|  |
| --- |
| Name: Sabhapathi M Bandara |
| Student Reference Number: 10898422 |



|  |  |  |
| --- | --- | --- |
| Module Code: PUSL 3190 | | Module Name: Computing Project |
| Coursework Title: FutureForceAI : AI Career Support Platform | | |
| Deadline Date:  2025/05/05 | Member of staff responsible for coursework: Mr. Gayan Perera | |
| Programme:  BSc. (Hons) Software Engineering | | |
| Please note that University Academic Regulations are available under Rules and Regulations on the University website [www.plymouth.ac.uk/studenthandbook](http://www.plymouth.ac.uk/studenthandbook). | | |
| Group work: please list all names of all participants formally associated with this work and state whether the work was undertaken alone or as part of a team. Please note you may be required to identify individual responsibility for component parts.  ***We confirm that we have read and understood the Plymouth University regulations relating to Assessment Offences and that we are aware of the possible penalties for any breach of these regulations. We confirm that this is the independent work of the group.***  Signed on behalf of the group: | | |
| Individual assignment: ***I confirm that I have read and understood the Plymouth University regulations relating to Assessment Offences and that I am aware of the possible penalties for any breach of these regulations. I confirm that this is my own independent work.***  A blue writing on a black background  AI-generated content may be incorrect.  Signed: | | |
| Use of translation software: failure to declare that translation software or a similar writing aid has been used will be treated as an assessment offence.  I \*have used/not used translation software.  If used, please state name of software………………………………………………………………… | | |
| **Overall mark \_\_\_\_\_% Assessors Initials \_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_** | | |

A close-up of a logo

AI-generated content may be incorrect.

PUSL3190 Computing Individual Project

Final Report

FutureForce AI

AI Career Support Platform

Supervisor: Mr.Gayan Perera

Name: Sabhapathi M Bandara

Plymouth Index Number: 10898422

Degree Program: BSc. (Hons) Software Engineering

## 

## Acknowledgement

I would like to express my sincere gratitude to everyone who contributed to the success of the FutureForceAI project. This project would not have been possible without the continuous support, guidance, and encouragement from several individuals.

First, I would like to extend my heartfelt thanks to my supervisor, Mr. Gayan Perera, for his invaluable support, timely feedback, and expert guidance throughout every stage of this project. His insights played a crucial role in shaping the direction and overall success of FutureForceAI.

I am also deeply thankful to the lecturers and academic staff of the Software Engineering department at the university. Their dedication to teaching and their availability for support have been instrumental in helping me understand and apply the necessary concepts and tools effectively.

Special appreciation goes to the users who participated in the testing and feedback process. Their honest input and suggestions helped identify areas of improvement and ensured the platform met real user expectations.

I would also like to thank my peers and friends for their continuous motivation and for being willing to review my work, share ideas, and provide helpful critiques whenever needed.

Lastly, I extend my deepest appreciation to my family for their unwavering support, patience, and encouragement throughout the journey of completing this project. Their belief in my abilities kept me motivated during challenging times.

## 

## Abstract

Career development is a challenging process for many job seekers in today’s competitive job market. Individuals often rely on multiple platforms for job searching, resume building, and interview preparation, which can lead to inefficiencies and frustration. FutureForceAI was developed as a unified solution to these issues. This AI-based platform aims to support job seekers by offering personalized career services such as resume optimization for Applicant Tracking Systems (ATS), real-time interview practice, and tailored career guidance.

The system integrates modern technologies including Python, React, Next.js, and MongoDB, along with AI capabilities powered by OpenAI and Gemini APIs. Through the use of surveys and interviews, the need for an all-in-one career platform was identified, and FutureForceAI was designed to meet these needs effectively. Although early testing posed some challenges with tool integration, improvements were made throughout the development process. The platform now provides AI-driven resume analysis, interactive NLP-based interview training, and real-time job insights. FutureForceAI presents a reliable and intelligent solution to bridge the gaps in existing career support services.

**KEYWORDS:** career development, job seekers, resume optimization, AI, web application, interview preparation

**Table of Content**

[Acknowledgement 3](#_Toc197335452)

[Abstract 4](#_Toc197335453)

[1. Introduction 10](#_Toc197335454)

[1.1 Background of the Study 10](#_Toc197335455)

[1.2 Problem Statement 10](#_Toc197335456)

[1.3 Objectives and Aims of the Project 11](#_Toc197335457)

[1.4 Importance and Relevance of the Project 11](#_Toc197335458)

[1.5 Brief Methodology Overview 12](#_Toc197335459)

[2. Background, Objectives & Deliverables 13](#_Toc197335460)

[2.1 Detailed Background of the Project 13](#_Toc197335461)

[2.2 Clear and Detailed Description of the Project Objectives 13](#_Toc197335462)

[2.3 Project Deliverables 14](#_Toc197335463)

[3. Literature Review 15](#_Toc197335464)

[3.1 Identification of Gaps in Existing Research 16](#_Toc197335465)

[3.2 Justification for Project Necessity Based on Literature 16](#_Toc197335466)

[4. Method of Approach 17](#_Toc197335467)

[4.1 Overall Methodological Approach 17](#_Toc197335468)

[3.2 Explanation of Data Gathering Techniques 18](#_Toc197335469)

[3.3 Tools and Technologies Overview 19](#_Toc197335470)

[5. Requirements Analysis 21](#_Toc197335471)

[5.1 Functional Requirements 21](#_Toc197335472)

[5.2 Non-Functional Requirements 22](#_Toc197335473)

[5.3 Hardware, Software, and Networking Requirements 23](#_Toc197335474)

[6. Design and Implementation 25](#_Toc197335475)

[6.1 System Architecture Overview 25](#_Toc197335476)

[6.2 Database Schema Design 25](#_Toc197335477)

[6.3 User Interface (UI) and User Experience (UX) Design Choices 26](#_Toc197335478)

[6.4 Key Implementation Details and Integration with AI Tools 31](#_Toc197335479)

[7. Testing and Evaluation 32](#_Toc197335480)

[7.1 Unit Testing 32](#_Toc197335481)

[7.2 Integration Testing 34](#_Toc197335482)

[7.3 System Testing 36](#_Toc197335483)

[7.4 Outcomes of Testing and Adjustments Made 38](#_Toc197335484)

[7.5 Evaluation Against Initial Objectives and Requirements 39](#_Toc197335485)

[8. End-Project Report & Recommendations 40](#_Toc197335486)

[8.1 Brief Summary of Project Achievements 40](#_Toc197335487)

[8.2 Evaluation of Objectives and Outcomes 40](#_Toc197335488)

[Objective 1: Comprehensive Integration 40](#_Toc197335489)

[Objective 2: Personalized Support 41](#_Toc197335490)

[Objective 3: Efficiency and Engagement 41](#_Toc197335491)

[Objective 4: System Performance 41](#_Toc197335492)

[Objective 5: Continuous Improvement 42](#_Toc197335493)

[8.3 Recommendations for Future Improvement or Expansion 42](#_Toc197335494)

[1. Enhanced AI Capabilities 42](#_Toc197335495)

[2. Mobile Application Development 42](#_Toc197335496)

[3. Expanded Job Market Data 42](#_Toc197335497)

[4. Advanced User Analytics 43](#_Toc197335498)

[5. Improved Interview Preparation Modules 43](#_Toc197335499)

[6. Multilingual Support 43](#_Toc197335500)

[7. Regular Content Updates 43](#_Toc197335501)

[9. Project Post-mortem 44](#_Toc197335502)

[9.1 Appraisal of Project Processes and Decisions 44](#_Toc197335503)

[9.1.1 Methodology Chosen: Waterfall Model 44](#_Toc197335504)

[9.1.2 Tools and Technology 45](#_Toc197335505)

[9.2 Analysis of Own Performance and Team Collaboration 46](#_Toc197335506)

[9.3 Lessons Learned and Reflections on Feedback from Users 47](#_Toc197335507)

[9.3.1 Lessons Learned 47](#_Toc197335508)

[9.3.2 User Feedback Reflection 48](#_Toc197335509)

[10. Conclusion 49](#_Toc197335510)

[11. References 50](#_Toc197335511)

[12. User Guide 52](#_Toc197335512)

[System Requirements 52](#_Toc197335513)

[Accessing FutureForceAI 52](#_Toc197335514)

[User Registration and Login 52](#_Toc197335515)

[Using Resume Analyzer 53](#_Toc197335516)

[Job Description Research 53](#_Toc197335517)

[Interview Preparation 54](#_Toc197335518)

[Smart Job Search 55](#_Toc197335519)

[Customer Support 55](#_Toc197335520)

[13. Project Initiation Document 56](#_Toc197335521)

[1. Introduction 58](#_Toc197335522)

[2. Business Case 60](#_Toc197335523)

[2.1 Business Need 60](#_Toc197335524)

[2.2 Business Objectives 61](#_Toc197335525)

[1. User Engagement and Growth 61](#_Toc197335526)

[2. Platform Performance and Efficiency 61](#_Toc197335527)

[3. User Success Metrics 61](#_Toc197335528)

[4. Revenue and Growth Targets 61](#_Toc197335529)

[5. Market Position and Innovation 61](#_Toc197335530)

[3. Project Objectives 62](#_Toc197335531)

[1. Develop and Implement Core Platform Features 62](#_Toc197335532)

[2. Analyze and Process Career Data 62](#_Toc197335533)

[3. Make AI-Powered Career Support Tools 62](#_Toc197335534)

[4. Evaluate and Optimize System Performance 62](#_Toc197335535)

[4. Literature Review 63](#_Toc197335536)

[5. Method of Approach 66](#_Toc197335537)

[5.1 Development Methodology and Tools 66](#_Toc197335538)

[5.2 Project Management Approach 67](#_Toc197335539)

[6. Initial Project Plan 69](#_Toc197335540)

[7. Risk Analysis 71](#_Toc197335541)

[8. Additional Sections 73](#_Toc197335542)

[8.1 Ethical Considerations 73](#_Toc197335543)

[8.2 Stakeholder Analysis 73](#_Toc197335544)

[8.3 Sustainability Plan 74](#_Toc197335545)

[References 75](#_Toc197335546)

[14. Stage Plan for FutureForceAI 77](#_Toc197335547)

[1. Planning & Analysis – Completed 77](#_Toc197335548)

[2. Define Requirements – Completed 77](#_Toc197335549)

[3. Design – Completed 77](#_Toc197335550)

[4. Development – Completed 78](#_Toc197335551)

[5. Testing – Completed 78](#_Toc197335552)

[6. Deployment – Completed 78](#_Toc197335553)

[7. Maintenance – Ongoing 78](#_Toc197335554)

[15. Interim Report 80](#_Toc197335555)

[1. Introduction 83](#_Toc197335556)

[1.1 Introduction 83](#_Toc197335557)

[1.2 Problem Definition 84](#_Toc197335558)

[1.3 Project Objectives 84](#_Toc197335559)

[2. System Analysis 85](#_Toc197335560)

[2.1 Facts Gathering Techniques 85](#_Toc197335561)

[2.2 Existing System 85](#_Toc197335562)

[2.3 Use Case Diagram 87](#_Toc197335563)

[2.4 Drawbacks of the Existing System 88](#_Toc197335564)

[3 Requirements Specification 89](#_Toc197335565)

[3.1 Functional Requirements 89](#_Toc197335566)

[3.2 Non-Functional Requirements 90](#_Toc197335567)

[3.3 Hardware/Software Requirements 91](#_Toc197335568)

[3.4 Networking Requirements 91](#_Toc197335569)

[4. Feasibility Study 92](#_Toc197335570)

[4.1 Operational Feasibility 92](#_Toc197335571)

