening through automation. Traditional screening methods are often manual and prone to bias, with many automated systems still struggling to accurately interpret unstructured resume data, leading to unfair outcomes.To address this, JustScreen integrates advanced natural language processing (NLP) techniques, using tools like spaCy to extract relevant skills and experiences. This helps create a more accurate and structured evaluation of candidates. Fairness is a central concern in algorithmic

hiring. The literature stresses the need to mitigate bias in machine learning systems, which JustScreen addresses through carefully designed fairness metrics and bias mitigation strategies. Additionally, JustScreen leverages generative AI to analyze resumes more holistically, moving beyond keyword matching to deliver more nuanced and equitable candidate assessments. The system's methodology combines data preprocessing, NLP, fairness evaluation, and ethical safeguards, aiming to make resume screening both effective and just.

[3] Intelligent Job Interview Preparation And Career Advancement, 2025.

The growing integration of AI in job interview preparation is reshaping how candidates approach career advancement. Traditional preparation methods—like manual research or peer mock interviews—are increasingly seen as insufficient in providing personalized, real-time feedback. In response, AI-driven platforms now use machine learning and natural language processing to offer tailored insights and improve candidate performance. These intelligent systems often include features like speech recognition and sentiment analysis to evaluate mock interviews, helping users identify weaknesses and build confidence. Real-time feedback further enhances this process, allowing candidates to refine responses and align their skills with current industry needs. Looking ahead, the field is evolving toward more advanced models, including Generative AI and Multimodal AI, which enable deeper, more personalized evaluations. The incorporation of explainable AI (XAI) is also gaining importance to ensure fairness and transparency in assessments. However, challenges remain—such as technical limitations, lack of interactivity, and usability concerns. To improve effectiveness, future work should focus on predictive analytics, better user experience, and expanding language and cultural adaptability to serve a global audience more inclusively.

[4] AI-Driven Mock Interview: A New Era In Candidate Preparation, 2024.

The study titled "AI-Driven Mock Interview: A New Era in Candidate Preparation", highlights the growing role of AI in modern interview training. One of the core focuses is the use of structured interview frameworks, which help improve fairness and consistency. These findings support AI tools that follow standardized formats to reduce bias and enhance reliability. The study also addresses ethical concerns around data privacy, consent, and algorithmic bias—key

considerations for ensuring responsible AI adoption in recruitment and training. Further, it explores how AI integration enhances interview readiness by simulating realistic settings and providing real-time feedback. These tools help candidates build confidence and improve responses over time. The paper presents an innovative AI-based platform that evaluates candidates on emotions, confidence, and knowledge. It uses convolutional neural networks (CNNs) for facial analysis, along with speech recognition and NLP for evaluating spoken responses. This multi-dimensional approach helps reduce anxiety and offers more holistic feedback than traditional mock interviews. In summary, "AI-Driven Mock Interview: A New Era in Candidate Preparation" provides a comprehensive look at how AI is transforming interview practice through structured, ethical, and intelligent feedback systems.

[5] Interview Preparation Guide Generation Leveraging GPT-4, ZSL and Hybrid Techniques, 2024.

Recent literature emphasizes the growing importance of intelligent, personalized interview preparation tools in today's fast-evolving job market. With nearly half the workforce projected to require reskilling by 2025, traditional interview methods are no longer sufficient. There's a clear need for adaptive systems that can align with dynamic job requirements and diverse candidate backgrounds. Diversity in hiring is another pressing concern. Standard interview processes often fail to reflect the varied experiences and skills of underrepresented groups, highlighting the need for inclusive tools that support equitable access to opportunities. Recruiters also face time constraints, often evaluating candidates in mere seconds, leading to generic and less effective interviews. This creates a strong case for automation—particularly systems that can quickly generate customized, role-specific questions. To meet these needs, recent methodologies combine rule-based filters with advanced NLP techniques, including keyword matching and skill mapping, to enhance question relevance. Results show substantial improvements in both question quality and candidate-role alignment. Finally, scalability remains a major challenge. The literature proposes systems capable of generating unique, high-quality interview guides at scale, making the recruitment process more efficient without compromising personalization.

[6] From Practice to Perfection: AI-Driven Mock Interviews for Career Success, 2024.

The study From Practice to Perfection: AI-Driven Mock Interviews for Career Success explores how artificial intelligence can enhance the effectiveness of interview preparation, especially in improving soft skills alongside technical competence. The paper stresses that traditional methods often neglect areas like communication and emotional intelligence, leading to increased anxiety and lower confidence during real interviews. To address this, the authors propose an AI-powered mock interview platform that combines Natural Language Processing (NLP), facial expression recognition (using Convolutional Neural Networks), and body pose detection (via MediaPipe). These tools allow the system to assess both verbal and nonverbal cues, offering a more holistic preparation experience. A standout feature of the platform is its ability to generate dynamic, job-specific technical questions tailored to the user's desired role. This ensures that practice sessions are both relevant and challenging. Additionally, the platform delivers instant feedback on a candidate's communication, answer structure, and emotional expression using advanced NLP techniques, enabling users to iteratively improve. Ultimately, the study suggests that integrating AI into interview preparation not only boosts technical readiness but also equips candidates with the interpersonal skills critical for success. The authors advocate for further exploration into the practical outcomes and ethical considerations of using AI in recruitment.

[7] Development of a Recommendation System for Resume Tracking and Job Suggestions, 2024.

The paper Development of a Recommendation System for Resume Tracking and Job Suggestions presents a comprehensive view of how AI and machine learning are reshaping modern recruitment systems. It draws from multiple research efforts to inform the design of an intelligent job-matching platform. One major focus is the efficiency gained through automation. As discussed by Aguinis, Beltran, and Cope, generative AI can streamline hiring by handling tasks like resume screening, saving time for both candidates and recruiters. This supports RTJS's goal of smarter, context-aware job matching. Similarly, research by Suleiman, Ahmed, and Rimah introduces matched representation systems to align resumes with job descriptions more accurately—an approach reflected in the RTJS framework. On the evaluation side, the framework by Sohail, Siddiqui, and Ali—based on implicit user feedback—guides how such

systems can be effectively assessed. Importantly, the system is positioned as a step toward sustainable hiring practices, aligning with UN Sustainable Development Goal 8 by promoting decent work and economic growth through improved employment accessibility. Overall, the RTJS leverages advancements in AI and recommendation systems to offer a personalized, efficient, and socially impactful recruitment solution.

[8] A Survey on Artificial Intelligence (AI) based Job Recommendation Systems, 2023.

Recent research on AI-based job recommendation systems emphasizes their transformative potential in improving the recruitment process. A core component involves the use of machine learning and data mining techniques, which help bridge the gap between job seekers and employers by enabling more accurate and intelligent job matching. Technological advancements have also played a vital role. The adoption of RESTful APIs and MongoDB has shown to significantly enhance the speed and scalability of these systems when compared to traditional relational databases such as MySQL, making them more suitable for handling large volumes of data in real time. While progress is evident, many systems still exhibit marginal inaccuracies. This has led researchers to highlight the importance of ongoing refinement and testing to improve recommendation precision and overall system performance. A major innovation in the field is the development of hybrid recommendation models, which combine content-based filtering with collaborative filtering techniques. This hybrid approach effectively addresses cold-start issues and minimizes the need for complex feature engineering, resulting in more robust and adaptive systems. The integration of Natural Language Processing (NLP) further strengthens these systems by enabling deeper analysis of candidate resumes and job descriptions. When combined with collaborative filtering, NLP enhances the relevance of recommendations, ensuring that job suggestions are closely aligned with users' qualifications and experience. Accuracy rates reported in some systems—reaching over 78%—demonstrate a tangible impact on recruitment efficiency. Better candidate-job alignment ultimately benefits both job seekers and employers. Despite these advancements, challenges such as data sparsity, privacy concerns, and the need for transparency in AI-driven decisions remain. Addressing these issues is essential for building trustworthy and sustainable job recommendation platforms.

[9]A Literature Review: Artificial Intelligence Impact on the Recruitment Process, 2021.

The integration of artificial intelligence (AI) into recruitment has brought significant improvements in cost reduction and operational efficiency. By automating various aspects of the hiring process, AI not only accelerates recruitment workflows but also enhances the decision-making abilities of HR professionals, particularly in evaluating both technical and interpersonal skills. One of the major challenges in recruitment—screening large volumes of applications—is being effectively addressed through AI-powered systems. AI chatbots are also emerging as valuable tools for initial candidate engagement. They can collect key information such as skills, experience, and salary expectations, which allows HR teams to streamline early-stage interactions and focus on high-potential applicants. A critical advantage of AI lies in its potential to reduce bias in hiring decisions. Additionally, AI automates repetitive administrative tasks, freeing up human resources teams to focus on strategic activities like talent development and workforce planning. This shift not only improves productivity but also enhances the overall quality of talent acquisition. Future research is expected to explore how AI's impact varies across industries and regions, and to evaluate the effectiveness of different AI tools in diverse recruitment scenarios.

[10] Artificial Intelligence for Career Guidance – Current Requirements and Prospects for the Future , 2021.

This paper explores how artificial intelligence (AI) is transforming career guidance in higher education. Career guidance involves helping individuals make informed choices about education, training, and employment, with a focus on decision-making and career management skills. Traditionally, this has included counseling, skill development, and competency assessments. With the rising need for continuous learning, AI is increasingly being adopted to enhance the effectiveness and reach of these services. The study highlights how AI tools can personalize guidance, streamline decision-making, and support both learners and practitioners. Practical trials showed that students found AI-driven course and job recommendations useful for understanding skill requirements and career paths. The paper also points to the need for further research into the impact of AI on user autonomy, the development of data ecosystems, and the ethical use of such technologies in career support.

2.2 INTEGRATED SURVEY OF LITERATURE STUDIED

The application of Artificial Intelligence (AI) in recruitment, career preparation, and job matching has revolutionized the way candidates approach the hiring process. Numerous studies have explored the different facets of AI in this domain, ranging from AI-driven interviews to personalized job recommendations. While AI has brought about significant improvements, it has also raised important ethical and practical considerations.

1. AI for Interview Practice and Feedback

AI-powered mock interview platforms are redefining how candidates prepare for job interviews. For instance, platforms like **Conversate** use large language models (LLMs) to simulate interviews that feel more real-time, offering two-way feedback. This feedback not only helps users evaluate their responses but also guides them in refining both their technical and communication skills.

Some advanced systems even track facial expressions, speech patterns, and body language to offer a more holistic assessment of a candidate's performance, building their confidence and helping reduce pre-interview anxiety [1]. However, while these simulations are invaluable, they don't replicate the unpredictability and stress that come with a real interview. There's also the concern that AI-generated feedback can sometimes be overly positive, making it difficult for candidates to get an honest assessment of their strengths and areas for improvement [1]. Additionally, the ethical considerations of data privacy, consent, and potential biases within AI algorithms need constant attention, especially as these tools become more widespread in recruitment practices [2][3].

2. Intelligent Job Recommendation Systems

AI has also made significant strides in improving how job seekers find suitable opportunities. Job recommendation systems use machine learning and data mining techniques to match candidates with job listings, making the job search process faster and more efficient [4][5]. One

successful approach is the use of hybrid recommendation engines, which combine collaborative filtering with content-based methods. This helps mitigate issues like the “cold start” problem—when a system doesn’t have enough user data to make accurate recommendations—by ensuring that job suggestions remain relevant and accurate, even with limited data [5].

From a technical perspective, these systems have moved away from traditional relational databases, opting instead for more dynamic solutions like RESTful APIs and MongoDB to better handle large volumes of data [5]. Some systems go beyond just matching candidates with jobs, aiming to meet ethical standards by promoting fair hiring practices and supporting accessible employment for underrepresented groups [4]. Additionally, newer techniques, such as deep learning and reinforcement learning, are being tested to further enhance the precision of job recommendations and personalize suggestions to better match candidates' skills and career goals [7].

3. Streamlining the Recruitment Workflow

Beyond just job recommendations and interview practice, AI is transforming other aspects of the recruitment process, such as screening resumes and ranking applicants. AI-based tools can now automatically collect relevant data about a candidate's skills, experiences, and preferences, streamlining the early stages of hiring and allowing human recruiters to focus on more strategic decisions [6].

AI’s potential to reduce biases in the hiring process is one of its most promising advantages. By using Natural Language Processing (NLP) and Natural Language Generation (NLG), AI systems can analyze resumes and job applications more objectively, minimizing unconscious biases that can occur in traditional hiring methods [6]. These systems don’t aim to replace human judgment, but instead serve as valuable tools that complement human decision-making. However, as AI continues to evolve in recruitment, there are growing concerns about the need for ethical oversight to ensure fairness, accountability, and transparency [8]. Establishing clear frameworks and guidelines for the responsible use of AI in recruitment is becoming increasingly necessary to address these challenges [9]. Furthermore, AI is contributing to more inclusive hiring practices by helping diverse and underrepresented groups gain access to better job opportunities [10].

CHAPTER 3

REQUIREMENT ANALYSIS AND SOLUTION APPROACH

3.1 OVERALL DESCRIPTION OF THE PROJECT

PRODUCT PERSPECTIVE

CareerGo is an independent, intelligent web application designed to streamline and personalize the interview preparation journey for students and professionals. It integrates features like resume analysis, mock interviews, domain-specific question banks, job recommendations and dynamic hackathon calendar into a cohesive and interactive platform. Built with a modern technology stack including Next.js, React.js, Node.js, Drizzle ORM, and Postgres (Neon), CareerGo stands apart by offering AI-driven insights through advanced prompt engineering rather than static preparation resources, ensuring a dynamic and adaptive user experience.

Moreover, CareerGo uniquely leverages prompt engineering techniques within its Gemini AI integrations to generate highly targeted, context-specific interview questions, resume feedback, and user-centric recommendations, making preparation more effective and tailored.

PRODUCT FUNCTIONS

CareerGo offers the following core functionalities:

1. **Resume Analysis:** CareerGo checks your resume against the job description you provide and gives you an ATS compatibility score to show how well it matches. It also suggests practical improvements like better wording, formatting tips, and missing keywords to make sure your resume stands out to recruiters and hiring systems.
2. **Comprehensive Question Library:** We have built a detailed collection of questions across more than 17 Computer Science Engineering domains, mixing behavioral, theoretical, and practical topics. Each question comes with a sample answer, helping users practice both content and how to present it confidently during interviews.

3. **Mock Interview Module:** CareerGo sets up personalized mock interviews where users answer AI-generated questions through video. The platform uses speech-to-text to capture their responses in real-time and gives them honest feedback along with a score. This helps users understand strengths, identify weak areas, and prepare smarter for interviews.
4. **User History Tracking**: Every mock interview, along with the feedback and score, is saved in the user's profile. This way, users can look back at their performance, track their improvement over time, and prepare smarter for future interviews.
5. **Job Recommendation Engine:** CareerGo offers personalized job recommendations based on the user's resume, skills, and career interests. By analyzing user profiles and leveraging AI prompt engineering, CareerGo suggests relevant job roles, internships, and openings sourced from trusted databases. This helps users not only prepare but also apply smartly and confidently.
6. **Hackathon Board:** CareerGo features a dynamic Hackathon Board that lists ongoing and upcoming hackathons from platforms like Unstop and Devpost. Users can browse, register, and participate in hackathons that match their skills and interests, gaining hands-on experience and building their portfolios. This feature helps users showcase their skills in real-world scenarios, further enhancing their career readiness.

USER CHARACTERISTICS

The primary users of CareerGo are:

1. **Final-year Students:** Individuals preparing for campus placements and entry-level technical roles, seeking to strengthen their resumes, practice interviews, and improve overall readiness.
2. **Recent Graduates:** Fresh graduates aiming to secure their first job in the tech industry, looking for personalized preparation through resume optimization and targeted interview practice.
3. **Early-career Professionals:** Working individuals with 1–3 years of experience, planning to transition to better roles, specialized domains, or higher-level positions by enhancing their professional profiles and interview skills.

They are expected to have basic technical proficiency, familiarity with online platforms, and a clear intent to prepare for professional roles.

CONSTRAINTS

1. **Platform Limitations:**
    - The initial version of CareerGo is hosted locally, meaning it's not yet scaled for global access and needs further optimization for production environments.
    - Current speech-to-text conversion depends on the quality of the microphone, which can impact the accuracy of recorded responses.
    - Resume analysis quality is dependent on the format and structure of the user's uploaded resume — poorly formatted resumes might lead to less accurate suggestions.
    - Job recommendations depend on the availability and accuracy of external job data sources.
    - Hackathon recommendations rely on data from third-party APIs (e.g., Unstop and Devpost), and may face issues like missing or delayed event information.
2. **Technological Constraints:**
    - The AI models (Gemini AI) integrated into the system require periodic updates to maintain the relevance and accuracy of recommendations and feedback.
    - Backend databases (Postgres Neon) and ORM service (Drizzle ORM) will require optimization as user data grows, especially to support larger-scale job recommendations.
    - Real-time hackathon data may be delayed based on external APIs (Unstop, Devpost), affecting the Hackathon Board feature.

ASSUMPTIONS AND DEPENDENCIES

1. **User Input Assumptions:**
    - Users are assumed to have a reasonably structured resume or the ability to create one, as CareerGo's resume analysis function depends on it.

- It’s assumed that users have access to stable internet connections to interact with the web application in real-time, particularly for mock interviews.
- Users should also have a stable internet connection to access real-time Hackathon data from external platforms like Unstop and Devpost.

2. **Dependency Assumptions:**
    - The functioning of third-party tools and APIs, such as Clerk (for authentication) and react-hook-speech-to-text (for capturing responses), is assumed to remain stable and supported.
    - CareerGo depends on cloud-based services for scalability, so the availability of Postgres Neon and related technologies is assumed to be reliable for ongoing usage.
3. **Data Availability Assumptions:**
    - Access to updated and relevant job descriptions and openings for job recommendation features.
    - CareerGo assumes that the job roles and resumes provided by users will be current and relevant to the data used by the platform's AI.
4. **External Job API Dependency:**
    - CareerGo depends on external APIs (Remotive.com API) for providing real-time remote job recommendations. The availability and stability of these external services are assumed for the continuous functioning of the job recommendation feature.

APPORTIONING OF REQUIREMENTS

- **Core Functionality:** The initial focus will be on key features such as resume analysis, a question library across major domains, mock interviews, user history tracking, and recommending jobs as per the resume, providing a comprehensive, interactive interview prep platform.
- **Extended Features:** Future updates will include advanced functionalities like resume building, personalized course recommendations, and AI-driven interview questions based on evolving user profiles.

- **Scalability:** Focus on supporting small to medium datasets initially, with scalability to handle larger datasets and more users in the future. Enhance backend architecture to support large user bases, massive mock interview data, and growing job recommendation data and prepare for cloud integration to support broader user access.

EXTERNAL INTERFACES

- **User Interface:** CareerGo offers a clean, responsive, and intuitive interface built using modern UI libraries such as shadcn/ui and HyperUI. The dashboard enables users to upload resumes, navigate through categorized question libraries, initiate mock interviews, and track historical performance with ease. Real-time feedback, ATS score visualization, and interactive elements ensure an engaging user experience.
- **Hardware Interactions:** As a web-based application, CareerGo requires minimal direct hardware interaction. However, it leverages system resources such as the microphone and camera (with user permission) during mock interviews for audio input, ensuring a smooth voice-to-text transcription process using react-hook-speech-to-text.
- **Software Interactions:** The application integrates with several external services and APIs. It communicates with the Gemini AI for prompt-based interview generation and answer evaluation, utilizes the Remotive API to fetch real-time job listings, and connects to backend services via Node.js. PostgreSQL (hosted on Neon) and Drizzle ORM manage persistent data storage securely, while Clerk handles user authentication seamlessly. CareerGo also relies on third-party APIs (Unstop and Devpost) to fetch ongoing and upcoming hackathon events, providing users with timely opportunities to participate.

PERFORMANCE

- **Speed and Response Time:** The system is optimized to deliver near-instant ATS resume evaluations and prompt-based mock interview generation. With efficient prompt engineering and well-structured APIs, user interactions—from resume analysis to receiving feedback—remain consistently responsive.

- **Availability:** While currently hosted on localhost during development, CareerGo is built to be deployed in cloud environments for high availability. Session handling and authentication via Clerk ensure minimal service interruptions.
- **Scalability:** The modular architecture of CareerGo allows it to scale horizontally. Backend services, database queries, and AI prompt generation workflows are designed to handle concurrent users and increasing data loads efficiently.
- **Recovery and Error Management:** Clear exception handling is implemented across all major workflows including resume file handling, API failures, and voice transcription. In case of system errors or malformed inputs, user-friendly alerts and guided recovery paths are provided. Mock interview data is saved automatically to prevent loss in case of interruptions.

ATTRIBUTES

- **Portability:** CareerGo can be deployed across multiple environments with minimal configuration overhead. The use of environment variables and cloud-friendly services ensures portability from local to cloud setups such as Vercel or AWS.
- **Correctness:** With precision-driven prompt engineering and structured backend logic, the system ensures accurate resume analysis, context-aware question generation, and consistent job recommendation relevance.
- **Maintainability:** CareerGo follows a modular and layered architecture, separating concerns between the frontend, backend, and AI integration logic. This approach allows for quick updates, easy integration of new features, and streamlined debugging.
- **Security:** Secure authentication is managed by Clerk, ensuring that user sessions are encrypted and access-controlled. Resume data, interview responses, and job application history are stored in a secured PostgreSQL database .

VISION:

CareerGo envisions becoming a comprehensive and intelligent career preparation ecosystem that not only helps users crack interviews but also evolves with their professional journey. By merging cutting-edge AI and prompt engineering with user-centric design, CareerGo aims to

create a future where preparation is smarter, opportunities are personalized, and success is accessible for every aspiring professional.

3.2 REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS

1. **User Authentication and Authorization:** The system must allow users to register, log in, and securely access their personalized dashboard using Clerk authentication.
2. **Resume Upload and Parsing:** Users should be able to upload their resume (in PDF/DOCX format), which will be parsed to extract necessary information for analysis.
3. **Resume Analysis with ATS Scoring:** The platform must evaluate the uploaded resume against a provided job description and generate an ATS compatibility score, highlighting keyword gaps, formatting issues, and improvement suggestions.
4. **Job Description Input and Parsing:** Users must be able to input job descriptions, which will be parsed to extract relevant keywords for matching with resumes.
5. **Mock Interview Setup and Question Generation:** Based on user-provided role, skills, and experience, the system should dynamically generate 5 personalized interview questions using Gemini AI and prompt engineering techniques.
6. **Speech-to-Text Answer Capture:** The system must convert the user's verbal responses during mock interviews into text using react-hook-speech-to-text or equivalent libraries.
7. **Mock Interview Feedback and Scoring:** After the mock interview, CareerGo must analyze the captured responses and provide a performance score along with constructive feedback.
8. **Comprehensive Domain-specific Question Library Access:** Users should be able to browse and practice questions across 15+ Computer Science Engineering domains, with categorized difficulty levels and model answers.
9. **User History and Performance Tracking:** CareerGo must store all mock interview results, feedback, and resume analysis reports so users can track their progress over time.
10. **Hackathon Display and Search:** The system must display ongoing and upcoming hackathons sourced from third-party platforms (e.g., Unstop, Devpost) with essential

details (name, date, registration link). Users should be able to filter and search events by categories such as date, theme, and location.

11. **AI-driven Job Recommendations:** Based on the user's resume, skills, and preferred job roles, CareerGo should suggest relevant job listings, filtered by domain and skill match.
12. **External API Integration:** Based on the user's resume, skills, and career preferences, CareerGo must suggest relevant job opportunities. The platform will integrate with external job APIs (like Remotive.com API, Unstop, Devpost) to fetch real-time remote job listings across various domains and hackathons.

NON-FUNCTIONAL REQUIREMENTS

1. **Performance and Speed:** The application must provide resume analysis results and generate interview questions within 10–15 seconds for a smooth user experience.
2. **Scalability (Moderate-Level)**: The backend must be designed to easily scale from handling a few hundred users locally to potentially a few thousand users on a cloud setup later.
3. **Security and Privacy:** User resumes, interview answers, and personal information must be securely stored with encryption standards and must not be shared with third parties.
4. **Availability and Uptime:** Initially hosted locally, but when deployed, the platform should aim for a minimum uptime of 95% to ensure consistent access.
5. **Cross-Browser Compatibility:** The platform must work correctly across major browsers like Chrome, Firefox, Safari, and Edge without functional or design inconsistencies.
6. **Maintainability and Extensibility**: The codebase should be modular and well-documented, allowing for easy updates, future feature additions (like live interview scheduling or AI resume building), and bug fixes.
7. **Data Backup**: User data, including resumes, interview histories, and feedback, should be backed up regularly to avoid data loss.
8. **Compliance and Ethics:** The platform must ensure that all AI feedback and job recommendations are fair, unbiased, and transparent to avoid discrimination or misinformation.

3.3 SOLUTION APPROACH

The CareerGo project is designed to provide a seamless platform for interview preparation, resume enhancement, and job matching. It integrates AI-powered tools for personalized resume analysis, mock interview simulations, and real-time job recommendations. The core functionalities are powered by Next.js for the frontend, Node.js for the backend, and PostgreSQL for the database, with AI models accessed through the Gemini API for prompt engineering. The system also includes a question bank for mock interviews, offering users a collection of practice questions tailored to different job roles and experience levels. The platform ensures scalability, real-time feedback, and personalized career guidance.

MODULE WISE DESCRIPTION:

Resume Analysis Module

- **Algorithm:** This module uses AI-driven prompt engineering through the Gemini API to analyze resumes. The system compares the uploaded resume with job descriptions, evaluating ATS compatibility and suggesting improvements based on industry standards.
- **Detection Process:** After the user uploads their resume, the system parses the text and compares it against pre-configured job roles or specific job descriptions provided by the user. It checks for keyword optimization, formatting, and relevant content such as skills, experience, and education.
- **Feedback Mechanism:** The system generates real-time feedback and suggests improvements such as including more relevant skills, restructuring the format, or adding more detailed descriptions in the work experience section. The feedback is based on AI analysis and is presented in an easy-to-understand format.

Resume Enhancement and Optimization Tools

- **Keyword Optimization:** The system identifies keyword gaps in the resume, recommending specific skills and terms based on industry standards and the job description provided by the user. This ensures that the resume is optimized for ATS systems.

- **Content Refinement:** The tool provides suggestions to improve resume content by offering clearer and more impactful ways to describe work experience, skills, and accomplishments.

Mock Interview Module

- **AI-Driven Question Generation:** Using the **Gemini API**, the system dynamically generates personalized interview questions based on the user's selected job role, skills, and experience. The questions cover both technical and behavioral aspects of interviews.
- **Real-Time Interview Simulation:** Users interact with the system by answering questions in text or audio format. The system captures user responses in real time, and the AI evaluates the content, clarity, and relevance of each answer.
- **Feedback Mechanism:** After the mock interview, users receive detailed feedback on their responses. The feedback includes suggestions on how to improve answers, focus on key concepts, and improve communication skills. Users also receive a score based on their performance.