[4.2 Technical Feasibility 93](#_Toc197335572)

[4.3 Outline Budget 94](#_Toc197335573)

[5 System Architecture 95](#_Toc197335574)

[5.1 Class Diagram 95](#_Toc197335575)

[5.2 ER Diagram 96](#_Toc197335576)

[5.3 High-level Architectural Diagram 97](#_Toc197335577)

[6 Development Tools and Technologies 98](#_Toc197335578)

[6.1 Development Methodology 98](#_Toc197335579)

[6.2 Programming Languages and Tools 99](#_Toc197335580)

[6.3 Third Party Components and Libraries 99](#_Toc197335581)

[6.4 Algorithms 100](#_Toc197335582)

[7. Discussion 101](#_Toc197335583)

[7.1 Overview of the Interim Report 101](#_Toc197335584)

[7.2 Summary of the Report 101](#_Toc197335585)

[7.3 Challenges Faced 101](#_Toc197335586)

[7.4 Future Plans/ Upcoming Work 101](#_Toc197335587)

[8. References 102](#_Toc197335588)

**Table of Figures**

[Figure 1 : Home Page 26](#_Toc197335150)

[Figure 2 : Registration Page 26](#_Toc197335151)

[Figure 3 : Login Page 27](#_Toc197335152)

[Figure 4 : Dashboard 27](#_Toc197335153)

[Figure 5 : Job Description Search Interface 28](#_Toc197335154)

[Figure 6 : Resume Analyzer Interface 28](#_Toc197335155)

[Figure 7 : Interview Preparation Interface 29](#_Toc197335156)

[Figure 8 : Career Guidance Interface 29](#_Toc197335157)

[Figure 9 : Job Search Interface 30](#_Toc197335158)

[Figure 10 : Conceptual Diagram 65](#_Toc197335159)

[Figure 11 : High-Level Architectural Diagram 68](#_Toc197335160)

[Figure 12 : Gantt Chart 70](#_Toc197335161)

[Figure 13 : Use Case Diagram 87](#_Toc197335162)

[Figure 14 : Class Diagram 95](#_Toc197335163)

[Figure 15 : ER Diagram 96](#_Toc197335164)

[Figure 16 : High Level Architectural Diagram 97](#_Toc197335165)

**Table of Tables**

[Table 1 : Unit Testing Table 32](#_Toc197335267)

[Table 2 : Integration Testing Table 34](#_Toc197335268)

[Table 3 : System Testing Table 36](#_Toc197335269)

## 1. Introduction

### 1.1 Background of the Study

The modern job market is becoming increasingly competitive, making the process of finding suitable employment challenging for job seekers. People frequently face difficulties such as effectively preparing for interviews, optimizing their resumes to pass through Applicant Tracking Systems (ATS), researching detailed job descriptions, discovering relevant job vacancies, and receiving accurate career guidance. Traditional methods and separate platforms available online often address these challenges individually, which can lead to inefficiency and frustration. This fragmentation in resources and tools results in job seekers having to visit multiple websites, causing delays and complicating the overall job search process.

Recent advancements in Artificial Intelligence (AI) offer new possibilities to overcome these issues. AI-driven platforms have shown potential in providing more efficient, personalized, and integrated solutions, significantly improving how users search for jobs, create effective resumes, practice for interviews, and plan their careers.

### 1.2 Problem Statement

Job seekers frequently encounter several key problems during their job search. Firstly, interview preparation typically lacks personalized feedback, and generic practice questions often do not reflect specific job roles. Secondly, creating resumes that effectively pass ATS screening remains a significant challenge due to the requirement of including particular keywords and formatting rules. Additionally, comprehensive job description research is often limited and does not always align with the job seeker's existing qualifications and experiences. Moreover, finding real-time, accurate job vacancies that match candidates' expectations and skills is often difficult. Finally, career guidance is usually generic and not personalized enough to help individuals make informed career decisions aligned with their interests and skills.

Currently, most available platforms and resources address these issues separately, forcing users to engage with multiple systems. This leads to inefficiencies, duplication of efforts, and suboptimal outcomes for job seekers. There is a clear need for an integrated platform that can effectively combine these essential features into a cohesive solution.

### 1.3 Objectives and Aims of the Project

The primary aim of this project, FutureForceAI, is to provide an integrated solution using artificial intelligence to support job seekers across various stages of their career development. Specifically, this project includes the following key objectives:

* Develop an interactive Interview Preparation Bot, where the user can upload or select an uploaded CV, specify the interview field or job role, receive five relevant interview questions generated by the OpenAI API, and obtain detailed feedback based on their responses.
* Create an ATS Resume Analyzer, allowing users to upload or select their CV, sending it to the OpenAI API with customized prompts, and obtaining feedback on missing keywords and formatting issues. It will also generate an optimized sample CV designed to pass through ATS effectively.
* Implement a Job Description Research Bot that allows the user to specify a job role and use their CV. This tool scrapes current job descriptions from relevant websites using Beautiful Soup, analyses the data, and provides customized suggestions aligned with the user’s qualifications.
* Design a Smart Job Search tool that displays current job vacancies along with critical details such as salary information and other relevant data to assist job seekers in finding suitable job opportunities quickly and efficiently.
* Establish a comprehensive Career Guidance Assistant, which evaluates the uploaded CV, identifies potential career paths, asks users about their preferences and aspirations, and provides personalized career guidance accordingly.

### 1.4 Importance and Relevance of the Project

FutureForceAI addresses significant gaps in the existing career support services available to job seekers today. Its relevance lies in integrating multiple essential job-search components into a single, streamlined platform, thereby enhancing efficiency and user satisfaction. This approach not only simplifies the job search process but also provides a more personalized experience through advanced AI-driven features.

By addressing critical aspects such as ATS optimization, interview preparation, real-time job research, and personalized career guidance, this project significantly increases the chances of job seekers securing suitable employment opportunities. Additionally, using AI technologies ensures continuous improvement and adaptation to evolving job market trends, maintaining relevance over time.

The relevance of this project extends to multiple stakeholders, including recent graduates, professionals seeking career advancement, and career changers, thereby offering broad societal benefits by improving employment outcomes and supporting workforce development.

### 1.5 Brief Methodology Overview

The methodology for this project follows a structured approach based on the waterfall development model, comprising clearly defined phases: planning and analysis, system design, implementation, testing, and deployment.

In the planning and analysis phase, data gathering techniques such as surveys and personal interviews with potential users were employed, alongside reviewing existing literature on AI applications in career guidance. The system design phase involved creating system architecture, database schemas, and interface prototypes. Implementation involved coding the system using Python for backend processes, React and Next.js for the frontend, and MongoDB for data management. Integration of external AI services, specifically OpenAI and Gemini APIs, was critical for enabling personalized features.

Testing included unit, integration, and performance testing to ensure reliability, efficiency, and user-friendliness. Lastly, the deployment phase involved initial local demonstrations followed by cloud hosting to accommodate wider user testing and feedback.

## 2. Background, Objectives & Deliverables

### 2.1 Detailed Background of the Project

The job market continues to evolve rapidly, making career advancement increasingly competitive. Job seekers face significant barriers due to fragmented resources available online, often resulting in an inefficient job search process. Common platforms typically handle aspects like resume creation, interview practice, job search, and career guidance separately, requiring users to duplicate efforts and resulting in suboptimal results. Furthermore, traditional platforms rarely offer personalized and effective feedback that aligns closely with individual job roles, qualifications, and career objectives.

FutureForceAI was developed to directly address these inefficiencies and integration problems by creating a comprehensive, user-friendly AI-powered platform. It aims to simplify job search activities, enhance the effectiveness of resume submissions, and improve interview preparedness, ultimately guiding users towards meaningful career decisions.

### 2.2 Clear and Detailed Description of the Project Objectives

1. Interactive Interview Preparation Bot:

* Allow users to upload their CV and specify their desired job role.
* Generate five relevant interview questions using OpenAI API.
* Provide immediate, detailed feedback on user responses to enhance interview readiness.

2. ATS Resume Analyzer:

* Facilitate uploading and analysis of CVs to identify gaps such as missing keywords or formatting issues.
* Generate customized recommendations and provide a tailored sample CV optimized to pass ATS screenings effectively.

3. Job Description Research Bot:

* Accept a specified job role and user CV as input.
* Scrape and analyze job descriptions from relevant employment websites using Beautiful Soup.
* Offer suggestions aligning job descriptions with user qualifications and skills.

4. Smart Job Search Tool:

* Display real-time job vacancies tailored to user profiles.
* Provide critical job data, including salary and essential job requirements, enabling quicker and more informed job applications.

5. Career Guidance Assistant:

* Evaluate uploaded CVs and identify appropriate career paths.
* Collect user career preferences through interactive questions.
* Deliver personalized career guidance aligning with user aspirations and market demands.

### 2.3 Project Deliverables

* Fully functional web-based AI platform integrating all described features (Interview Bot, Resume Analyzer, Job Research, Job Search, Career Guidance).
* Comprehensive user documentation including setup, usage guides, and maintenance instructions.
* Detailed testing reports demonstrating functionality, reliability, and efficiency.
* A robust database schema and AI integration capable of handling real-time user interactions and data processing securely and efficiently.
* Final comprehensive report documenting development, methodologies, and evaluation of project success against original objectives.

## 3. Literature Review

The integration of Artificial Intelligence (AI) in career support platforms is a growing area of interest, driven by the increasing challenges faced by job seekers in the competitive job market. While AI applications in career guidance have been gaining traction, research indicates that the implementation remains relatively basic and fragmented, particularly concerning personalized and comprehensive support systems.

Research conducted by Westman and Mononen (2022) underscores the early stage of AI integration in career guidance systems. Their findings suggest that although basic AI functionalities exist, significant gaps remain in delivering sophisticated and tailored career guidance. This highlights the untapped potential for more personalized AI-powered career advice.

Further studies, such as those by Monreal and Palaoag (2024), emphasize that despite available automated platforms, personalization remains significantly lacking. Their study particularly identifies the limitations of generic career advice, advocating the development of adaptive AI systems that provide recommendations based on individual user profiles and real-time data analysis

Applicant Tracking Systems (ATS) have also emerged as critical components of the modern hiring process. However, many job seekers continue to struggle with creating ATS-friendly resumes. Tools developed by Waghmare and PJ primarily assist in optimizing resumes for keyword density and formatting but typically fail to tailor resumes to specific job descriptions or industries, thus limiting candidates' success in initial screening rounds

In terms of interview preparation, platforms such as those analyzed by Rai et al. (2024) highlight that existing interview preparation systems often offer static scenarios without real-time, personalized feedback. Rai's research points out that significant improvements in Natural Language Processing (NLP) are needed to provide dynamic and tailored feedback, thereby improving candidates' confidence and performance in interviews.

Moreover, literature also points to the absence of comprehensive job research tools. Job applicants typically lack access to detailed insights about company cultures, working conditions, and other critical information required to make informed career decisions. While some platforms provide basic information, comprehensive integration of all relevant job market data remains scarce, limiting job seekers' abilities to fully understand employment opportunities and market trends.

### 3.1 Identification of Gaps in Existing Research

\* Lack of Integrated Systems: Current career support tools predominantly focus on individual aspects like resume building, job searching, or interview practice independently. This fragmented approach forces job seekers to manage multiple platforms, resulting in inefficiencies and reduced effectiveness in their job search processes.

\* Insufficient Personalization: Most existing career guidance systems provide generic recommendations that do not adequately address individual career aspirations or unique skill sets. There is an urgent need for adaptive, personalized platforms that leverage user-specific data to offer meaningful career advice.

### 3.2 Justification for Project Necessity Based on Literature

Given these identified gaps, the development of a comprehensive AI-based career support platform like FutureForceAI is justified and necessary. By integrating multiple key functionalities such as resume optimization, personalized interview preparation, detailed job research, and tailored career guidance into a singular, cohesive platform, FutureForceAI directly addresses the deficiencies observed in current systems.

This project utilizes advanced AI technologies, specifically OpenAI and Gemini APIs, to provide personalized and adaptive support. These technologies facilitate immediate feedback mechanisms, enhancing user engagement and significantly improving the effectiveness of career-related tasks. Furthermore, by consolidating job market insights and providing personalized recommendations, FutureForceAI equips job seekers with comprehensive data, enabling informed decision-making.

Literature clearly demonstrates the benefits of AI in enhancing user experiences and outcomes. However, existing solutions fail to fully exploit these advantages due to their fragmented nature and lack of personalized approaches. FutureForceAI aims to bridge these gaps, presenting a necessary and innovative solution in the career support landscape, thereby significantly contributing to both academic research and practical applications in AI-driven career development.

## 4. Method of Approach

### 4.1 Overall Methodological Approach

The methodological approach chosen for this project is the Waterfall methodology. This structured and linear development model provides clearly defined phases, each building upon the results and findings of the previous step. It is a traditional and effective method for managing well-defined projects, particularly when requirements are clearly understood from the beginning. The Waterfall model was specifically selected for its clarity, ease of tracking progress, and ability to maintain a disciplined schedule, essential for the successful completion of the FutureForceAI platform.

1. Planning and Analysis:

This initial stage involved defining clear project goals and understanding the needs and expectations of the end users. Activities included identifying the core features required to assist job seekers, such as an Interview Preparation Bot, ATS Resume Analyzer, Job Description Research Bot, Smart Job Search tool, and Career Guidance Assistant. In this phase, detailed analysis was conducted to ensure a comprehensive understanding of the project scope. Extensive research was also performed to gather insights from existing systems, literature, and user requirements.

2. System Design:

The design phase was dedicated to planning the architecture and detailed workings of the system. It involved creating class diagrams, entity-relationship diagrams (ERD), and user interface designs. This step ensured that all system components would integrate seamlessly. The database schema design was particularly crucial, given the importance of storing user data, resumes, and job descriptions effectively. This phase also included defining system security measures and considering performance and scalability requirements.

3. Implementation:

During the implementation phase, the project transitioned into active development. This stage involved actual coding, integration, and preliminary testing of individual system components. Python was used for backend development due to its versatility and extensive library support, while React and Next.js were selected for the frontend, providing a robust and interactive user interface. MongoDB was chosen for database management, ensuring flexibility and scalability to handle large volumes of user data efficiently. Integration with external AI services like OpenAI and Gemini was crucial during this phase to enable intelligent, personalized responses and recommendations.

4. Testing:

Testing was essential to verify system functionality, reliability, and user satisfaction. This phase included comprehensive unit tests, integration tests, and performance evaluations. Identified issues were logged, prioritized, and resolved systematically. Regular testing ensured the product met quality standards and operated smoothly under various conditions.

5. Deployment:

Deployment involved making the system available for user interaction initially in a local environment, followed by cloud deployment using platforms like DigitalOcean. Cloud deployment allowed broader user testing and ensured that the system could handle increased traffic and data processing demands. Monitoring tools were established to track performance and user feedback, ensuring continuous improvements and quick resolution of any emerging issues.

### 3.2 Explanation of Data Gathering Techniques

Data gathering techniques were critical for ensuring the project's alignment with actual user needs. Multiple methods were employed to ensure comprehensive and reliable data:

Surveys:

Surveys were distributed online to gather quantitative data on job seekers' experiences and expectations. These surveys were designed with straightforward questions regarding users’ habits related to job searching, resume creation, interview preparation, and career guidance preferences. The objective was to gain clear insights into the most common challenges and user preferences. Over 100 responses were received, exceeding the initial target of 80, thus enhancing data reliability and statistical significance.

Interviews:

Personal, structured interviews with job seekers and career advisors were conducted to complement survey findings. These interviews provided qualitative data, revealing detailed user experiences, frustrations, and suggestions for improvements in existing career support tools. Open-ended questions facilitated detailed discussions and deeper insights into user needs, allowing the identification of recurring themes and specific areas requiring enhancement.

### 3.3 Tools and Technologies Overview

Python:

Python was chosen for backend development because of its simplicity, extensive library support, and suitability for rapid application development. Libraries such as FastAPI were utilized for developing robust, scalable APIs and efficient backend services, providing excellent performance and reliability.

React and Next.js:

React and Next.js were selected for frontend development. React offered flexibility and ease in creating interactive, responsive user interfaces, essential for user engagement. Next.js, built on React, enabled server-side rendering and optimized performance, enhancing user experience through fast loading times and efficient handling of user interactions.

MongoDB:

MongoDB, a NoSQL database, was employed for data management due to its flexibility in storing complex, structured, and semi-structured data. Its capability to handle large volumes of data efficiently and provide rapid access to stored information made it ideal for managing user profiles, resumes, and job descriptions effectively.

OpenAI and Gemini APIs:

Integration with OpenAI and Gemini APIs was central to the project, providing advanced natural language processing (NLP) capabilities and real-time, personalized feedback. OpenAI’s powerful text-generation models supported the generation of relevant interview questions, resume analysis feedback, and personalized career guidance. Gemini API facilitated multimodal AI capabilities, enhancing the platform’s adaptive learning features and interactive experiences.

Beautiful Soup:

Beautiful Soup was utilized for web scraping activities in the Job Description Research Bot. It efficiently extracted detailed job descriptions from relevant employment websites, enabling real-time analysis and ensuring the suggestions provided were aligned with user qualifications.

Additional Tools:

* Visual Studio Code: Used as the primary Integrated Development Environment (IDE) for coding, debugging, and managing the development process.
* Git and GitHub: Essential for version control, ensuring code integrity and facilitating collaborative development.
* Postman: Utilized for API testing and validation, ensuring the robustness and reliability of API integrations.

## 5. Requirements Analysis

### 5.1 Functional Requirements

1. User Registration

* The system should allow new users to register easily by entering basic details like name, email, and password.
* Users must be able to update their profiles later with more detailed information, such as education, work experience, and job interests.
* Users should be able to securely log in and log out from their accounts.

2. Resume Optimization

* Users must be able to upload their existing resume or use one that they previously uploaded.
* The system will send the uploaded resume to the OpenAI API to check for important keywords needed for passing Applicant Tracking Systems (ATS).
* Feedback will be given to the user about what needs improvement in their resume.
* The platform will create a sample resume based on the feedback provided to help users successfully apply for jobs.

3. Job Search

* Users should have access to a tool that shows current job openings.
* Each job listing will include important details such as job title, company, salary, location, and job requirements.
* Users should be able to filter these listings based on their preferences like job title, salary, or location.

4. Interview Preparation

* Users can select or upload their resumes and choose a specific job or interview area.
* The system should then use OpenAI API to generate five relevant interview questions for the selected job role.
* Users will answer these questions one by one, and the system will analyze their answers to give immediate, useful feedback to help them improve their responses.

5. Career Guidance

* Users should be able to upload their resumes, and the system will analyze them to suggest possible career paths.
* The platform should ask users about their interests and goals and then provide personalized career advice based on their answers.
* Guidance should include suggestions for necessary skills, training, and resources to help users advance their careers.

### 5.2 Non-Functional Requirements

Non-functional requirements explain how the system should operate and perform. They ensure the system runs smoothly, safely, and effectively for the users.

1. Security

* User data must be protected with strong encryption and secure storage methods.
* The system should include user authentication measures like passwords.
* Only authorized users should access sensitive personal data.

2. Usability

* The platform should be easy to navigate and use, even for first-time users.
* All features should be clear and straightforward, with simple instructions provided.
* Users should be able to perform actions like uploading resumes or searching for jobs quickly without difficulty.

3. Reliability

* The platform should be available for use without frequent downtime.
* Errors should be minimized, and any issues should be quickly fixed.
* Users should always receive accurate and timely responses from the system.

4. Performance

* The system must respond quickly to user actions, with minimal delays.
* The website should load pages and process requests efficiently, especially during busy times.
* Real-time features like job searches and interview practice should perform smoothly without noticeable delays.

5. Scalability

* The platform must handle an increasing number of users without slowing down.
* Additional resources should be easily added to manage growing data and user requests.
* The system’s architecture should allow for future expansions and feature additions.

### 5.3 Hardware, Software, and Networking Requirements

This part explains the necessary hardware, software, and networking resources needed to develop and run the FutureForceAI platform effectively.

**Hardware Requirements**

* Development and testing will initially use local computers with a minimum of 8 GB RAM and at least a Core i5 processor.
* For actual deployment, cloud servers from platforms like DigitalOcean are necessary to ensure good performance and uptime.
* These servers should have sufficient storage and memory capacity to handle user data, job listings, and resumes effectively.

**Software Requirements**

* Backend: Python is chosen for backend development because it is easy to learn, reliable, and has good support from many libraries. FastAPI will help build secure and quick backend APIs.
* Frontend: React and Next.js are selected for creating interactive and responsive user interfaces. They help in building websites that load quickly and provide a smooth user experience.
* Database: MongoDB, a NoSQL database, is selected to store user information, job data, and resumes. MongoDB allows flexible data storage and quick access.
* AI Services: OpenAI and Gemini APIs are essential for providing personalized recommendations and feedback to users. They help in analyzing resumes, generating interview questions, and offering career guidance.
* Development Tools: Visual Studio Code will be used for coding, debugging, and managing the software development process. Git and GitHub will manage code versions and collaboration, while Postman will test API integrations.

**Networking Requirements**

* The platform should have a stable internet connection for effective communication between servers and users.
* HTTPS protocols will secure data transmission between the server and users to protect sensitive information.
* Network infrastructure should be able to handle high traffic and data loads, especially during peak usage times.
* Regular monitoring of network performance will ensure the system runs smoothly and efficiently.

## 6. Design and Implementation

### 6.1 System Architecture Overview

The FutureForceAI platform uses a clear and simple system architecture. This makes the platform easier to build, use, and manage. The architecture has three main parts: the frontend, backend, and database.

The frontend of the system is built with React and Next.js. These technologies make the interface fast and user-friendly. Next.js helps the system load quickly because it renders pages on the server. Users interact with the frontend by logging in, searching for jobs, uploading their resumes, practicing interviews, and getting career advice.

The backend is created using Python, which handles all the business logic and data processing. Python was chosen for its simplicity and the large number of libraries available. The backend is responsible for communicating with the frontend, managing user data, and integrating AI services such as OpenAI and Gemini APIs.

MongoDB is used as the database because it is flexible and can handle many different types of data easily. MongoDB stores user details, resumes, job listings, and other important information.

Together, these three parts communicate smoothly through RESTful APIs. RESTful APIs help different software components communicate clearly, improving the overall performance and scalability of the system.

### 6.2 Database Schema Design

The database schema is designed using MongoDB because it allows easy storage and retrieval of data in a flexible JSON-like format. The main collections used in the database include:

* **Users:** Stores user information like names, email, passwords, and profiles.
* **Resumes:** Keeps the uploaded resumes, including metadata and analysis results from AI tools.
* **InterviewQuestions:** Stores questions generated by AI for interview preparation.
* **Feedback:** Contains feedback data from user interviews and resume analyses.

This schema is simple but powerful, making data access and updates easy. Detailed schemas, including fields and relationships, are provided in the appendix.

### 6.3 User Interface (UI) and User Experience (UX) Design Choices

The user interface of FutureForceAI was carefully planned to ensure a good user experience. The main goal was to keep the platform easy to use, clean, and professional-looking.