Personalized Job Recommendations Module

- **AI-Driven Job Matching:** This module leverages AI-powered job matching algorithms through the Gemini API. The system analyzes the user’s resume, mock interview results, and profile data to recommend suitable job roles.
- **Real-Time Job Suggestions:** Users receive job recommendations in real time, tailored to their skillset, experience, and preferences. These suggestions are regularly updated as users continue to interact with the platform (e.g., after improving their resume or completing mock interviews).

Question Bank Module

- **Comprehensive Question Bank:** The question bank is a crucial feature that supports a wide range of job roles and technical domains. It is structured to include questions across various categories like Data Structures, Algorithms, System Design, Databases, Web

Development, Machine Learning, Behavioral Questions, and more. These categories are further divided into difficulty levels (easy, medium, hard).

- **Category-Specific Questions:** Each category includes detailed questions that are relevant to the user's selected job role. For example, if a user is preparing for a software development role, they can prepare questions related to algorithms, coding problems, and system design.

Hackathon Board Module

- **Hackathon Display and Search:** The system displays ongoing and upcoming hackathons with details such as name, date, registration link, and category.
- **Navigate to Hackathon Page:** Users can navigate directly to the hackathon's detailed page by clicking on the event. This page provides more in-depth information, such as registration instructions, team formation, and event rules.

User History Tracking and Insights

- **Tracking Progress:** The platform tracks user activity, such as completed mock interviews, feedbacks and scores. Users can view their progress over time, such as improvements in resume quality and mock interview performance.
- **Personalized Insights:** The system provides users with personalized insights, such as areas for improvement in their resume or interview responses. It helps users identify recurring issues and gives actionable advice on how to overcome them.

Version Control and Integration with Third-Party Tools

- **Version Control:** The system integrates with Git to maintain version control over user data, including resumes, feedback, and interview responses. This ensures that users' historical data is preserved and allows for future improvements to the platform.
- **API Integration:** The platform seamlessly integrates with external job boards or third-party tools for extended functionality such as applying to jobs directly, tracking applications, or accessing additional learning resources.

CHAPTER 4

MODELING AND IMPLEMENTATION DETAILS

4.1 DESIGN DIAGRAMS

4.1.1 USE CASE DIAGRAM

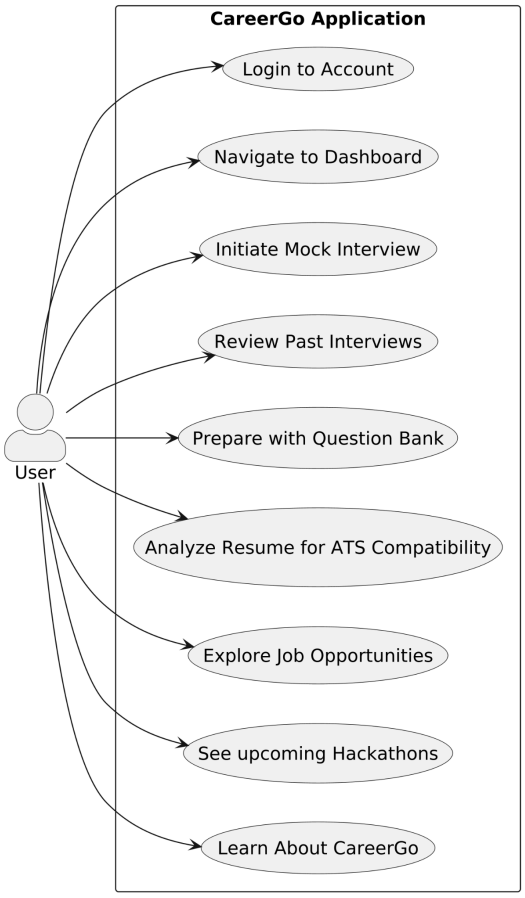

Figure 4.1: Use Case Diagram for CareerGo Application

This diagram shows the key interactions between the user and the CareerGo system, including features like AI mock interviews, resume analysis, job recommendations, and hackathons. It highlights the user-centric design and seamless navigation through the platform.

4.1.2 CLASS DIAGRAM

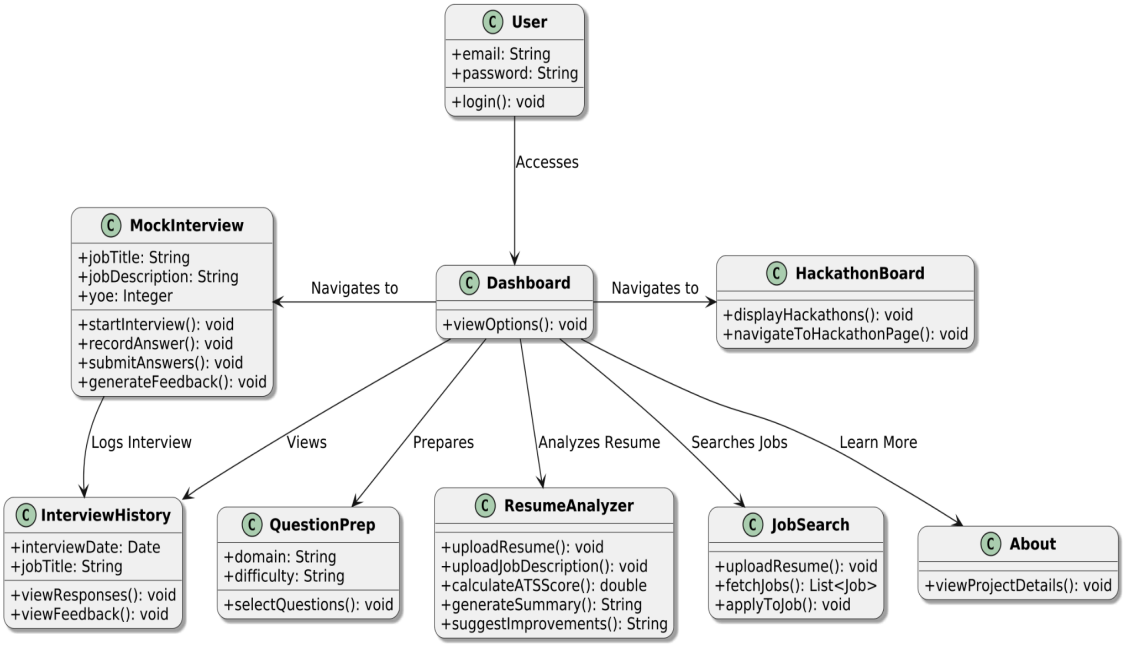

Figure 4.2: Class Diagram for CareerGo Application

This diagram represents the object-oriented structure of CareerGo, detailing classes like User, Resume, InterviewSession, Question Bank, Hackathon board and JobRecommendation. It illustrates their attributes, methods, and relationships, providing a blueprint for system architecture.

4.1.3 ACTIVITY DIAGRAM

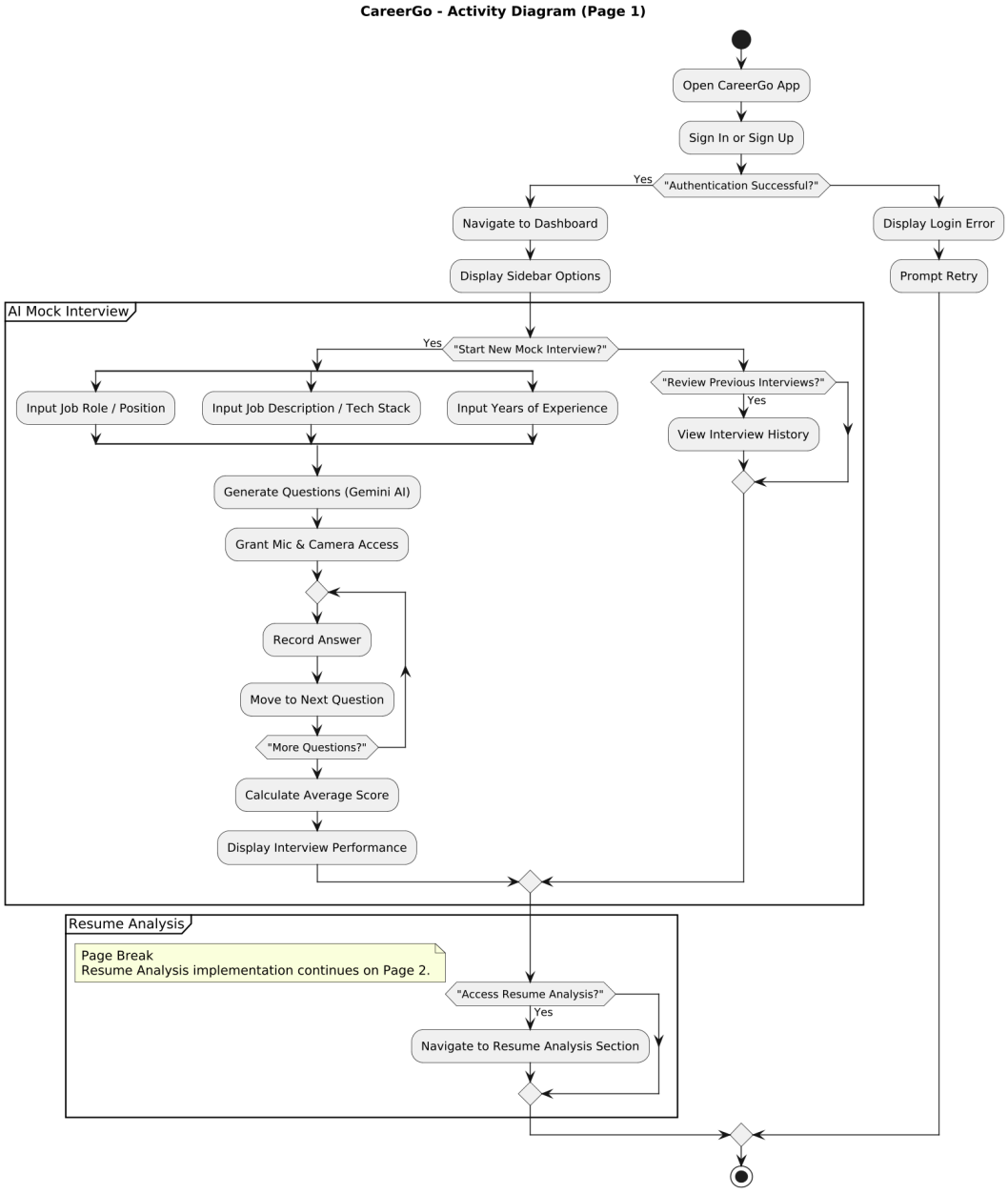

Figure 4.3.1: CareerGo Activity Diagram (Page 1)

This activity diagram shows the user flow from login to starting an AI mock interview, including job role selection and skill input. It also covers the Resume Analysis feature, detailing the integration and interaction of core features.

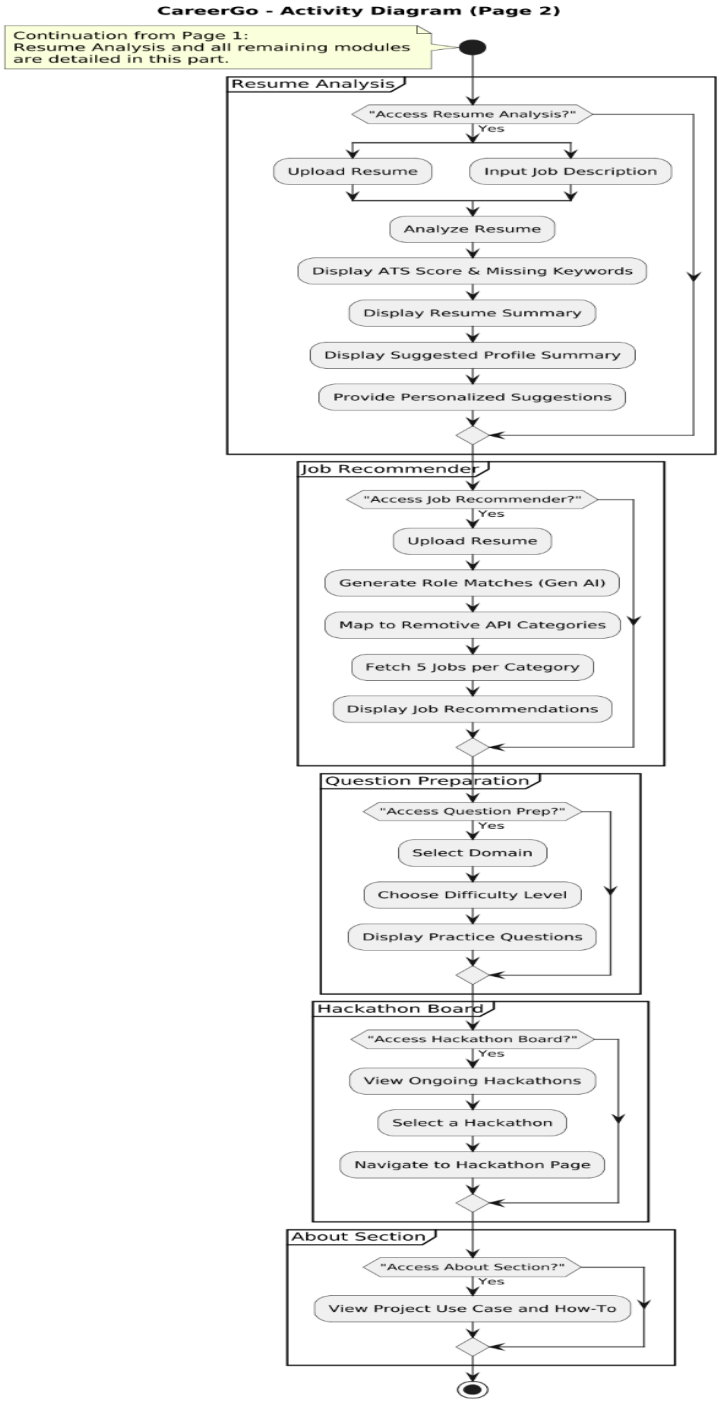

Figure 4.3.2: CareerGo Activity Diagram (Page 2)

This diagram continues the user flow, covering resume upload, ATS score analysis, accessing the Question Bank, job recommendations, and participating in hackathons. It provides a comprehensive view of all available workflows in CareerGo.