The UI uses simple colors and clear text, making the website easy on the eyes and easy to navigate. The navigation bar at the top allows quick access to main features like job search, resume upload, interview practice, and career guidance.

1. **Homepage Interface Screenshot  
   A person sitting at a computer

   AI-generated content may be incorrect.**

Figure 1 : Home Page

1. **User Registration/Login Screenshot  
   A screenshot of a computer

   AI-generated content may be incorrect.**

Figure 2 : Registration Page

**A screenshot of a login form

AI-generated content may be incorrect.**

Figure 3 : Login Page

1. **Dashboard Screenshot**

**A screenshot of a computer

AI-generated content may be incorrect.**

Figure 4 : Dashboard

1. **Job Description Search Interface ScreenshotA screenshot of a computer

   AI-generated content may be incorrect.**

Figure 5 : Job Description Search Interface

1. **Resume Analyzer Interface Screenshot:  
   A screenshot of a computer

   AI-generated content may be incorrect.**

Figure 6 : Resume Analyzer Interface

1. **Interview Preparation Bot Screenshot:**

**A screenshot of a computer

AI-generated content may be incorrect.**

Figure 7 : Interview Preparation Interface

1. **Career Guidance Assistant Screenshot**

**A screenshot of a computer

AI-generated content may be incorrect.**

Figure 8 : Career Guidance Interface

1. **Job Search Interface Screenshot**

A screenshot of a job search

AI-generated content may be incorrect.

Figure 9 : Job Search Interface

### 

### 6.4 Key Implementation Details and Integration with AI Tools

The main feature of FutureForceAI is the integration with advanced AI tools. These tools provide intelligent services such as resume analysis, interview practice, and personalized career advice.

The **OpenAI API** plays an important role in generating personalized feedback for resumes and interview questions. When a user uploads a resume, the system sends it to OpenAI with a specific prompt to get advice about missing keywords or formatting improvements. Similarly, when a user prepares for an interview, OpenAI generates realistic questions based on the user's resume and targeted job role.

The **Gemini API** is used to offer multimodal AI features, providing advanced data processing capabilities. It helps analyze detailed job descriptions, which allows the system to give highly accurate job recommendations and personalized career guidance.

Data processing and AI integration happen mainly in the backend using Python scripts. The system ensures data is securely transferred between the frontend and backend using HTTPS, maintaining user privacy and data security.

For the job research feature, Python scripts use the Beautiful Soup library to scrape and analyze current job descriptions from reliable employment websites. This data helps give users relevant job suggestions that match their skills and experience.

By clearly integrating these AI tools, FutureForceAI effectively meets user needs for personalized, accurate, and fast career support, making the job search process more efficient and productive.

## 7. Testing and Evaluation

Testing and evaluation are essential processes to ensure FutureForceAI achieves its objectives, is dependable, and provides an excellent experience for users. Comprehensive testing strategies were employed to verify that the platform performed well in terms of functionality, usability, and reliability. These strategies made sure each feature operated correctly and aligned with users' expectations, thus enhancing overall platform quality.

**Description of Testing Strategies**

The testing involved three primary methods: Unit Testing, Integration Testing, and System Testing. Each type was designed to verify different aspects and functionalities of the system comprehensively.

### 7.1 Unit Testing

Unit testing focused on individual components or functions, checking each part independently. This approach quickly identified and fixed potential issues, ensuring individual functions such as backend logic and frontend user interfaces operated correctly and efficiently.

Table 1 : Unit Testing Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Testcase ID** | **Test Case Description** | **Preconditions** | **Test Steps** | **Expected Result** | **Status** |
| UT001 | User registration function | Database connection available | 1.Go to Registration Page 2.Enter valid registration details | User successfully registered | Pass |
| UT002 | Login functionality | User account exists | 1.Go to login page 2.Enter valid login details | User logs in successfully | Pass |
| UT003 | Resume upload function | Logged-in user | 1.Go to dashboard. 2.Select one feature.  3.Upload valid PDF or DOC file | Resume uploaded successfully | Pass |
| UT004 | User profile update | Logged-in user | 1.Go to Profile Page 2.Update profile details | Profile updates successfully | Pass |
| UT005 | Interview question retrieval | Logged-in user Interview module available | 1.Go to dashboard 2.Click Interview Prep Bot 3.Request interview questions | Appropriate interview questions displayed | Pass |
| UT006 | Career advice generation | Career advice module active | 1.Go to Dashboard. 2.Click Career Guidance Feature 3.Request personalized career advice | Relevant career advice displayed | Pass |

#### 

### 7.2 Integration Testing

Integration testing ensured smooth interaction among the different components, such as the frontend, backend, and external AI integrations. The testing verified how well these individual modules communicated and functioned together as intended.

Table 2 : Integration Testing Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Testcase ID** | **Test Case Description** | **Preconditions** | **Test Steps** | **Expected Result** | **Status** |
| IT001 | Login and database integration | Database operational | 1.Go to login page. 2.Perform login with valid credentials | Login details verified, user logs in | Pass |
| IT002 | AI resume analysis integration | User Logged in Resume analyzer module active | 1.Go to Dashboard. 2.Select one option. 3.Upload resume, initiate analysis | AI accurately analyzes and provides feedback | Pass |
| IT003 | Interview bot and AI service integration | User Logged in. AI service active | 1.Go to dashboard. 2.Click interview prep bot 3.Select job role, request interview questions | Relevant interview questions displayed | Pass |
| IT004 | Job search and filter integration | User Logged in. | 1.Go to dashboard. 2.Click Job Search option. 3.Search using multiple filters | Relevant jobs displayed accurately | Pass |
| IT005 | Career guidance integration | Career guidance module active | 1.Go to dashboard. 2.Click Job Career Guidance Option. 3.Submit user profile, request guidance | Personalized guidance accurately provided | Pass |
| IT006 | Resume and job match integration | Resume and jobs available | 1.Go to dashboard. 2.Click Job Research Option. 3.Perform resume-job matching | Accurate job recommendations provided | Pass |

#### 

### 7.3 System Testing

System testing examined the complete, integrated system under real-world scenarios. It verified that the system as a whole met critical requirements such as performance, security, user-friendliness, and overall functionality from a user's perspective.

Table 3 : System Testing Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Testcase ID** | **Test Case Description** | **Preconditions** | **Test Steps** | **Expected Result** | **Status** |
| ST001 | Complete user registration and login | System deployed and running | 1.Go to Register Page 2.Enter Details and Register. 3.Go to Login Page. 4. Enter details and register as a new user. | User registration and login successful | Pass |
| ST002 | Complete job search | User logged in, job listings loaded | 1.Go to dashboard. 2.Click Job Research Option. 3.Search and apply for a job | Successful job application completed | Pass |
| ST003 | Resume analysis and feedback session | Resume analyzer running | 1.Go to dashboard. 2.Click Resume Analyzer. 3.Upload resume, analyze and review feedback | Accurate analysis, clear feedback provided | Pass |
| ST004 | Interview practice module | Interview practice module active | 1.Go to dashboard. 2.Click Interview Prep Bot. 3.Complete interview practice for specific job role | Appropriate questions and feedback displayed | Pass |
| ST005 | Career guidance functionality | Career guidance service running | 1.Go to dashboard. 2.Click Career Guidance Option. 3.Input details, receive personalized guidance | Personalized career advice accurately provided | Pass |
| ST006 | System performance under load | Multiple concurrent users | Simulate multiple simultaneous users accessing system | System maintains stable performance | Pass |
| ST007 | Security measures validation | Security protocols implemented | Attempt unauthorized access | Unauthorized access blocked securely | Pass |

### 

### 

### 

### 

### 

### 

### 

### 

### 7.4 Outcomes of Testing and Adjustments Made

* **AI Response Time:** Initial tests revealed slow AI responses. Improvements included optimizing API interactions and caching common results, greatly enhancing responsiveness.
* **Job Search Accuracy:** The complexity of job filters initially caused inaccuracies. Enhancing the search algorithm resolved these issues, improving reliability.
* **User Interface (UI) Enhancements:** Early feedback highlighted usability concerns. Changes included clearer navigation labels and simplified paths to critical functions, significantly improving the user experience.
* **Security Improvements:** Minor security vulnerabilities were identified and resolved by encryption protocols and enhancing user authentication measures.

### 7.5 Evaluation Against Initial Objectives and Requirements

Testing confirmed that FutureForceAI effectively meets its initial objectives and requirements

**Integrated System**

* + All features were seamlessly integrated, resulting in an intuitive and cohesive user experience.

1. **Personalized Support**
   * The AI-driven functionalities successfully delivered personalized advice, enhancing user satisfaction after implementing improvements.
2. **Efficiency and Engagement**
   * Performance enhancements made the platform more efficient and engaging, resulting in high user satisfaction ratings.
3. **Robust System Performance**
   * Under extensive testing, the platform proved reliable and capable of handling significant user activity without performance issues.
4. **Continuous Improvement**
   * Continuous testing and user feedback loops ensured ongoing platform enhancements, rapidly addressing issues as they arose.

## 8. End-Project Report & Recommendations

### 8.1 Brief Summary of Project Achievements

FutureForceAI was successfully developed to address significant problems faced by job seekers in the competitive job market. The main achievements of this project include creating an integrated platform that combines resume optimization, interview preparation, detailed job searching, and personalized career guidance, all powered by advanced Artificial Intelligence (AI). The platform effectively used technologies like OpenAI and Gemini APIs, enabling users to get immediate, tailored feedback on their resumes, interview responses, and career choices.

The project achieved a smooth integration of various functionalities, providing users with a cohesive and user-friendly interface built using modern technologies such as React, Next.js, Python, and MongoDB. The testing phase showed that FutureForceAI successfully met most initial project requirements, ensuring reliability, user-friendliness, performance, and security.

Through extensive testing and iterative enhancements, FutureForceAI demonstrated effective handling of high traffic, providing personalized and accurate career recommendations, and significantly improving job search and application processes. User feedback gathered during testing phases confirmed high satisfaction and identified areas for continuous improvement, emphasizing the platform's relevance and effectiveness.

### 8.2 Evaluation of Objectives and Outcomes

The project's success was evaluated against the clearly defined objectives initially outlined. Here is a detailed assessment of each objective of this project.

#### Objective 1: Comprehensive Integration

**Successes:**

* Successfully integrated multiple career support features into a single platform, reducing the need for users to switch between different services.
* Seamless interaction between frontend, backend, and external AI services was achieved.

**Failures:**

* Initial integration faced delays due to the complexity of combining multiple AI services, but these were later resolved through optimization.

#### Objective 2: Personalized Support

**Successes:**

* Effectively implemented AI-driven personalized feedback for resumes and interview preparation.
* User testing showed high satisfaction with personalized career guidance and recommendations.

**Failures:**

* Early phases showed inconsistent response times from AI integrations, affecting user experience initially. Improvements significantly enhanced performance.

#### Objective 3: Efficiency and Engagement

**Successes:**

* Optimized system performance ensured rapid responses and enhanced user engagement.
* The intuitive user interface increased ease of use and encouraged active user participation.

**Failures:**

* Initial user feedback indicated some difficulties navigating complex job search filters, leading to necessary interface adjustments.

#### Objective 4: System Performance

**Successes:**

* Successfully handled significant concurrent user activity without major performance issues.
* Security improvements effectively safeguarded user data and system stability.

**Failures:**

* Minor performance issues initially occurred under very high traffic loads, but optimizations resolved these problems.

#### Objective 5: Continuous Improvement

**Successes:**

* Implemented regular feedback loops and testing cycles for ongoing enhancements.
* User suggestions were promptly addressed, improving the platform continually.

**Failures:**

* Some early user feedback was not anticipated initially, causing brief delays in addressing minor usability improvements.

### 8.3 Recommendations for Future Improvement or Expansion

Based on detailed testing, user feedback, and observed outcomes, several recommendations are proposed for future development and enhancement of the FutureForceAI platform.

#### 1. Enhanced AI Capabilities

While current AI integrations with OpenAI and Gemini APIs perform well, future improvements could include deeper AI capabilities such as advanced predictive analytics to anticipate career market trends more accurately. Expanding AI features to include emotional intelligence recognition during interview practice could significantly enhance user interview readiness.

#### 2. Mobile Application Development

Developing a dedicated mobile application would greatly enhance accessibility and convenience for users. A mobile version could support push notifications for job alerts, reminders for interview practice, and updates on resume recommendations, further enhancing user engagement.

#### 3. Expanded Job Market Data

Integrating more extensive job market analytics, including real-time salary trends, industry growth rates, and detailed employer ratings, would significantly improve user decision-making. These additional insights would make the platform more informative and valuable to job seekers.

#### 4. Advanced User Analytics

Implementing comprehensive user analytics to monitor and evaluate user behavior more effectively could help in personalizing user experiences further. Detailed analytics could inform targeted improvements and feature developments, ensuring continuous alignment with user needs.

#### 5. Improved Interview Preparation Modules

Expanding the interview module to include industry-specific scenarios and advanced real-time feedback based on natural language processing (NLP) could greatly improve user confidence and preparedness. Providing additional resources like video-based practice scenarios could also enhance effectiveness.

#### 6. Multilingual Support

Introducing multilingual capabilities would expand the platform's accessibility to a broader user base, significantly enhancing its inclusivity and global appeal. This improvement would help attract a diverse range of job seekers and cater to global career markets.

#### 7. Regular Content Updates

Ensuring the content, including job listings, industry insights, and career advice, remains current and relevant through regular updates is vital. A systematic content management plan to routinely review and refresh platform data could maintain its relevance and accuracy.

## 9. Project Post-mortem

### 9.1 Appraisal of Project Processes and Decisions

Throughout the development of FutureForceAI, many important processes and decisions were made. Each choice significantly influenced the project outcome, either positively or negatively. A careful look at these processes and decisions helps to understand their effectiveness and identify areas of improvement for future projects.

#### 9.1.1 Methodology Chosen: Waterfall Model

The project was developed using the Waterfall methodology. This model was chosen because it provided clear phases such as planning, design, implementation, testing, and deployment. Each phase depended on the completion of the previous one, which helped maintain order and discipline.

**Advantages:**

* The Waterfall model made it easy to manage tasks and deadlines.
* Clear documentation in each phase helped keep the project organized.
* Easy to monitor progress and track any delays or problems.

**Disadvantages:**

* Less flexibility to change requirements once the phase had started.
* Early misunderstandings or mistakes in planning phases caused later delays.
* Adjusting to user feedback required careful and often time-consuming planning.

Considering these factors, the Waterfall methodology was effective for managing clear and structured tasks. However, for future projects requiring more frequent changes and user feedback, a more flexible method like Agile might be more suitable.

#### 9.1.2 Tools and Technology

The project utilized several important tools and technologies including React, Next.js, Python, MongoDB, OpenAI API, and Gemini API. Each technology played a critical role in delivering project goals.

**Frontend Development (React, Next.js):**

* React and Next.js provided a modern, responsive user interface. Next.js significantly improved page loading times due to server-side rendering.
* Minor issues initially occurred in navigation and filtering systems but were resolved quickly.

**Backend Development (Python):**

* Python was an excellent choice due to its ease of use and vast library support.
* Integration with external AI services was smooth, although initial delays were encountered with API responses.

**Database (MongoDB):**

* MongoDB provided flexible and efficient data management.
* Data storage and retrieval were fast, with only minor adjustments needed during heavy usage scenarios.

**AI Integration (OpenAI, Gemini API):**

* These AI technologies offered powerful features like resume analysis and personalized career guidance.
* Early implementation faced response delays, resolved through caching and optimization strategies.

### 9.2 Analysis of Own Performance and Team Collaboration

As an individual project, FutureForceAI required significant personal discipline and effective self-management.

**Strengths:**

* Consistent scheduling and time management ensured deadlines were mostly met.
* Regular documentation and clear goal-setting helped maintain project direction.
* Actively seeking and applying feedback improved project quality significantly.

**Weaknesses:**

* Initial underestimation of some tasks, particularly AI integration, led to delays.
* Occasional difficulties balancing multiple roles (development, testing, documentation) affected overall efficiency.
* Challenges in predicting user interface issues required additional rounds of feedback and adjustments.

Despite some challenges, overall performance remained effective due to timely adjustments and active supervisor collaboration. Regular feedback sessions and structured progress meetings greatly enhanced project management and outcomes.

### 9.3 Lessons Learned and Reflections on Feedback from Users

Reflecting on feedback from users provided invaluable insights into the project and highlighted several important lessons.

#### 9.3.1 Lessons Learned

**Importance of Early User Feedback**

* Initial delays highlighted the need for early and frequent user feedback. Future projects should incorporate regular user interactions from the beginning to avoid significant late-stage changes.

**Realistic Time Estimations**

* Underestimating the complexity of integrating advanced AI tools led to timeline extensions. Realistic time management and better initial estimations are crucial for future success.

**Flexible Project Management**

* The rigid nature of the Waterfall methodology created occasional challenges when adapting to user feedback. Future projects might benefit from incorporating elements of Agile methodology, allowing for more flexibility.

**Continuous Learning and Adaptation**

* Technology and project requirements evolve continuously. Staying adaptable and regularly updating skills and knowledge are essential for project success.

#### 9.3.2 User Feedback Reflection

Feedback from users during testing phases provided critical insights. Users appreciated the integrated platform's convenience and personalized features, highlighting the project's successful elements.

However, users also identified several areas needing improvement, such as:

* Difficulty in initial navigation, leading to a simplified and more intuitive user interface.
* Minor delays in AI response time, prompting optimization and caching solutions.

Responding promptly to user feedback significantly improved user satisfaction. Future projects should prioritize user feedback early and throughout development to ensure final products fully meet user expectations and needs.

## 10. Conclusion

FutureForceAI has successfully achieved its primary goal of creating an integrated, AI-driven platform to help job seekers effectively manage their career development tasks. The platform combines multiple important features such as resume optimization, interview preparation, personalized career guidance, detailed job search, and real-time job recommendations. This comprehensive approach greatly improves user experience and efficiency in the job search process.

The chosen technologies including React, Next.js, Python, MongoDB, and advanced AI tools like OpenAI and Gemini APIs played critical roles in the successful development and functionality of FutureForceAI. User testing clearly demonstrated that the platform effectively meets users’ expectations, providing valuable personalized feedback and support across all career-related activities.

Despite encountering some initial integration challenges, the careful selection of technologies and methodologies helped overcome these issues effectively. Continuous feedback from users and the supervisor significantly contributed to the project's ongoing improvement, highlighting areas for further refinement.

Future recommendations include enhancing AI capabilities, expanding mobile accessibility, providing detailed job market insights, and increasing user engagement through gamification and networking features. These improvements will ensure FutureForceAI remains relevant, effective, and adaptable to the evolving needs of job seekers.

Overall, FutureForceAI represents a significant step forward in using artificial intelligence to support career development. It provides valuable insights, personalized recommendations, and an integrated, user-friendly platform, greatly enhancing job seekers' chances of successfully achieving their career goals.

## 

## 

## 

## 

## 11. References

Chelimella, A.R., Jayanth, B.S., Rithvik, B., Avinash, B. & Tiwari, R., 2024. Intelligent Resume Tracking System. ResearchGate, June. Available at:<https://www.researchgate.net/publication/381321958_Intelligent_Resume_Tracking_System>

Chavan, A., Tatewar, N., Naicker, P. & Deore, S., 2023. AI Resume Analyzer. International Journal of Creative Research Thoughts, Vol. 11, Issue 12, December. Available at:<https://ijcrt.org/papers/IJCRT2312507.pdf>

Dharmatti, S., Jain, S., Khandekar, S., Vora, P. & More, M., 2022. Interview Practice – Voice-Based Chatbot. International Journal of Advances in Engineering Research, Vol. 23, Issue V, May, pp. 141-143. Available at:<https://ijaer.com/admin/upload/23%20Siddhant%20Dharmatti%2001275.pdf>

Elakkiya, P., Varun, M., Maliq, P.S.M. & Pragadeesh, S., 2022. Self-Learning Conversational AI Chatbot Using NLP. International Journal of Advanced Research in Science, Communication and Technology, Vol. 2, Issue 1, June. Available at:<https://ijarsct.co.in/Paper4603.pdf>

Mahroof, A., Rajapaksha, S., Gamage, V., Rajendran, K. & Wijendra, D., 2020. An AI Based Chatbot to Self-Learn and Self-Assess Performance in Ordinary Level Chemistry. 2020 2nd International Conference on Advances in Computing (ICAC), IEEE. Available at:<https://www.researchgate.net/publication/349659799_An_AI_based_Chatbot_to_Self-Learn_and_Self-Assess_Performance_in_Ordinary_Level_Chemistry>

Mavuso, N.C., Jere, N. & vanGreunen, D., 2023. A Customized Artificial Intelligence Based Career Choice Recommender System for a Rural University. African Conference on Information Systems and Technology, DigitalCommons@Kennesaw State University. Available at:<https://digitalcommons.kennesaw.edu/acist/2023/presentations/1/>

Mononen, A., Alamäki, A., Kauttonen, J., Klemetti, A., Passi-Rauste, A. & Ketamo, H., 2023. Forecasted Self: AI-Based Careerbot-Service Helping Students with Job Market Dynamics. Engineering Proceedings, Volume 39, Issue 99. Available at:<https://www.mdpi.com/2673-4591/39/1/99>

Monreal, J.B. & Palaoag, T., 2024. Use of Artificial Intelligence in Career Guidance: Perspectives of Secondary Guidance Counselor. Nanotechnology Perceptions, Vol. 20 No. S3, pp. 436-449. Available at:<https://nano-ntp.com/index.php/nano/article/view/600>

Özcan, A. & Polat, S., 2023. Artificial Intelligence and Chat Bots in Academic Research. Journal of Research in Social Sciences and Language, Vol. 3, Issue 2, pp. 81-90. Available at:<https://www.researchgate.net/publication/371806931_Artificial_Intelligence_and_Chat_Bots_in_Academic_Research>

Patil, R., Sarvade, P., Patil, A. & Bhosale, Y., 2020. Resume Evaluation System Based on AI. International Research Journal of Engineering and Technology, Vol. 7, Issue 7, July. Available at:<https://www.irjet.net/archives/V7/i7/IRJET-V7I7490.pdf>

PJ, N., TN, J., Omanakuttan, A. & Komath, T., 2023. Intelligent Resume Analyzer. International Research Journal of Modernization in Engineering, Technology, and Science, Volume 5, Issue 4. Available at:<https://doi.org/10.56726/IRJMETS35351>

Rahman, M., Figliolini, S., Kim, J., Cedeno, E., Kleier, C., Shah, C. & Chadha, A., 2023. Artificial Intelligence in Career Counseling: A Test Case with ResumAI. arXiv. Available at:<https://arxiv.org/abs/2308.14301>

Rajguru, S., Chavan, A., Rane, A., Shinde, S. & Dangore, M., 2018. Interview Preparation by Chatbots. SSRG International Journal of Computer Science and Engineering, Vol. 5, Issue 12, December. Available at:<https://www.internationaljournalssrg.org/IJCSE/2018/Volume5-Issue12/IJCSE-V5I12P103.pdf>

Siswanto, J., Suakanto, S., Andriani, M. & Kusumasari, T.F., 2022. Interview Bot Development with Natural Language Processing and Machine Learning. International Journal of Technology, Vol. 13, Issue 2, pp. 274-285. Available at:<https://ijtech.eng.ui.ac.id/article/view/5018>

Westman, S., Kauttonen, J., Klemetti, A., Korhonen, N., Manninen, M., Mononen, A. & Niittymäki, S., 2021. Artificial Intelligence for Career Guidance – Current Requirements and Prospects for the Future. IAFOR Journal of Education: Technology in Education, Volume 9, Issue 4, pp. 43-48. Available at:<https://eric.ed.gov/?id=EJ1318705>

**Appendices**

## 12. User Guide

This user guide provides step-by-step instructions on how to use the FutureForceAI website effectively.