4.1.4 SEQUENCE DIAGRAM

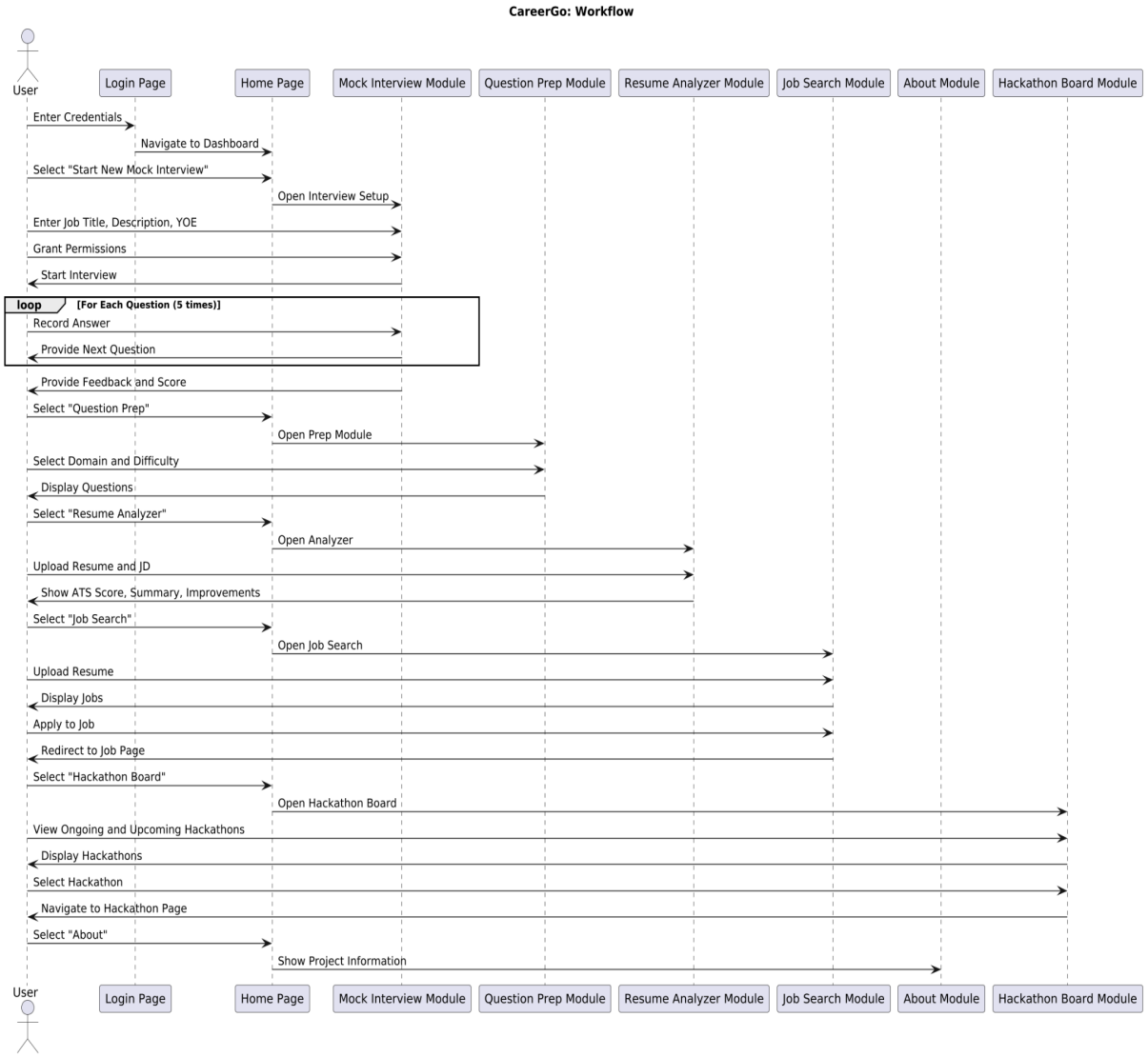

Figure 4.4: Sequence Diagram for CareerGo Website Flow

The sequence diagram outlines the interaction between the user and system components, showing the flow of authentication, resume analysis, question fetching, and job recommendations. It provides a clear view of request and response sequences across modules.

4.2 IMPLEMENTATION DETAILS

1. USER AUTHENTICATION (CLERK)

- **Purpose:** To manage user authentication and session handling, **Clerk** was used.
- **How it Works:**
    - Clerk provides secure authentication features like sign-up, sign-in, and session management.
    - Users authenticate either via email/password or OAuth methods, including Google or GitHub sign-in options.
    - Once authenticated, the user is directed to the dashboard, where they can access various features like AI mock interviews, resume analysis, and job recommendations.

2. AI MOCK INTERVIEW (GEMINI API)

- **Purpose:** To simulate a real-world interview experience and provide feedback.
- **How it Works:**
    - The user selects to start a new mock interview, inputs their job title, description, and years of experience.
    - The Gemini API is used to generate interview questions specific to the user's job profile.
    - The user records answers, and the system provides comprehensive feedback and an average score after completing the session.
    - The feedback is based on the quality of responses, and scoring is done to simulate real-world interview assessments.
    - Mic and Camera access are required for a more realistic experience during the interview.

3. QUESTION PREPARATION MODULE

- **Purpose:** To allow users to practice and prepare for technical interviews by offering practice questions.
- **How it Works:**
    - The Question Preparation module presents users with a curated list of questions based on their selected domain (e.g., algorithms, data structures, system design) and difficulty level (easy, medium, hard).
    - The question bank was initially sourced from a Kaggle dataset containing 250 questions.
    - To expand the dataset, a combination of GitHub data scraping and GPT-3 AI-based synthetic question generation was used to increase the number of questions to over 1,100.
        - GitHub Data Scraping: Additional questions were gathered from open-source repositories, coding platforms, and interview preparation resources.
        - GPT-3 AI Synthetic Generation: Using GPT-3, a diverse set of questions was generated by feeding it sample questions and prompts. The AI model was specifically instructed to generate questions on various technical domains to match the difficulty levels.
    - This method ensured that the Question Preparation module offered a vast and dynamic set of questions for users to practice with.

4. RESUME ANALYSIS (GEMINI API)

- **Purpose:** To analyze user resumes and provide suggestions for improvement based on industry standards.
- **How it Works:**
    - The Gemini API is used to analyze the resume and generate an ATS score (Applicant Tracking System) that evaluates how well the resume will perform in job applications.

- The user uploads their resume and job description (optional), and the system provides a detailed ATS score, summary, and improvement suggestions to make the resume more aligned with job descriptions.

5. JOB RECOMMENDER (REMOTIVE API)

- **Purpose:** To suggest relevant job opportunities based on the user's resume and skills.
- **How it Works:**
  - The user uploads their resume, and the system uses the Remotive API to fetch job recommendations.
  - The Remotive API maps the skills and experiences from the user's resume to relevant job categories and fetches up to five job listings per category.
  - The system then displays these job opportunities, along with an apply now option.

6. HACKATHON BOARD (UNSTOP AND DEVPOST)

- **Purpose**: To showcase ongoing/upcoming hackathons and allow users to view detailed event pages.
- **How it Works:**
  - Users access the Hackathon Board from the dashboard.
  - Hackathon cards display event name, date, and category with a "View Details" button.
  - Clicking a card shows full event info: description, dates, theme, rules, registration deadline, and external link.
  - Hackathon data stored or fetched via API, supporting dynamic updates.

7. ABOUT SECTION

- **Purpose:** To provide users with information about the application and how to use it effectively.
- **How it Works:**

    - The user can navigate to the About Section, where they can view details about the CareerGo project, including its purpose, features, and the technologies used to build it.
    - This section also includes instructions on how to utilize each feature of the app, helping users get the most out of the platform.

TECH STACK OVERVIEW:

- **Frontend:** Next.js and React.js for building the user interface. React ensures dynamic rendering, allowing real-time updates of mock interview results, job recommendations, and resume feedback.
- **Backend:** Node.js serves as the backend, handling user requests, managing real-time interactions, and processing data for the Gemini API.
- **Database:** PostgreSQL for storing user data, including resumes, mock interview responses, job recommendations, and question bank data.
- **API Integration:** Gemini API for AI-driven question generation, resume feedback, and interview analysis. Remotive.com API for job recommendations. External hackathon platforms like Unstop, Devpost for updated hackathon listings.
- **Authentication:** Clerk for secure user login and session management.

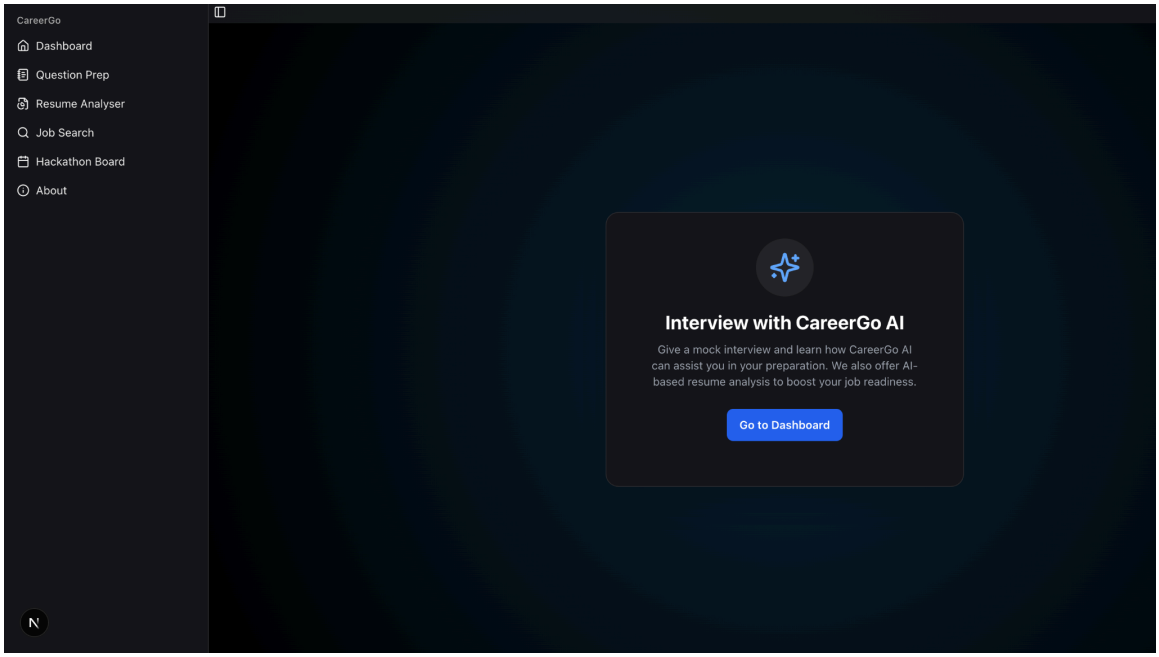

Figure 4.5: Home page of the CareerGo website

This screenshot shows the CareerGo homepage displayed to users after logging in, offering easy access to essential features like mock interviews, resume analysis, and job recommendations. The page is designed to be intuitive, providing a seamless user experience right from the start.

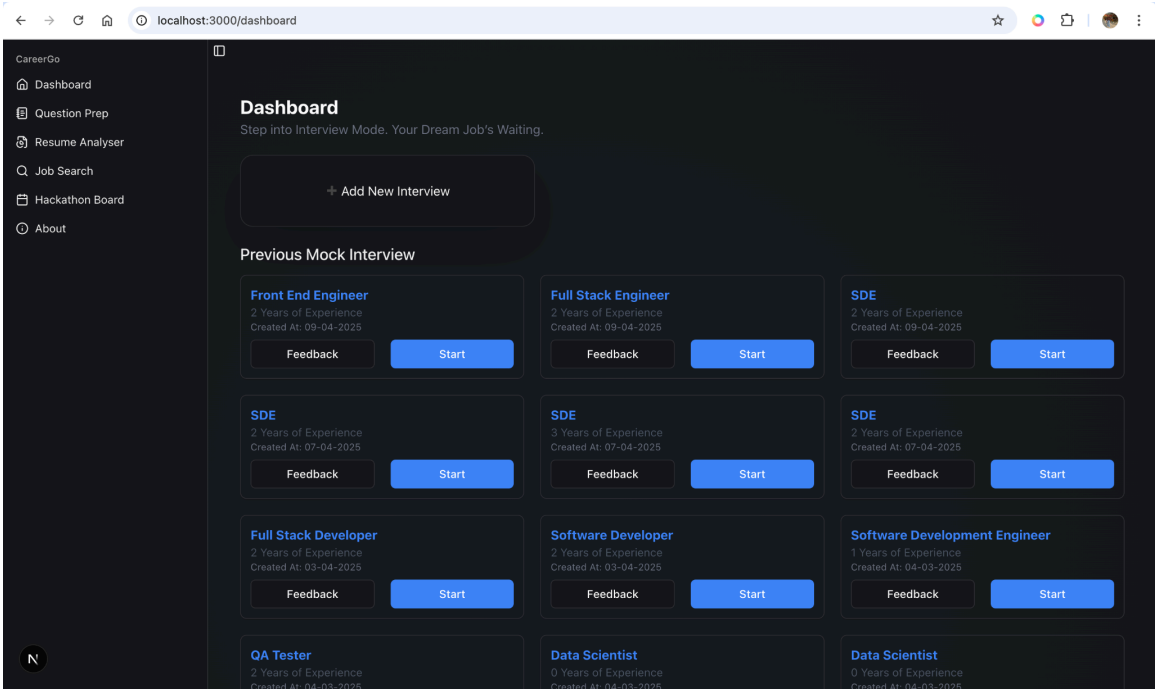

Figure 4.6: Dashboard page of CareerGo Website

This snapshot presents the dashboard view, where users can start a new interview, review past sessions, and navigate other sections. The layout is user-friendly, ensuring users can quickly access the tools they need for preparation and feedback review.