### System Requirements

Before using FutureForceAI, ensure your system meets the following minimum specifications:

* **Operating System:** Windows 10/11, macOS 10.15 or newer, Linux
* **Browser:** Google Chrome (recommended), Mozilla Firefox, Safari, or Microsoft Edge
* **Internet Connection:** Stable broadband connection
* **RAM:** Minimum 4 GB
* **Processor:** Intel Core i3 or equivalent

### Accessing FutureForceAI

To use FutureForceAI, follow these simple steps:

1. Open your web browser.
2. Visit the FutureForceAI website by typing the URL into your browser address bar.

### User Registration and Login

1. Click on the "Register" button located on the top-right corner of the homepage.
2. Fill in your details including name, email address, and create a secure password.
3. Click "Submit" to create your account.
4. After registration, use your email and password to log in.

*A screenshot of a login form

AI-generated content may be incorrect.A screenshot of a login form

AI-generated content may be incorrect.*

### 

### Using Resume Analyzer

1. Navigate to the "Resume Analyzer" section.
2. Click "Upload Resume" and select your resume file (PDF or DOC format).
3. The system will analyze your resume and provide suggestions for ATS optimization.
4. Review and apply suggestions to improve your resume.
5. **A screenshot of a computer

   AI-generated content may be incorrect.**

### Job Description Research

1. Go to the "Job Decription Research" section.
2. Enter job title search bar.
3. Browse through the job description detailed information.

*A screenshot of a computer

AI-generated content may be incorrect.*

### Interview Preparation

1. Select the "Interview Preparation" feature.
2. Choose your desired job role and click on "Start Practice."
3. Answer the AI-generated interview questions.
4. Receive real-time feedback on your responses.

*A screenshot of a computer

AI-generated content may be incorrect.*

**Career Guidance**

1. Access the "Career Guidance" section.
2. Interact with the AI assistant by typing your queries about career paths, skill development, or industry insights.
3. Receive personalized recommendations and advice.

**A screenshot of a computer

AI-generated content may be incorrect.**

### Smart Job Search

1. Go to the "Smart Job Search" section.
2. Enter job title in the search bar.
3. Use the filters provided to refine your search.
4. Browse through the job listings and click on jobs for detailed information.

A screenshot of a computer

AI-generated content may be incorrect.

### Customer Support

For any issues or assistance, please contact our support team via the "Contact Us" page or use the live chat feature available on the website.

## 13. Project Initiation Document

A close-up of a logo

AI-generated content may be incorrect.

PUSL3190 Computing Individual Project

Project Initiation Document

FutureForceAI – Career Support Platform

Supervisor: Mr. Gayan Perera

Name: Sabhapathi M Bandara

Plymouth Index Number: 10898422

Degree Program: BSc. (Hons) Software

Engineering

**Table of Contents**

***1. Introduction***

***2. Business Case***

**2.1 Business Need**

**2.2 Business Objectives**

1. User Engagement and Growth

2. Platform Performance and Efficiency

3. User Success Metrics

4. Revenue and Growth Targets

5. Market Position and Innovation

***3. Project Objectives***

1. Develop and Implement Core Platform Features

2. Analyze and Process Career Data

3. Make AI-Powered Career Support Tools

4. Evaluate and Optimize System Performance

***4. Literature Review***

***5. Method of Approach***

**5.1 Development Methodology and Tools**

**5.2 Project Management Approach**

***6. Initial Project Plan***

***7. Risk Analysis***

***8. Additional Sections***

**8.1 Ethical Considerations**

**8.2 Stakeholder Analysis**

**8.3 Sustainability Plan**

***References***

# 

# 1. Introduction

As the competition in the job market increases, finding and developing a successful career has become complex. Many job seekers face significant challenges in navigating their professional journey. They have problems from finding suitable job opportunities to preparing effective resumes. FutureForceAI comes up as a response to these challenges, aiming to revolutionize how people approach career development through artificial intelligence.

The inspiration for FutureForceAI comes from understanding the common struggles that job seekers face. Most of well qualified applicants miss opportunities because their resumes don't make it through Applicant Tracking Systems (ATS), or they lack proper preparation for interviews. Traditional career development methods having issue in providing personalized guidance, leaving many individuals feeling lost in their professional journey.

The project's background is in the growing need for an integrated career development solution. While there are various tools available for specific aspects of job searching such as resume builders or job boards, there isn't a comprehensive platform which has all these with AI powered personalization. This issue forces users to use multiple services, making the job search process more time consuming and less effective.

FutureForceAI aims to fill these gaps by creating an all-in-one platform that combines these key features.

· Job searching and recommendations

· ATS friendly resume building

· AI-powered interview preparation

· Personalized career guidance

· Comprehensive job market insights

· Interactive learning resources

This platform is designed to inspire not only with information of different tools and knowledge but also inspiring its users to continuously learn and grow their professional skills in making informed career decisions. By leveraging artificial intelligence, the platform can provide personalized recommendations and adapt to each user's unique career goals and circumstances. The platform's ability to help candidates prepare better applications and develop relevant skills can lead to more efficient hiring processes and better job fit outcomes.

FutureForceAI has the potential to transform how people approach career development. By combining artificial intelligence with comprehensive career support features, the platform aims to make professional growth more accessible and effective for everyone, from fresh graduates to experienced professionals looking to advance or change their careers.

The relevance of this project can tell like this.

· Increasing use of AI in recruitment processes

· Need for continuous skill development

· Rising importance of personal branding

· Rapid evolution of job roles and required skills

# 2. Business Case

## 2.1 Business Need

**Integration of Multiple Services**

Currently, job seekers must navigate multiple platforms and services to manage their career development effectively. According to research by Rahman et al. [6], this issue leads to inefficiency and frustration among users. FutureForceAI addresses this by providing a unified platform that combines all essential career development tools in one place.

**Overcoming ATS Challenges**

Studies show that 75% of resumes are rejected by Applicant Tracking Systems before reaching human recruiters [15]. Many qualified candidates are overlooked simply because their resumes aren't optimized for these systems. FutureForceAI's resume optimization feature directly addresses this issue by helping users create ATS-friendly resumes that highlight their qualifications effectively.

**Personalized Career Guidance**

Traditional career guidance services often provide generic advice that fails to account for individual circumstances. Research by Monreal and Palaoag [2] highlights that personalized career guidance is crucial for effective career development. FutureForceAI uses AI to deliver customized guidance based on each user's unique profile, skills, and career goals.

**Enhanced Interview Preparation**

According to Rai et al. [16], inadequate interview preparation is a significant barrier to employment success. Current interview preparation tools often lack real-time feedback and personalization. FutureForceAI's interactive interview preparation system addresses this gap by providing AI-powered practice sessions with immediate feedback.

## 2.2 Business Objectives

### 1. User Engagement and Growth

· Achieve 10,000 active users within the first six months of launch

· Maintain a monthly user retention rate of at least 70%

· Generate 1,000 premium subscriptions by the end of the first year

### 2. Platform Performance and Efficiency

· Maintain a system uptime of 99.9%

· Achieve an average response time of less than 2 seconds for AI-powered features

· Process at least 5,000 resume analyses per month with 95% accuracy in ATS optimization

### 3. User Success Metrics

· Help users achieve a 40% higher interview success rate compared to traditional methods

· Increase resume pass rates through ATS systems by 50%

· Achieve an 85% user satisfaction rate based on feedback surveys

### 4. Revenue and Growth Targets

· Generate monthly recurring revenue of $50,000 by month 12

· Achieve a customer acquisition cost (CAC) below $50 per premium user

· Maintain a churn rate below 5% for premium subscribers

### 5. Market Position and Innovation

· Establish partnerships with at least 10 major employers or recruitment agencies

· Release monthly feature updates based on user feedback and market trends

· Maintain an average user rating of 4.5/5 or higher on app stores

# 3. Project Objectives

### 1. Develop and Implement Core Platform Features

· Design and construct a user-friendly interface

· Create a secure user authentication and profile management system

· Integrate OpenAI and Gemini APIs for AI-powered functionalities

· Establish efficient data storage and retrieval systems using MongoDB

### 2. Analyze and Process Career Data

· Implement algorithms to evaluate the content in resumes for ATS requirements

· Create data mining systems to collect and analyze job market trends

· Design analytics tools to track user progress and platform performance

### 3. Make AI-Powered Career Support Tools

· Make an intelligent resume optimization system that provides specific recommendations.

· Create an adaptive interview preparation module.

· Develop a personalized career guidance system that generates personalized advices.

· Make a job recommendation engine that matches user profiles with opportunities.

### 4. Evaluate and Optimize System Performance

· Test and validate AI model accuracy in career guidance bot.

· Enhance system response times for every AI powered features.

· Test and improve the accuracy of resume analysis and optimization tools

# 4. Literature Review

**AI Integration in Career Guidance**

A research done by Westman and Mononen [7] showed that the integration of AI into career guidance is still in early stages. Even basic AI applications exist, there's a significant gap in sophisticated, personalized career guidance systems. Their study emphasizes the fact that AI can be taken further to provide personalized career advice which considers a user's profile and market trends.

**Resume Optimization Systems**

Studies by Patil et al.[15] show that existing resume optimization tool is mainly concentrated on formatting and keyword density. However, these tools often lack the ability to provide context-specific recommendations or adapt to different industry requirements. Their research shows that optimizing resumes through AI and industry expertise is needed.

**Interview Preparation Technologies**

Rai et al. [16] provide limitations on existing interview preparation systems through their research. Some platforms provide very basic question and answer features, but they don’t come with sophisticated feedback mechanisms or any type of personalization. The researchers' findings indicate that further advanced systems are needed that can offer real-time, personalized feedback and can be tailored to interview styles and industries..

**Integrated Career Development Platforms**

Monreal and Palaoag [2] analyzes a considerable gap in the offering of comprehensive career development platforms. According to their findings, most of the current solutions are only focusing on single aspects of career development and force users to jump between various platforms. This fragmentation highlights the need for an integrated solution that combines various career development tools in one platform.

**Career Counseling Automation**

Studies by Rahman et al. [6] on ResumAI demonstrate the potential of AI in career counseling but also highlight current limitations. Their research shows that while AI can provide basic career guidance, there's room for improvement in creating more sophisticated systems that can offer nuanced, personalized career advice.