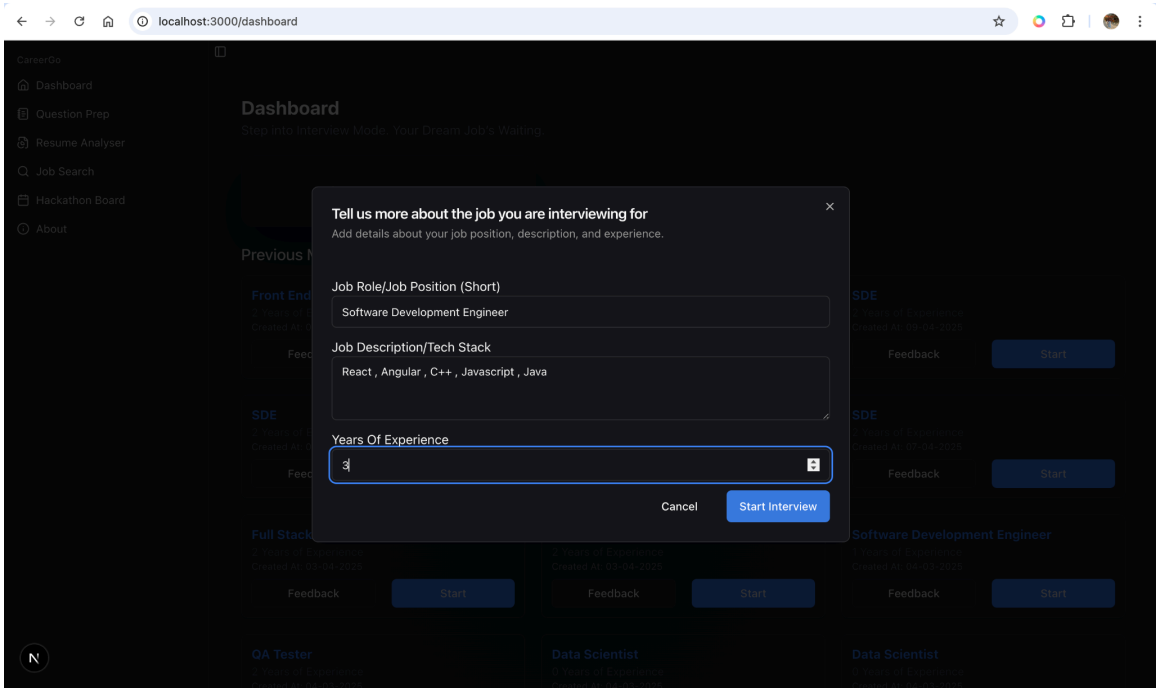

Figure 4.7: New Interview Setup Form

This screen prompts the user to enter the job role, job description, and their years of experience to tailor the mock interview session to their profile. The form is designed to guide the user in setting up a personalized and relevant interview scenario based on their career goals.

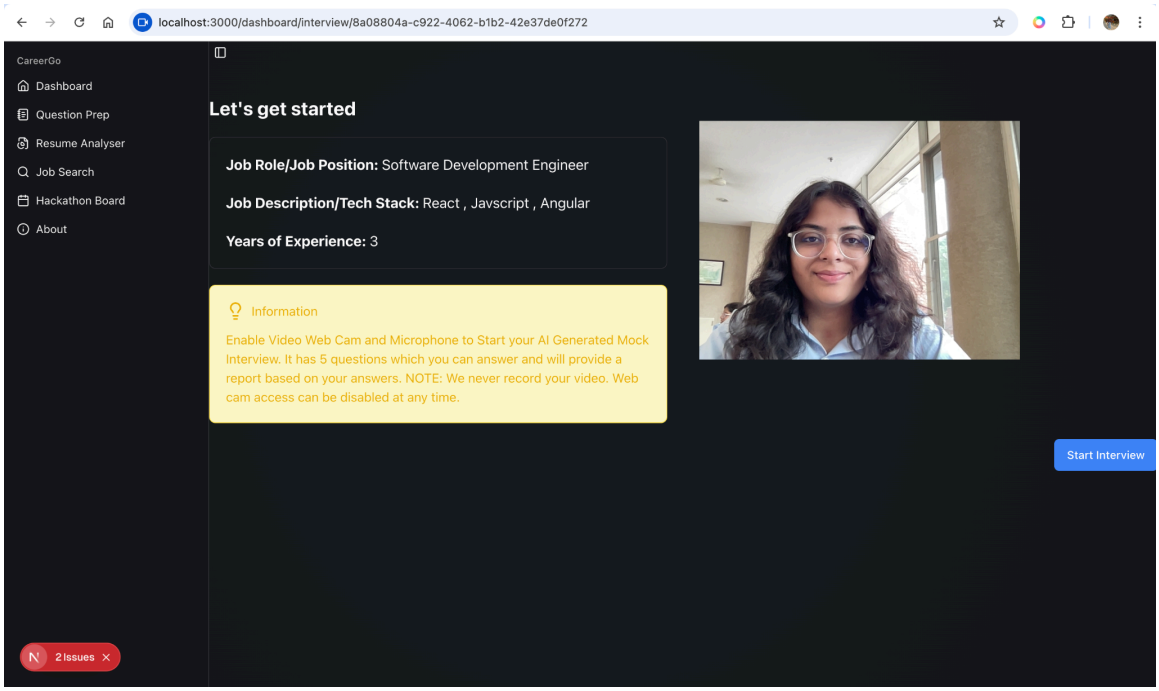

Figure 4.8: Video Preview Before Interview Start

This displays the user's feed after granting access to the mic and camera, preparing the user for the interview by showing the video and audio setup. It ensures the user's equipment is working properly before they begin the interview, promoting a smooth start to the session.

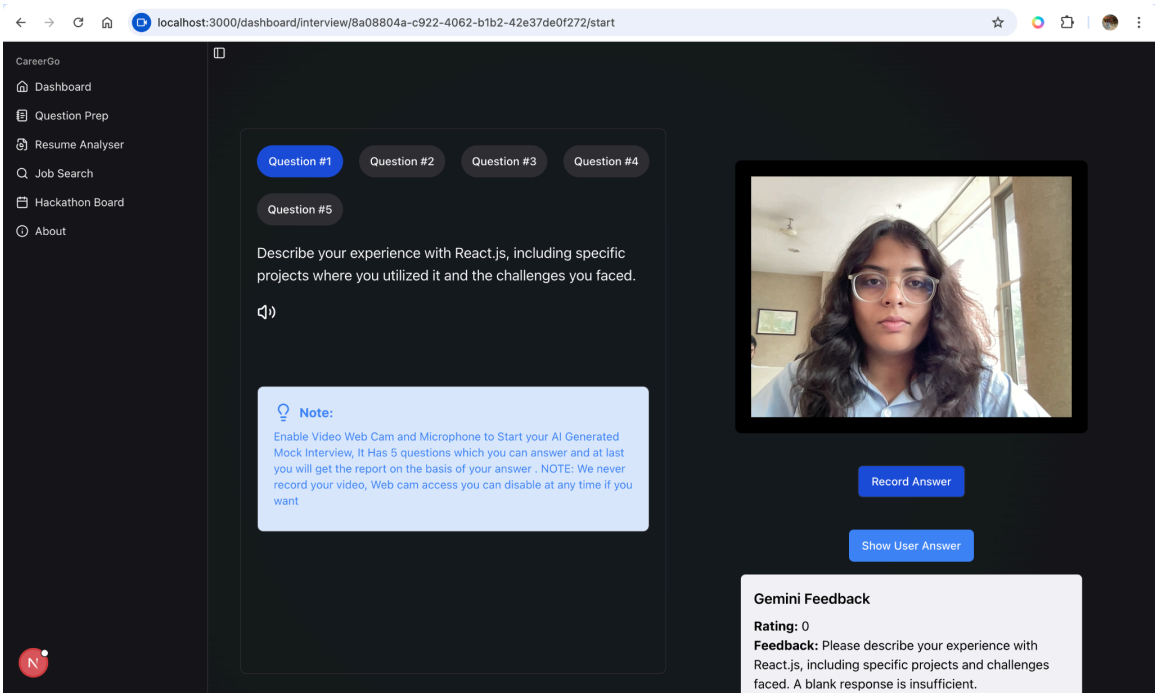

Figure 4.9: Interview Interface with Question Display and AI Feedback

Shows the interview interface, with the question displayed and real-time feedback provided by Gemini, including a rating and comments on the user's recorded response. The interface is designed to offer a dynamic and interactive experience, helping users improve as they progress through their mock interview.

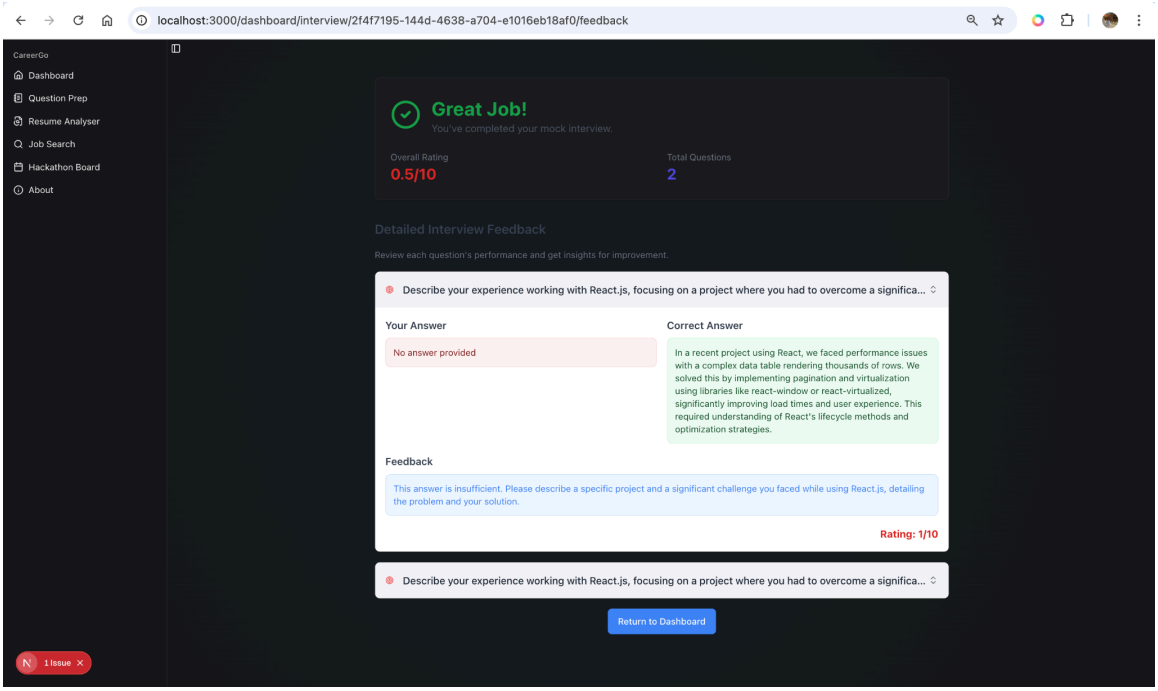

Figure 4.10: Interview Summary Screen

This screen shows a summary after the interview, displaying the overall rating, number of questions answered, and detailed feedback for each response. It offers a comprehensive review of the user's performance, highlighting strengths and areas for improvement.

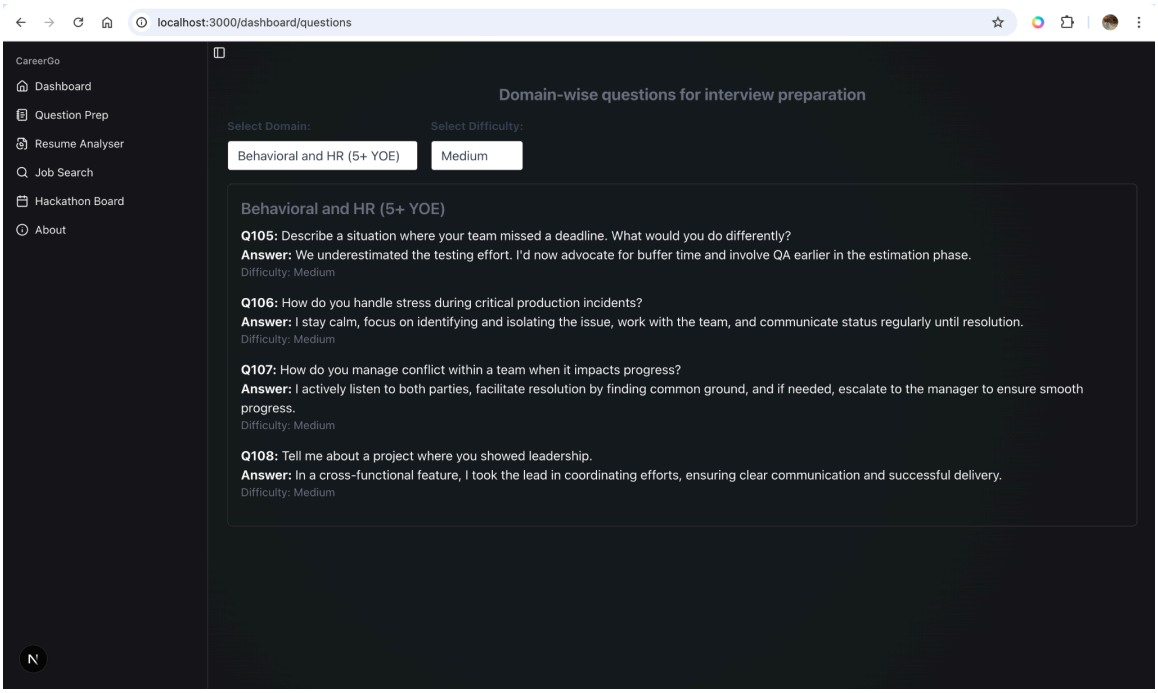

Figure 4.11: Comprehensive Question Bank

Displays the extensive question bank, categorized by domain and difficulty level, allowing users to choose specific questions for their practice sessions. This feature ensures users can prepare efficiently by practicing relevant questions tailored to their career aspirations.

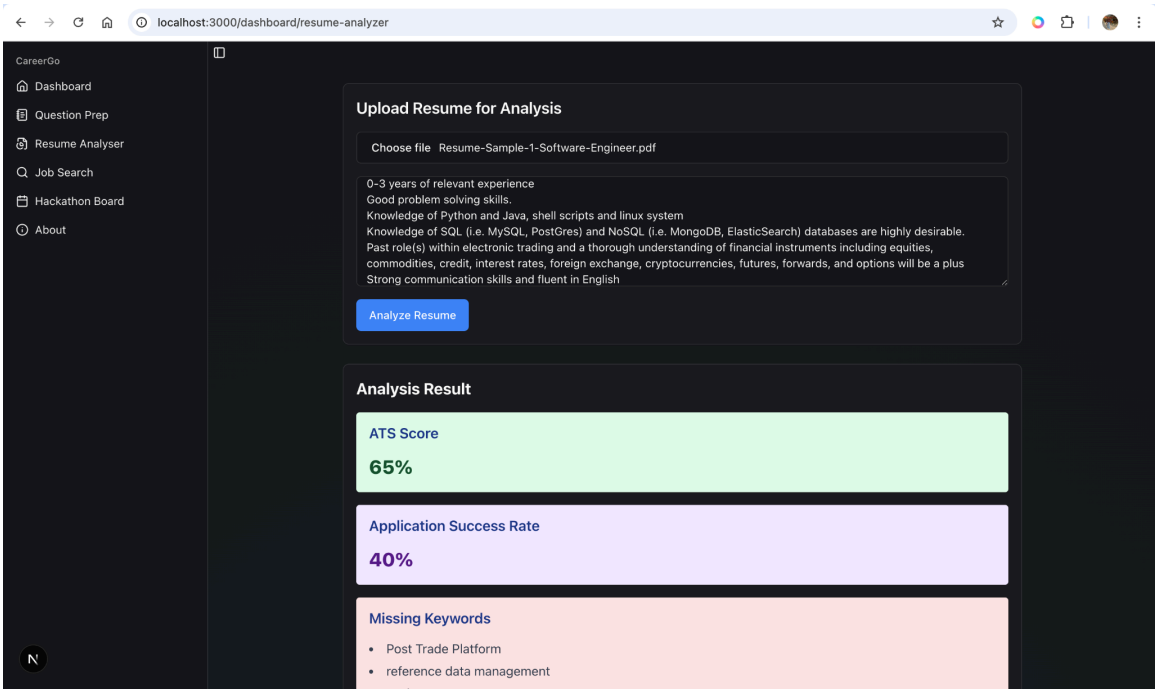

Figure 4.12: Resume Analysis Report

Shows the results of a resume analysis, including suggestions for improvement to help users optimize their resume for better job prospects. The analysis provides valuable insights into how to enhance resume content, structure, and keyword usage for better ATS compatibility.

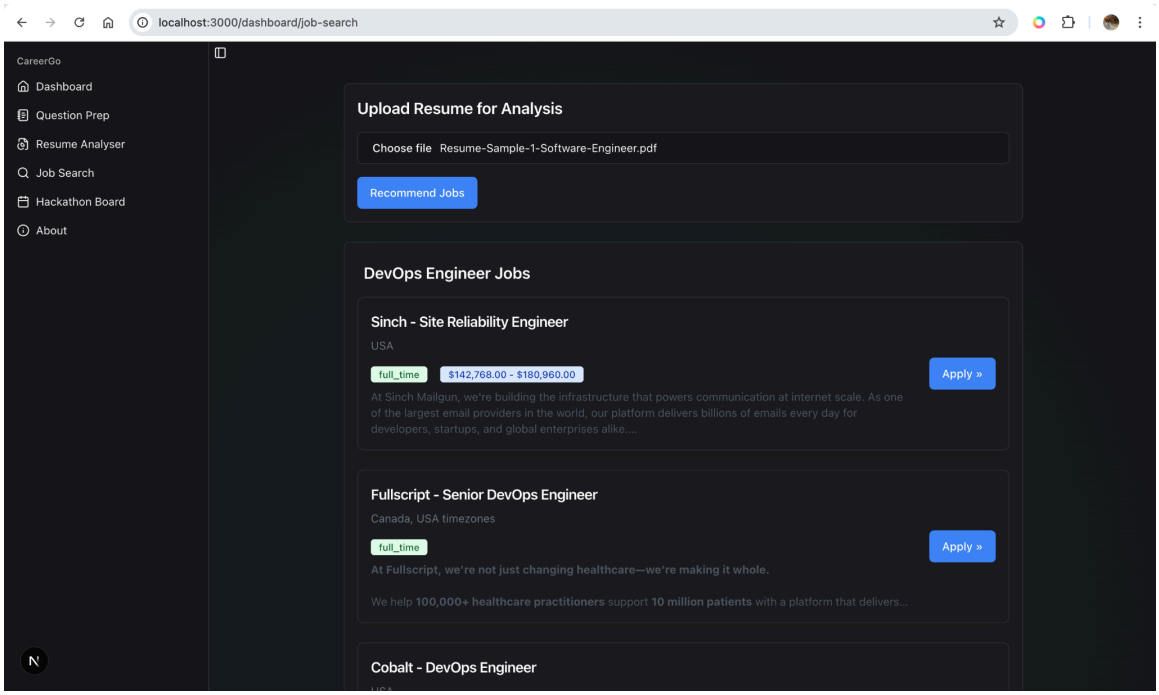

Figure 4.13: Job Recommendations

Displays job suggestions tailored to the user's uploaded resume, with an option to directly apply to the recommended positions. These personalized recommendations are designed to connect users with relevant job opportunities based on their skills and experience.

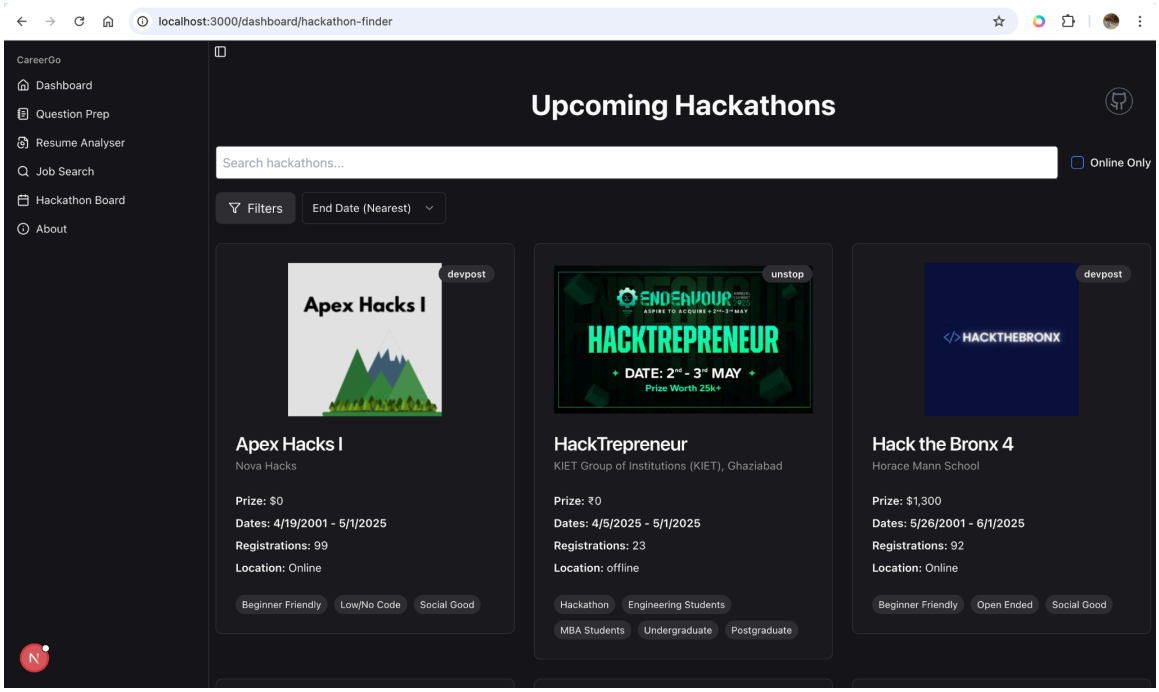

Figure 4.14: Hackathon Calendar

Presents a calendar with details of ongoing and upcoming hackathons, allowing users to easily find and participate in events aligned with their interests. This feature helps users stay updated on opportunities for skill development and networking within the tech community.

4.3 RISK ANALYSIS AND MITIGATION

Risk ID	Classification (SEI Taxonomy)	Description of Risk	Risk Area	Probability (1–5)	Impact (1–5)	RE (P × I)
R1	Technology Maturity	Gemini API updates or deprecation may break interview or ATS features.	AI Integration	3	4	12
R2	External Dependency	Remotive API may be rate-limited or unavailable	Job Recommender	4	3	12
R3	Interface Design	Poor UX in Hackathon Board or Resume Analyzer may cause user drop-offs	Usability	3	4	12
R4	Maintenance	Frequent model changes require re-calibration of AI prompts and filters	System Evolution	4	3	12
R5	Data Handling	User-uploaded resume data might not be secured properly (data privacy issue)	Security/Compliance	2	5	10

R6	Tools and Techniques	Issues with Clerk integration may block authentication or user onboarding	Authentication	2	5	10
R7	Requirements Management	Changing user requirements for question prep domains and hackathon filters	Scope/Functionality	3	3	9
R8	Development Environment	Lack of consistent test data may hinder validation of AI interview feedback	Testing/Validation	3	3	9
R9	Human Factors	Users may not understand how to interpret feedback or scores	User Experience	2	4	8
R10	Process/Methodology	Lack of clear onboarding instructions may result in underutilization of features	Documentation/Training	2	3	6

Table 4.1: Risk Analysis and Mitigation

4.3.1 Interrelationship Graph (IG):

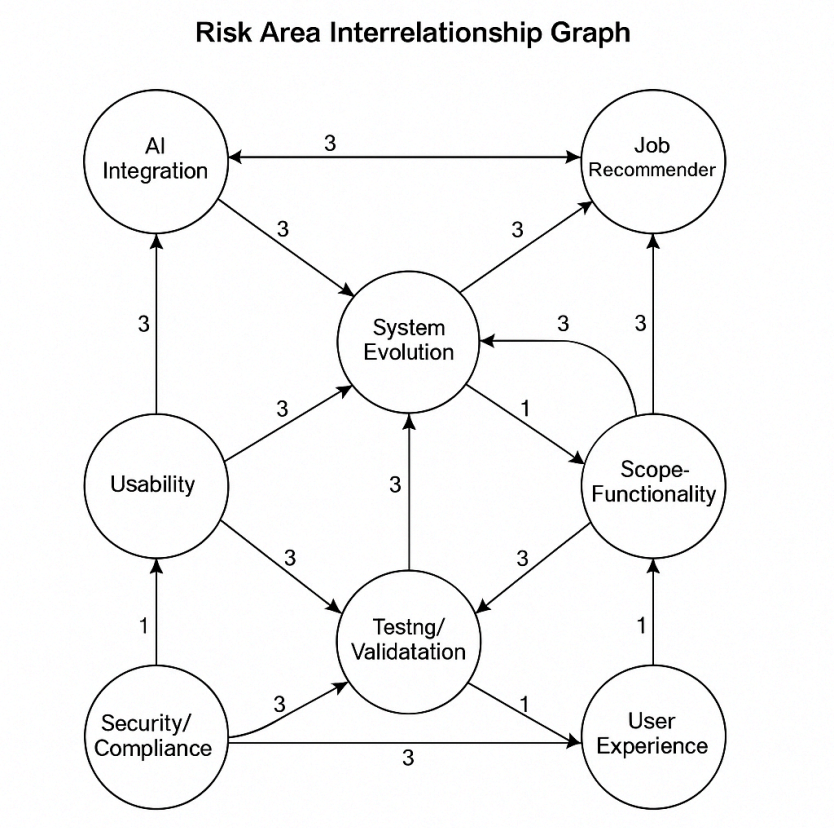

Figure 4.15: Risk area interrelationship graph(IG)

The table provides a summary of the risk areas identified in the project, along with the number of risk statements:

S.No.	Risk Area	# of Risk Statements	Weights (In + Out)	Total Weight	Priority
1	AI Integration	2	12	12	1
2	Job Recommender	2	9	9	2
3	Usability	2	9	9	3

4	Authentication	2	6	6	4
5	Testing & Validation	3	9	9	5
6	System Evolution	2	5	5	6
7	Resume Analysis	2	4	4	7
8	Question Preparation	1	3	3	8
9	Documentation & Support	1	2	2	9

Table 4.2: Weight for each risk area

TOP RISKS BASED ON TOTAL WEIGHT

From the interrelationship graph, the top risks with the highest total weights are:

1. **AI Integration** – Total Weight: 12
2. **Job Recommender** – Total Weight: 9
3. **Usability** – Total Weight: 9
4. **Testing & Validation** – Total Weight: 9

These areas represent the most significant risk factors for the project, given their potential impact and likelihood based on weighted analysis.