Gaps Identified in Current Research:

1. Limited integration of advanced AI technologies in comprehensive career guidance

2. Lack of personalized, adaptive learning systems for interview preparation

3. Insufficient use of data analytics in providing career insights

4. Absence of unified platforms combining multiple career development tools

5. Limited application of real-time feedback mechanisms in career development tools

**Conceptual Diagram**

**A diagram of a company

AI-generated content may be incorrect.**

Figure 10 : Conceptual Diagram

# 5. Method of Approach

## 5.1 Development Methodology and Tools

**Frontend Development**

· React.js for building the user interface components

· Next.js for server-side rendering and routing

· Tailwind CSS for responsive styling

· Integration with AI services via API calls

**Backend Development**

· Next.js API routes for handling server-side logic

· MongoDB for data storage and management

· RESTful API architecture for service communication

**AI Integration**

· OpenAI API for natural language processing tasks

· Gemini API for multimodal AI features

**Development Tools**

· Visual Studio Code as the primary IDE

· Git/GitHub for version control

· MongoDB for database

· Postman for API testing

## 5.2 Project Management Approach

This project follows a systematic waterfall approach with clear phases and milestones.

**Phase 1: Project Initialization (September 2024)**

· Project identification and scope definition

· Research paper identification and analysis

· Initial planning and requirements gathering

**Phase 2: Design Phase (November 2024)**

· UI design and prototyping

· Database architecture design

· System components specification

**Phase 3: Development Phase (December 2024 - March 2025)**

· Frontend implementation

· Database development

· Backend system development

· Integration of AI components

**Phase 4: Testing and Finalization (March - April 2025)**

· System testing and debugging

· Performance optimization

· Final documentation and reporting

# 

**High-Level Architectural Diagram  
A diagram of a software company

AI-generated content may be incorrect.**

Figure 11 : High-Level Architectural Diagram

# 6. Initial Project Plan

**Phase 1: Project Planning and Research (September - October 2024)**

· Project Identification (Sep 1 - Sep 30)

· Research Papers Identification (Sep 28 - Oct 14)

· Project Idea Approval (Oct 1 - Oct 10)

· Requirements Analysis and Planning (Oct 10 - Oct 19)

· Project Risk Assessment (Oct 18 - Oct 22)

· Project Proposal Development and Approval (Oct 21 - Nov 10)

**Phase 2: Design Phase (November - Early December 2024)**

· UI Design (Nov 11 - Dec 7)

· Database Design (Nov 20 - Nov 29)

**Phase 3: Development Phase (December 2024 - Feb 2025)**

· Frontend Development (Dec 10 - Jan 20)

· Database Development (Jan 4 - Jan 18)

· Backend Development (Jan 20 - Feb 25)

**Phase 4: Testing and Project Closure (Feb - April 2025)**

· Testing and Debugging (Feb 25 - Mar 13)

· Final Report Preparation (Mar 14 - Apr 1)

A graph with blue squares

AI-generated content may be incorrect.A grid of paper with a grid on it

AI-generated content may be incorrect.

Figure 12 : Gantt Chart

# 7. Risk Analysis

**Technical Risks**

The project implementation is a huge challenge in AI API Integration. The integration of multiple AI services like OpenAI and Gemini APIs requires careful handling to ensure smooth operation. The project will use comprehensive API testing protocols to handle this high risk area, will maintain alternative AI service providers as fall back options.

Database performance is another crucial technical consideration for the project. Over depend on data processing and storage could lead to performance bottlenecks as user data and interactions grow To manage this risk, my implementation will include performance monitoring systems regular systems and sensible database indexing strategies, along with efficient caching mechanisms optimized for query performance and overall system responsiveness.

Due to the nature of user data that the platform handles, system security vulnerabilities present a great risk to users. The project will include security audits along with authentication and data encryption protocols to protect against possible security breaches.

**Development Risks**

Integrating various AI features and maintaining system performance presents a substantial development challenge. This risk will be managed by breaking these complex features down into smaller, more manageable components, through which there will be thorough documentation. In the case of the most complex implementations, they will spend extra development time on these to ensure that testing and refinement are adequate.

Software development projects are commonly risky with timeline delays. In order to reduce the impact of all these possibilities on the project schedule, the project schedule includes extra phases to accommodate for these unknown challenges. Core features are prioritized in the development timeline, and a flexible development approach allows for adjustments without compromising essential functionality.

**Resource Risks**

One thing to pay attention is to cost / limits on API usage while accessing AI services. Careful budgeting of the API based services, implementation of the usage optimization strategies and identification of alternative AI service providers are part of the project plan that enables the continuous operation of system within resource constraints.

# 8. Additional Sections

## 8.1 Ethical Considerations

**Privacy and Data Protection**

· Implementation of data protection measures for user information

· Transparent privacy policies regarding data usage and storage

· Compliance with data protection regulations

**AI Ethics and Fairness**

· Ensuring unbiased job recommendations across

· Transparent AI decision-making processes in career guidance

· Clear disclosure of AI-powered features to users

## 8.2 Stakeholder Analysis

**Primary Stakeholders**

· Job Seekers (Main Users)

§ Fresh graduates

§ Career changers

§ Professional development seekers

**Secondary Stakeholders**

· University

§ Provides academic framework and assessment

## 8.3 Sustainability Plan

**Long-term Maintainability**

· Documentation of all code and systems

· Modular design for easy updates

· Regular updates of AI models and APIs

**Future Development Possibilities**

· Integration with additional AI services

· Expansion of career guidance features

· Mobile application development

· Integration with professional networking platforms

# References

[1] Dharmatti, S., Jain, S., Khandekar, S., Vora, P., & More, M. (2022) "Interview Practice – Voice-Based Chatbot." International Journal of Advances in Engineering Research, 23(5), pp. 141-143.

https://ijaer.com/admin/upload/23%20Siddhant%20Dharmatti%2001275.pdf

[2] Monreal, J.B., & Palaoag, T. (2024) "Use of Artificial Intelligence in Career Guidance: Perspectives of Secondary Guidance Counselor." Nanotechnology Perceptions, 20(3), pp. 436-449.

https://nano-ntp.com/index.php/nano/article/view/600

[3] Sowjanya, Y., Keerthana, M., Suneeksha, P., & Harsha, D.S.S. (2023) "Smart Resume Analyser." International Journal of Research in Engineering and Science, 11(3), pp. 409-418.

https://www.ijres.org/papers/Volume-11/Issue-3/1103409418.pdf

[4] Mavuso, N.C., Jere, N., & vanGreunen, D. (2023) "A Customized Artificial Intelligence Based Career Choice Recommender System for a Rural University." African Conference on Information Systems and Technology.

https://digitalcommons.kennesaw.edu/acist/2023/presentations/1/

[5] Mahroof, A., Rajapaksha, S., Gamage, V., Rajendran, K., & Wijendra, D. (2020) "An AI Based Chatbot to Self-Learn and Self-Assess Performance in Ordinary Level Chemistry." 2020 2nd International Conference on Advances in Computing (ICAC), IEEE.

https://www.researchgate.net/publication/349659799\_An\_AI\_based\_Chatbot\_to\_Self-Learn\_and\_Self-Assess\_Performance\_in\_Ordinary\_Level\_Chemistry

[6] Rahman, M., et al. (2023) "Artificial Intelligence in Career Counseling: A Test Case with ResumAI." arXiv.

https://arxiv.org/abs/2308.14301

[7] Westman, S., et al. (2021) "Artificial Intelligence for Career Guidance – Current Requirements and Prospects for the Future." IAFOR Journal of Education: Technology in Education, 9(4), pp. 43-48.

https://eric.ed.gov/?id=EJ1318705

[8] PJ, N., TN, J., Omanakuttan, A., & Komath, T. (2023) "Intelligent Resume Analyzer." International Research Journal of Modernization in Engineering Technology and Science, 5(4).

https://doi.org/10.56726/IRJMETS35351

[9] Waghmare, K., et al. (2024) "AI Bot for Interview Preparation." International Research Journal of Modernization in Engineering Technology and Science, 6(4).

https://www.irjmets.com/uploadedfiles/paper//issue\_4\_april\_2024/54604/final/fin\_irjmets1714377592.pdf

[10] Mononen, A., et al. (2023) "Forecasted Self: AI-Based Careerbot-Service Helping Students with Job Market Dynamics." Engineering Proceedings, 39(99).

https://www.mdpi.com/2673-4591/39/1/99

## 14. Stage Plan for FutureForceAI

### 1. Planning & Analysis – Completed

* Collected detailed system requirements specific to career development, resume optimization, interview preparation, and job search domains.
* Clearly defined project goals, scope, and deliverables, focusing on enhancing the user experience for job seekers.
* Identified key stakeholders, including potential users and industry professionals.
* Developed a comprehensive project timeline, including clear milestones, resource planning, and task allocation.

### 2. Define Requirements – Completed

* Outlined detailed functional and non-functional requirements for each feature (resume analyzer, job search, interview preparation, career guidance).
* Conducted user surveys and interviews to validate user expectations and requirements.
* Prepared detailed user stories and use cases for main user interactions (job seekers, system administrators).

### 3. Design – Completed

* Created user interface mockups for all primary views, including registration/login, resume analyzer, job search, interview preparation, and career guidance screens.
* Designed a flexible MongoDB database schema capable of efficiently managing user data, resumes, job postings, and feedback records.
* Finalized system architecture, clearly selecting React, Next.js, Python, MongoDB, and external AI tools (OpenAI and Gemini APIs) as the primary technologies.

### 4. Development – Completed

* Developed frontend using React and Next.js to ensure responsiveness and fast loading.
* Backend developed with Python, ensuring seamless integration with frontend components and external AI APIs.
* Integrated MongoDB for flexible and efficient data management.
* Implemented core features:
  + Resume analyzer using OpenAI API.
  + Real-time job research functionality.
  + Interactive interview practice sessions integrated with OpenAI and Gemini APIs.
  + AI-driven personalized career guidance.
  + Smart Job Search functionality.
* Conducted regular code reviews and integration tests throughout the development phase to maintain high-quality standards.

### 5. Testing – Completed

* Unit tests for individual system components (frontend and backend).
* Integration tests ensuring all components communicate effectively.
* System-wide testing to validate the full functionality and user flows.
* User Acceptance Testing (UAT) involving actual users to identify usability improvements.
* Resolved identified bugs and optimized system performance based on feedback.

### 6. Deployment – Completed

* Deployed the application on cloud infrastructure (DigitalOcean) for scalability and easy accessibility.
* Prepared production-ready versions for comprehensive user evaluation and demonstration.
* Provided detailed user guides and facilitated demo sessions to ensure smooth user onboarding and ease of use.

### 7. Maintenance – Ongoing

* Continuously monitor website performance, security, and responsiveness.
* Collect and analyze user feedback regularly to inform future updates and enhancements.
* Regularly roll out updates addressing any identified issues, improving AI response times, and adding new features based on user demand.
* Maintain compatibility with the latest software updates and dependencies (React, Next.js, Python, MongoDB, OpenAI, Gemini APIs).

## 15. Interim Report

A close-up of a logo

AI-generated content may be incorrect.

**PUSL3190 Computing Individual Project**

**Project Interim Report**

FutureForceAI – AI Career Support Platform

Supervisor: Mr. Gayan Perera

Name: Sabhapathi M Bandara

Plymouth Index Number: 10898422

Degree Program: BSc. (Hons) Software Engineering

**Table of Contents**

***1. Introduction***

**1.1 Introduction**

**1.2 Problem Definition**

**1.3 Project Objectives**

***2. System Analysis***

**2.1 Facts Gathering Techniques**

**2.2 Existing System**

**2.3 Use Case Diagram**

**2.4 Drawbacks of the Existing System**

***3 Requirements Specification***

**3.1 Functional Requirements**

**3.2 Non-Functional Requirements**

**3.3 Hardware/Software Requirements**

**3.4 Networking Requirements**

***4 Feasibility Study***

**4.1 Operational Feasibility**

**4.2 Technical Feasibility**

**4.3 Outline Budget**

***5 System Architecture***

**5.1 Class Diagram**

**5.3 High-level Architectural Diagram**

***6 Development Tools and Technologies***

**6.1 Development Methodology**

**6.2 Programming Languages and Tools**

**6.3 Third Party Components and Libraries**

**6.4 Algorithms**

***7 Discussion***

**7.1 Overview of the Interim Report**

**7.2 Summary of the Report**

**7.3 Challenges Faced**

**7.4 Future Plans/ Upcoming Work**

***8 References***

## 1. Introduction

### 1.1 Introduction

Today’s job market moves fast and changes quickly. Building a career is not easy. Many factors make it hard for job seekers. The FutureForceAI project was started to help address these challenges. It uses artificial intelligence to support every stage of career development. This system brings several tools together in one place. I combine job search, resume improvement, interview practice, and career guidance into a single platform. This approach helps users save time and reduce the need to visit many different sites.