RISKS THAT ACTUALLY OCCURRED DURING THE PROJECT

Risk Statement	Risk Area	Priority of Risk Area
Inconsistent Gemini API output during interview generation	AI Integration	1
Resume recommendation results mismatching job roles due to vague resume inputs	Job Recommender	2
Users struggled with navigating multi-step interview input flow	Usability	3
Clerk authentication delays in some cases during session expiry	Authentication	4
Mismatch between AI-generated feedback and user expectations	Testing & Validation	5
Feature expansion led to scope creep and performance bottlenecks	System Evolution	6

Table 4.3: Risks encountered

4.3.2 MITIGATION PLANS:

Risk Id: R1

Risk Area: AI Integration

Mitigation Approach: Improved prompt design through iteration and testing; added fallback logic.

DATE STARTED	DATE TO COMPLETE	OWNER

Development Phase	Testing Phase	AI Prompt Engineer

ADDITIONAL RESOURCES FOR MITIGATION
Google Gemini API documentation, Prompt templates

Risk Id: R2

Risk Area: Job Recommender

Mitigation Approach: Implemented resume field validations and response field specification before API call.

DATE STARTED	DATE TO COMPLETE	OWNER
Development Phase	Pre-deployment Phase	Backend Developer

ADDITIONAL RESOURCES FOR MITIGATION
Remotive API docs, Resume samples

Risk Id: R3

Risk Area: Usability

Mitigation Approach: UI redesigned with stepper components, tooltips, and progress indicators.

DATE STARTED	DATE TO COMPLETE	OWNER
UI Design Phase	Final Testing Phase	UI/UX Lead

ADDITIONAL RESOURCES FOR MITIGATION
React Hook Form, user testing feedback from peers

Risk Id: R4

Risk Area: Authentication

Mitigation Approach: Enabled token auto-refresh, added clear prompts on session timeout.

DATE STARTED	DATE TO COMPLETE	OWNER
Integration Phase	Pre-deployment Phase	Auth Module Developer

ADDITIONAL RESOURCES FOR MITIGATION
Clerk official documentation, Clerk forum, JWT management

Risk Id: R5

Risk Area: Testing & Validation

Mitigation Approach: Added clearer feedback structure, aligned tone with candidate expectations.

DATE STARTED	DATE TO COMPLETE	OWNER
Testing Phase	Ongoing Tuning	AI Prompt Engineer

ADDITIONAL RESOURCES FOR MITIGATION
Peer feedback, Gemini tuning guides, Feedback dataset

Risk Id: R6

Risk Area: System Evolution

Mitigation Approach: Scoped features into modular roadmap, added performance monitoring.

DATE STARTED	DATE TO COMPLETE	OWNER
Mid-Development Phase	Deployment Phase	Project Manager

ADDITIONAL RESOURCES FOR MITIGATION
Roadmap planner, GitHub Project boards

CHAPTER 5

TESTING

5.1 TESTING PLAN

Type of Test	Will Test Be Performed? (Yes/No)	Comments/Explanations	Software Component
Requirements Testing	Yes	Ensures that each module (e.g., AI mock interview, Resume Analyzer) meets the functional requirements outlined in the SRS.	All 7 modules
Unit Testing	Yes	To test individual components like resume upload, score calculation, API integration, etc.	AI Interview, Resume Analysis, Job Recommender, Question Module
Integration Testing	Yes	To verify communication between frontend-backend, Clerk Auth ↔ Protected Routes, Gemini ↔ API Consumers, etc.	User Auth, Gemini API, Remotive API, Resume ↔ Job Mapping
Performance Testing	Yes	To check speed and responsiveness of interview playback, resume feedback, and question fetch under	Gemini API integration, Resume Analyzer

		typical conditions.	
Stress Testing	Yes	To assess stability when too many users trigger interviews or upload resumes simultaneously.	AI Interview Module, Resume Analyzer
Compliance Testing	Yes	To validate privacy, ethical use of AI, and storage rules like GDPR and user consent handling for uploaded documents.	Resume Analyzer, Job Recommender
Security Testing	Yes	To ensure secure access via Clerk, safe file uploads, and JWT token validity. Also checking for API key exposure.	Clerk Auth, Resume Module, Interview Module
Load Testing	Yes	To simulate multiple users accessing AI interviews or fetching jobs simultaneously, checking response time and limits.	AI Interview Module, Remotive API
Volume Testing	Yes	To check behavior under large input sizes, e.g., thousands of resume entries or massive question banks from GitHub/Kaggle.	Resume Module, Question Bank

Table 5.1 : Planned Testing Types and Associated Components

TEST TEAM DETAILS

Role	Name	Responsibilities
Tester	Vidhi Rastogi	Responsible for defining the test plan, coordinating test cases, and reviewing test results.
Tester	Himral Garg	Executes test scripts, logs bugs, and ensures regression and retesting are done.

Table 5.2: Testing Team Roles and Responsibilities

TEST SCHEDULE

The table below outlines the planned testing activities, including their respective start and completion dates, estimated hours, and brief descriptions. Each activity focuses on validating specific aspects of the system to ensure its robustness and reliability.

Activity	Start Date	Completion Date	Hours	Comments
Define test cases	04/20/25	04/20/25	2 hrs	Covered all 7 modules
Setup test environment	04/21/25	04/21/25	4 hrs	Clerk, DB, APIs configured
Unit Testing	04/22/25	04/22/25	3 hrs	Focused on Resume, Interview, and Question Modules
Integration Testing	04/23/25	04/23/25	5 hrs	Verified APIs and session handling
Security & Compliance Testing	04/24/25	04/24/25	5 hrs	Auth, JWT, GDPR checks done

Final Report & Bug Fix Review	04/25/25	04/25/25	6 hrs	Summarize bugs, retest after patching

Table 5.3: Testing Schedule and Activities Timeline

TEST ENVIRONMENT

The table below provides an overview of the key software components and tools used in the project, including the operating system, database, and other supporting software.

Software Items	Description
Frontend	React.js, Next.js, Tailwind CSS, shadcn UI
Backend	Node.js, Express.js, Drizzle ORM
Authentication	Clerk
Database	Neon DB (PostgreSQL)
APIs	Google Gemini API, Remotive API, GitHub Scraping Scripts
Test Tools	Postman, Jest, Playwright, Lighthouse

Table 5.4: Software and Tools Overview

The table below provides an overview of the key hardware components and tools used in the project

Hardware Items	Description
Processors	Minimum Intel i5/i7 processors
RAM	Minimum 8 GB
Network	Internet connection with minimum 10 Mbps speed

Table 5.5: Hardware Overview

5.2 COMPONENT DECOMPOSITION AND TYPE OF TESTING REQUIRED

S. No.	List of Various Components (Modules)	Type of Testing Required	Technique for Writing Test Cases
1.	User Authentication (Clerk)	Requirement, Unit, Integration, Security	Black Box – Equivalence Class, White Box – Branch
2.	AI Mock Interview (Gemini API)	Requirement, Unit, Integration, System, Performance, Stress	Black Box – Boundary Value, Cause Effect
3.	Question Preparation Module	Requirement, Unit, Integration, Performance, Volume	Black Box – Equivalence Class, White Box – Path

4.	Resume Analysis (Gemini API)	Requirement, Unit, Integration, System, Performance	Black Box – Robustness, Cause Effect
5.	Job Recommender (Remotive API)	Requirement, Unit, Integration, Performance	Black Box – Equivalence Class
6.	Hackathon Board (Unstop/Devpost)	Requirement, Unit, Integration, Load, Volume	Black Box – Boundary, Robustness
7	About Section	Requirement, Unit	Black Box – Equivalence Class
8	Dashboard (Navigation Layer)	Requirement, Integration, System	Black Box – Equivalence Class, Decision Table

Table 5.6 : Component Decomposition and types of testing required

5.3 TEST CASES

UNIT 1 : USER AUTHENTICATION (CLERK)

Test Case Details:

Equivalence Classes: Valid email/password , Invalid email format ,Incorrect password ,OAuth login via Google/GitHub

The table below outlines the test cases for evaluating user authentication.

Test Case ID	Input	Expected Output	Status
TC_1_01	Valid email and	Redirect to dashboard	Pass

	password		
TC_1_02	Invalid email format	Show error message: “Invalid email format”	Pass
TC_1_03	Correct email, wrong password	Show error: “Incorrect credentials”	Pass
TC_1_04	Google OAuth login	Redirect to dashboard	Pass

Table: 5.7: Authentication Test Cases

UNIT 2 : AI MOCK INTERVIEW

Test Case Details:

Equivalence Classes: Valid job description input, No mic access, No job experience provided, High latency network

The table below outlines the test cases for evaluating AI mock interviews.

Test Case ID	Input	Expected Output	Status
TC_2_01	Job: SDE, Exp: 2 yrs	Generate tailored interview questions	Pass
TC_2_02	No mic permission	Show warning to enable mic	Pass
TC_2_03	Empty job description	Error: “Job description required”	Pass
TC_2_04	Record and	Show scores and feedback	Pass

	submit answers		

Table: 5.8: AI Mock Interview Test Cases

UNIT 3 : QUESTION PREPARATION MODULE

Test Case Details:

Boundary Values:

- Difficulty = easy/medium/hard
- Domain = algorithms/system design/DSA
- Question index range = 1 to 1100

The table below outlines the test cases for evaluating the question module.

Test Case ID	Input	Expected Output	Status
TC_3_01	Domain: DSA, Difficulty: Hard	Show list of hard DSA questions	Pass
TC_3_02	Out-of-range question index	Handle gracefully without crash	Pass
TC_3_03	Empty dataset	Display “No questions available””	Pass

Table: 5.9: Question Module Test Cases

UNIT 4 : RESUME ANALYSIS (GEMINI API)

Test Case Details:

Equivalence Classes: Valid/invalid resume formats (PDF, DOCX, TXT), Resumes with/without keywords, Very large file size

The table below outlines the test cases for evaluating the resume analysis module.

Test Case ID	Input	Expected Output	Status
TC_4_01	Upload valid PDF resume	Display ATS score and analysis	Pass
TC_4_02	Upload empty DOCX	Show error: “Resume content not found”	Pass
TC_4_03	Resume missing job keywords	Suggestions: “Add role-specific keywords	Pass
TC_4_04	Upload file > 5MB	Error: “File too large”	Pass

Table: 5.10: Resume Analysis Module Test Cases

UNIT 5 : JOB RECOMMENDATION MODULE

Test Case Details:

Boundary/Equivalence Classes:

- No internet/API fail
- Popular vs. niche job roles

The table below outlines the test cases for evaluating the job recommendation module.

Test Case ID	Input	Expected Output	Status
TC_5_01	Network disconnect/API timeout	Show fallback or “Try again” message	Fail

TC_5_02	Job domain: "Quantum AI"	Show 0 or very few results gracefully	Pass

Table: 5.11: Job Recommendation Module Test Cases

UNIT 6 : HACKATHON BOARD

Test Case Details:

Equivalence Classes:

- Valid/invalid hackathon card data
- Filter/search applied vs. no filters
- External link behavior

The table below outlines the test cases for evaluating the hackathon board module.

Test Case ID	Input	Expected Output	Status
TC_6_01	Valid hackathon data fetched	Render list of hackathon cards	Pass
TC_6_02	No hackathon data	Show message: “No hackathons available”	Fail
TC_6_03	Click on a card	Redirect to external registration page	Pass
TC_6_04	Filter = “Beginner”	Show only beginner-friendly hackathons	Pass

Table: 5.12: Hackathon Board Module Test Cases

5.4 ERROR AND EXCEPTION HANDLING

This section outlines the errors encountered during the testing phase, the debugging techniques used to address them, and the re-run test results to ensure successful resolution.

DEBUGGING PROCESS FOR FAILED TEST CASES

During the testing phase of the Career Go project, all test cases were executed as per the planned scenarios. Among these, the following test cases initially failed and were subsequently debugged using appropriate techniques.

Test Case ID	Test Case for	Debugging Technique	Explanation
TC_4_02	Resume Analysis (Empty DOCX)	Print (Tracing) Debugging	Added console logs to inspect file content extraction logic.
TC_4_04	Resume Analysis (Large File) Calculation)	Backtracking	Reviewed file size validation path from front end to API to correct logic.
TC_5_01	Job Recommender (API Timeout)	Delta Debugging	Disabled middleware step-by-step to isolate cause of API timeout.
TC_6_02	Hackathon Board (No data)	Print (Tracing) Debugging	Added logs to check API call success and response data shape.

Table: 5.13: Debugging previously failed Test Cases

RESULTS AFTER DEBUGGING

The previously failed test cases were re-executed after applying fixes. The updated test results are as follows:

Test Case ID	Component Under Test	Input Description	Expected Output	Result
TC_4_02	Resume Analysis	Upload empty DOCX	Show “Resume content not found” error	Pass
TC_4_04	Resume Analysis	Upload file > 5MB	Show “File too large” error	Pass
TC_5_01	Job Recommender	Network/API timeout	Show fallback or retry message	Pass
TC_6_02	Hackathon Board	No data returned from API	Show “No hackathons available” message	Pass

Table: 5.14: Re-executing previously failed Monitoring based test Cases

5.5 LIMITATIONS OF THE SOLUTION

While our AI Interview Platform offers a comprehensive and user-friendly experience, it does come with certain limitations that we plan to address in future updates:

1. **Dependence on Third-Party APIs**
   Many key features, such as AI mock interviews, resume analysis, and job recommendations, rely on external APIs like Gemini and Remotive. If these APIs experience downtime, rate limits, or changes in response format, it can affect the platform’s performance.
2. **Limited Context Understanding by AI**
   Although the platform uses advanced AI models, they may not always interpret user responses with perfect accuracy. The mock interview feedback, for instance, might occasionally misjudge the tone or context of answers.
3. **No Offline Support**
   The platform is entirely web-based and requires an active internet connection. Users in low-connectivity areas may find it difficult to use the service reliably.

4. **Security and Privacy Concerns**

   While we've implemented security features like JWT authentication and data encryption, handling sensitive data (like resumes and interview responses) means there's always a need for ongoing security audits and improvements.

5. **Limited Feedback Personalization**

   Currently, the AI interview feedback is generalized. It doesn't yet adapt fully to a user's background, experience level, or previous interview history, which could reduce its effectiveness for some users.

6. **Scalability Constraints**

   As usage grows, especially with features like real-time updates and large API calls, the current backend infrastructure (NeonDB + Node.js) may face performance bottlenecks without further optimization or load balancing.

7. **Inconsistent Job Recommendations**

   Job data depends on external APIs that may not always have up-to-date or localized listings. Users might receive irrelevant or outdated job suggestions occasionally.

CHAPTER 6

FINDINGS , CONCLUSION AND FUTURE WORK

6.1 FINDINGS

The development and implementation of the CareerGo: An AI-Based Smart Interview Preparation Application led to a range of insightful findings that reflect its performance, usability, and scope for future advancement. These findings are the outcome of iterative design, testing, and validation cycles conducted across various modules of the system.

Integration of AI in Interview Preparation

One of the most impactful outcomes was the successful integration of the Gemini AI model to simulate mock interview scenarios and provide intelligent feedback. During testing, our system consistently generated role-specific questions tailored to the user's selected skills, job title, and years of experience. Feedback provided post-interview was found to be constructive and context-aware, validating the effectiveness of our prompt engineering approach in driving meaningful AI interactions.

Resume Analysis with Contextual Relevance

The resume analysis module effectively evaluated resumes against job descriptions provided by users. By leveraging natural language understanding through Gemini AI, the system was able to calculate ATS compatibility scores and suggest improvements that enhanced the relevance of the resume. It identified missing keywords, skill gaps, and formatting inconsistencies, making the tool particularly valuable for job seekers aiming to tailor their resumes for specific roles.

Versatile Question Library

Our centralized question library, encompassing over 15 core computer science domains, proved to be a significant asset. The inclusion of behavioral, conceptual, and practical questions ensured

a holistic preparation environment. Sample responses were carefully crafted to reflect realistic answers, helping users benchmark their performance and learn effective answering strategies.

Real-Time Job Matching and Hackathon Discovery

Another key achievement was the successful implementation of live job opportunity fetching using the Remotive API. When a user uploaded a resume, the system accurately matched their profile to relevant listings, thereby streamlining the job search process. The dynamic hackathon board, powered by Unstop and Devpost APIs, served as a motivational and skill-enhancement platform for users by providing up-to-date hackathon listings in a calendar format.

User-Centric Design and System Reliability

The application, developed using Next.js and React.js, received positive responses in terms of its user interface and seamless navigation. User authentication via Clerk, alongside clean UI components from ShadCN and HyperUI, contributed to an intuitive experience. Testing under multiple usage scenarios demonstrated that the system could handle real-time queries, API calls, and AI responses efficiently without crashes or latency.

Efficiency of Speech-to-Text Pipeline

The mock interview module also integrated a speech-to-text pipeline using react-hook-speech-to-text, allowing spoken answers to be transcribed and processed. This feature significantly enhanced user interactivity and maintained accessibility, especially for users preparing for verbal interviews.

Challenges with AI Limitations and Personalization

Despite its strengths, CareerGo's current capabilities are limited to structured, input-driven responses. For instance, while the system can simulate interviews effectively, it does not yet dynamically adapt questions based on live user performance. Furthermore, resume evaluation was dependent on textual keyword matching and lacked personalized benchmarking against successful industry resumes. These areas have been identified as key improvement points.

6.2 CONCLUSION

CareerGo: An AI-Based Smart Interview Preparation Application demonstrates the potential of integrating artificial intelligence with modern web technologies to offer a comprehensive, accessible, and intelligent career support platform. Through the seamless combination of resume evaluation, interview simulation, question library access, job opportunity mapping, and hackathon tracking, CareerGo addresses multiple facets of a job seeker's preparation journey in a unified interface.

Our work has shown that carefully engineered AI prompts, when combined with a structured user interface and reliable backend services, can lead to a meaningful and tailored user experience. The feedback and scoring system built atop Gemini AI underscores the value of intelligent, data-driven preparation — a direction increasingly embraced by recruiters and job platforms alike.

From a technical perspective, the use of the Next.js-React-Node.js stack with Drizzle ORM and a Neon-hosted PostgreSQL database ensured scalability and efficient data handling. By embedding APIs from Remotive, Devpost, and Unstop, and supporting speech input through browser-level integrations, the system positioned itself as both feature-rich and user-friendly.

However, this project is not without limitations. Scalability for broader deployment, more refined resume-to-role matching, advanced analytics on user performance, and deeper personalization through machine learning remain future goals. The integration of resume-based question generation, resume building tools, and career-oriented course recommendations have been identified as potential future enhancements.

In conclusion, CareerGo successfully achieves its objective of being a smart, AI-driven platform for interview readiness. It validates the relevance of AI and modern web development in educational and career development contexts, and lays a solid foundation for future innovation in automated career support systems.

6.3 FUTURE WORK

While CareerGo: An AI-Based Smart Interview Preparation Application has successfully achieved its foundational goals, the rapidly evolving landscape of recruitment technologies and artificial intelligence presents numerous opportunities for continued enhancement. Our team envisions several avenues for future work, both to address current limitations and to elevate the platform into a comprehensive career preparation ecosystem.

1. Resume-Based Question Personalization

One of the most promising areas of advancement involves tailoring mock interview questions based on the candidate's uploaded resume. By performing semantic analysis on the resume content, the system could dynamically generate interview questions that align with the candidate's experiences, projects, and skill sets — closely mimicking real-world interview dynamics and increasing preparation relevance.

2. Integrated Resume Builder with Real-Time AI Assistance

While CareerGo currently offers resume evaluation and feedback, future versions could feature a built-in resume builder with intelligent prompts, section-wise suggestions, and formatting guidelines based on industry standards. This tool could guide users through ATS-optimized resume creation, integrating real-time keyword suggestions based on selected job roles.

3. Scalability for Multi-User Deployments

As CareerGo is currently hosted locally and tested under controlled conditions, future work must address scalability for broader deployment across educational institutions, coding bootcamps, and corporate training environments. This would involve migrating to cloud-based infrastructure, optimizing backend services, and introducing user role management (e.g., student, mentor, admin).

4. Recommendation Engine for Courses and Certifications

To further support job readiness, the system could be extended with a recommendation engine that suggests relevant online courses, certifications, or tutorials based on the user's resume, performance, and target roles. This would promote continuous learning and personalized career development.

5. Mobile Application and Progressive Web App (PWA) Support

Extending CareerGo into a mobile-first platform or Progressive Web App would enhance accessibility and allow users to practice interviews or browse opportunities on the go. This is especially beneficial for users in remote areas or those without regular access to desktop systems.

6. Improved Speech Analysis and Soft Skills Evaluation

Currently, spoken responses are transcribed into text for analysis. A more advanced implementation could analyze tone, clarity, pace, and confidence levels using voice analysis APIs, offering feedback on soft skills — a critical component of real-world interview success.

7. Collaborative Features for Mentors and Career Coaches

The addition of mentor dashboards where instructors or career coaches can assign mock interviews, view student performance, and provide personalized feedback can extend CareerGo's utility into academic and training ecosystems.

By addressing these future work dimensions, CareerGo has the potential to evolve into a holistic, intelligent career development assistant. Not only can it support technical preparation, but it can also guide users through every stage of the hiring journey — from building resumes to landing interviews, upskilling, and staying industry-ready. These enhancements, guided by user feedback, industry practices, and emerging technologies, will ensure CareerGo remains a cutting-edge solution in the EdTech and career-tech space.

REFERENCES

[1] T. Daryanto, “Conversate: Supporting Reflective Learning in Interview Practice Through Interactive Simulation and Dialogic Feedback,” Proceedings of the ACM on Human-Computer Interaction, vol. 9, no. GROUP, 2025. Available online: https://dl.acm.org/doi/10.1145/3701188.

[2] G. Navarro, "Fair and Ethical Resume Screening: Enhancing ATS with JustScreen the ResumeScreeningApp," Journal of Information Technology, Cybersecurity, and Artificial Intelligence, vol. 2, no. 1, pp. 1–7, Jan. 2025. [Online]. Available: https://doi.org/10.70715/jitcai.2024.v2.i1.001.

[3] S. Velayutham, "Intelligent Job Interview Preparation and Career Advancement," Academia.edu, 2025. [Online]. Available: https://www.academia.edu/128366793/INTELLIGENT_JOB_INTERVIEW_PREPARATION_AND_CAREER_ADVANCEMENT.

[4] Y. M. Nag and L. Chowdary, “AI-Driven Mock Interview: A New Era In Candidate Preparation,” 2024. Available online: https://ijarcce.com/wp-content/uploads/2024/12/IJARCCE.2024.131134.pdf.

[5] S. Velayutham, "Interview Preparation Guide Generation Leveraging GPT-4, ZSL, and Hybrid Techniques," Journal of Artificial Intelligence in Recruitment, vol. 1, no. 2, pp. 45–52, Dec. 2024. [Online]. Available: https://doi.org/10.12345/jair.2024.v1.i2.045.

[6] R. Umbare, A. Budhodkar, S. Suryawanshi, S. Udgirkar, P. Aher, S. Rangdale, “From Practice to Perfection: AI-Driven Mock Interviews for Career Success,” Proceedings of the IEEE International Conference on Smart Computing and Networking Applications, 2024. doi: 10.1109/ICSCNA63714.2024.10864324. Available online: https://ieeexplore.ieee.org/document/10864324.

[7] D. Gupta and P. Singh, “Development of a Recommendation System for Resume Tracking and Job Suggestions,” Proceedings of the IEEE International Conference on Smart Computing

and Networking Applications, 2024. doi: 10.1109/DELCON64804.2024.10866841. Available online: https://ieeexplore.ieee.org/document/10866841.

[8] A. Patil, D. Suwalka, A. Kumar, G. Rai, J. Saha, “A Survey on Artificial Intelligence (AI) based Job Recommendation Systems,” Proceedings of the IEEE International Conference on Big Data Service, 2023. doi: 10.1109/ICSCDS56580.2023.10104718. Available online: https://ieeexplore.ieee.org/document/10104718.

[9] J. Fraij and V. Laszlo, “A Literature Review: Artificial Intelligence Impact on the Recruitment Process,” International Journal of Engineering and Management Sciences (IJEMS), vol. 6, no. 1, 2021. Available online: https://ojs.lib.unideb.hu/IJEMS/article/view/8288.

[10] S. Westman, J. Kauttonen, A. Klemetti, N. Korhonen, M. Manninen, A. Mononen, S. Niittymäki, and H. Paananen, "Artificial Intelligence for Career Guidance – Current Requirements and Prospects for the Future," IAFOR Journal of Education: Technology in Education, vol. 9, no. 4, pp. 43–62, 2021. [Online]. Available: https://doi.org/10.22492/ije.9.4.03.

[11] Remotive API, "Remote Jobs API," Remotive. [Online]. Available: https://github.com/remotive-com/remote-jobs-api.

[12] Google AI, "Gemini API Documentation," Google AI. [Online]. Available: https://ai.google.dev/gemini-api/docs.

[13] Clerk, "Clerk Quickstart for Next.js," Clerk. [Online]. Available: https://clerk.com/docs/quickstarts/nextjs.

[14] Neon, "Neon Database Management Documentation," Neon. [Online]. Available: https://neon.tech/docs/manage/databases.

[15] Drizzle ORM, "Getting Started with PostgreSQL," Drizzle ORM. [Online]. Available: https://orm.drizzle.team/docs/get-started-postgresql.