Since the project began, I have planned and executed many tasks. I carried out literature reviews, user surveys, and interviews with career advisors. The outcomes show a clear need for an integrated solution. I produced initial design documents and prototypes that meet our quality standards. Although some tasks took longer than expected, my work so far is in line with my original plan. I have updated my risk list and made changes where needed.

My system uses APIs from OpenAI and Gemini to offer personal advice and real-time feedback. These tools help me analyze data and match recommendations to each user. The design focuses on simplicity and clear user benefits. In summary, my work to date confirms that an integrated career support platform is needed. This report sets the stage for further discussion of my tasks, outcomes, and the planned final deliverables.

## 

### 1.2 Problem Definition

Many online career tools exist, yet job seekers still face serious problems. One major issue is that the services are split between different websites. Users must visit separate sites for job search, resume building, interview practice, and career counseling. This separation wastes time and makes it hard to get complete, personalized support. My surveys confirm this problem. I planned to find gaps in current systems, and our work has shown that the problem is real.

Another key issue is that many resume tools do not help users pass Applicant Tracking Systems (ATS). Even qualified candidates are often overlooked because their resumes are not optimized. In addition, current interview preparation tools offer static content without real-time, personal feedback. This leaves users unprepared for dynamic interview situations.

During the project, some risks became clear. I found that combining many separate tools into one system is harder than planned. This has caused some delays and led me to update my risk list. I now have added extra testing phases to overcome these challenges. My planned solution, FutureForceAI, is designed to solve these issues by offering one unified, adaptive system. The gap between what is available and what is needed is now clear. I continue to assess these issues and adjust my plans to meet my goals.

### 1.3 Project Objectives

The main goal of FutureForceAI is to build one system that brings together all essential career support tools. My objective is to create a platform that helps job seekers by combining job search, resume improvement, interview practice, and career guidance in one place. I plan to use AI to offer personal advice and real-time feedback that fits each user’s needs.

· 1.Comprehensive Integration.

· 2.Personalized Support.

· 3.Efficiency and Engagement.

· 4.Robust System Performance.

· 5.Continuous Improvement.

## 2. System Analysis

### 2.1 Facts Gathering Techniques

I used several methods to gather the facts and data needed for my project. First, I distributed surveys to potential users. I asked simple questions about job search habits, resume building, and interview preparation. The survey responses gave me clear insights into the common challenges job seekers face. I had planned to collect at least 80 responses, and I received over 100. This result confirmed my expectations and improved the reliability of the data.

Next, I conducted one-on-one interviews with job seekers and career advisors. I asked open-ended questions to encourage honest answers about the current career support tools. I recorded and analyzed these interviews, which revealed recurring themes and real issues.

I also reviewed literature and industry reports on AI in career guidance. This secondary research confirmed current trends and highlighted the gaps in existing systems. My literature review was planned to support the survey and interview data, and it did so effectively.

Finally, I observed how users interact with current career support tools. I watched online demos and read user reviews to see where they struggle. These observations allowed me to cross-check my survey and interview data. The high quality of the data has given me a solid foundation for the next stages of my project.

### 2.2 Existing System

I studied the current career support systems in detail. I found that most job seekers use different websites for different tasks. For example, one site handles job search while another focuses on resume building. This issue forces users to re-enter the same data multiple times, which is inefficient and increases the chance of error. My analysis confirmed that this separation was a major issue.

I also found that existing systems do not share data well. Information entered in one tool does not flow to another. This lack of integration means that users must update details manually. I expected this problem from the start and it remains a clear drawback. In addition, many of these systems use basic templates that do not adapt to each user’s needs. As a result, the output is it does not provide personalized career guidance.

Another problem is the limited personalization available. Many tools give standard advice that does not consider individual strengths or career goals. Without real-time feedback, users cannot quickly improve their resumes or interview skills. I noted that many current tools do not update their content regularly. Job listings and resume tips are often outdated, reducing their usefulness in a rapidly changing job market.

My planned analysis expected these issues, and my findings match them. I have updated my risk list to include data fragmentation, manual data updates, and outdated content. I plan to address these issues in my final design by developing a unified system. The study of the existing systems shows clear gaps that my project must fill. Overall, my work in this area is in line with my initial plan, though I have had to adjust my schedule slightly.

### 2.3 Use Case Diagram

A diagram of a job seeker

AI-generated content may be incorrect.

Figure 13 : Use Case Diagram

### 2.4 Drawbacks of the Existing System

I identified several drawbacks in the current career support systems. The first major drawback is fragmentation. Users must switch between different websites for job search, resume building, and interview preparation. This forces them to enter the same information repeatedly, which is inefficient and increases errors. I planned to examine this issue, and my findings confirm that it is a significant problem.

Another drawback is the lack of data integration. Information entered in one system does not flow automatically to another. Users must update their data manually, which is time-consuming. I expected this from the beginning, and it remains a key risk.

Limited personalization is another issue. Most current systems use generic templates and do not tailor their advice to individual needs. Users receive standard recommendations that do not reflect their unique skills or goals. This lack of customization limits the usefulness of the tools.

In addition, many systems do not offer real-time feedback. Without immediate responses, users cannot quickly adjust their resumes or interview techniques. Outdated content is another drawback. Job listings and career advice are not updated frequently enough, which diminishes the tools’ relevance in a fast-changing market.

I compared these drawbacks with my initial project plan. My planned solution, FutureForceAI, is designed to overcome these problems by integrating all functions into one system. I have noted these issues in my progress reports and have taken corrective actions by adjusting my schedule. The lessons learned from studying these drawbacks have been valuable. Overall, my analysis of the drawbacks confirms the need for a unified, integrated solution, and I have updated my plans accordingly.

## 3 Requirements Specification

### 3.1 Functional Requirements

I have defined a set of functions that my system must offer. My platform is designed to support the career development process. The main functions include user registration, profile management, job search, resume optimization, interview preparation, and personalized career guidance.

First, the system must allow new users to register by entering basic details such as name, email, and password. It must let users create, view, and update their profiles easily. The profile will store information like contact details, career history, and personal preferences. This data is used to tailor recommendations to each user. So far, my progress in designing the registration and profile modules is on schedule. I have produced prototypes that meet my quality expectations.

Second, the job search feature must let users search for available jobs. Users should filter results by job title, location, salary range, and type of employment. The system must update job listings in real time and show detailed information such as job description, requirements, and how to apply

Third, the resume optimization function must let users upload or create their resumes on the platform. The system should analyze the resume content and format. It must check for missing keywords and errors. Clear suggestions for improvement must be given so that resumes can pass through Applicant Tracking Systems. I have started work on this module and have adjusted my approach after initial tests showed some issues with keyword detection.

Fourth, the interview preparation module must provide practice questions that match the user’s job role. It should allow users to record responses and analyze them for tone, clarity, and content. Immediate feedback is needed to help users improve. My work in this area has met planned milestones, although further refinement is required.

Finally, the personalized career guidance function should use user data to offer tailored advice. It must suggest career paths, additional skills, and training resources. The system should learn from user interactions to improve recommendations over time.

### 3.2 Non-Functional Requirements

I also defined non-functional requirements to ensure the system works well overall. The system must be reliable, secure, efficient, and easy to use.

Reliability means the system must run without frequent errors or downtime. I planned to have a robust system with clear error messages. My tests so far show that basic functions are stable, but I have noted a few areas where reliability can be improved.

Security is a major requirement. The system must protect user data with strong authentication and encryption. Personal details and career information must be stored safely, and only authorized users should access them. I have set up initial security measures and updated my risk list to include new threats that I discovered during early testing.

Efficiency is also important. The system must respond quickly to user actions and handle many requests at the same time. I planned for this by choosing efficient languages and hosting options. Early performance tests are promising, though I plan to conduct more rigorous testing later.

Usability is a key. The interface must be simple and clear. Navigation should be intuitive so that users can easily find and use the system’s features. Overall, the non-functional requirements are being met according to plan, though I will keep monitoring and adjusting as needed.

### 

### 3.3 Hardware/Software Requirements

I have also specified the hardware and software needed for the platform. On the software side, the backend will be built in Python because it is simple and has strong library support. The frontend will use JavaScript with frameworks React and Next.js. I will use a NoSQL database MongoDB to store user data, resumes, and job listings. I also require secure APIs to integrate external AI services like OpenAI and Gemini. I have set up a Git repository to manage the code. My actual progress in this area is close to what I planned, with most tools already chosen.

For hardware, I will host the system on cloud servers with enough processing power and memory. My local development machines are updated and meet the necessary specifications. I have secured the IT resources required, and my hardware progress is on schedule.

### 3.4 Networking Requirements

Networking is essential for smooth operation. My system must use a reliable network that allows fast communication between clients and servers. The network will use secure data transmission protocols such as HTTPS. This ensures that user data remains protected during transit.

Low latency is important for real-time features like job search updates and interview practice sessions. I have designed the network to minimize delays and provide quick responses. Scalability is also a key requirement. As more users join the platform, I must be able to add resources without causing downtime. My plan includes regular monitoring of network performance to identify and resolve any bottlenecks. I will make any needed changes based on future testing and user feedback.

## 4. Feasibility Study

### 4.1 Operational Feasibility

Operational feasibility shows how the system will work day to day. My platform is developed for job seekers, career advisors, and system administrators. I planned for the system to be easy to use and require little training. So far, I have met most of these targets. I set up user registration, profile creation, and login functions. Users can quickly register, create a profile, and start using the system with simple guidance. I will produce user manuals and help documents.

Each day, users will log in, update their profiles, and use the job search, resume optimization, interview preparation, and career guidance features. I planned to have the system update job listings and content regularly. In practice, I have set up a basic automated update mechanism. The system stores data securely, and every user action is recorded for later analysis. I planned for a support team to monitor the system during business hours. I wish to set up an alert system that notifies me if an issue occurs. I have not yet experienced major issues, and any small issues are resolved quickly.

I also planned to gather user feedback continuously through surveys and feedback forms. I will start this process once finalized the project. Overall, my operational tasks are largely on schedule. When I compare my actual progress with my plan, I see that I have met most goals. Some delays in backend parts have occurred, but I have adjusted my schedule according to that.

### 4.2 Technical Feasibility

Technical feasibility checks if I can build the system with the tools and skills I have. I planned to use proven open-source technologies. I’m developing the backend in Python and build the frontend using JavaScript frameworks React and Next.js. I chose MongoDB as my NoSQL database to store user data, resumes, and job listings. I planned this setup to support high traffic and allow easy expansion. So far, my technical setup is in line with without any issue.

A key part of my system is the integration with external AI services. I planned to use APIs from OpenAI and Gemini. I have studied the documentation for these services and set up initial tests. My tests show that these APIs work well with my code. I have run basic tests and now plan to conduct more tests later. My schedule has been adjusted to include extra testing rounds because early tests revealed minor integration issues.

My technical design also planned for cloud hosting to meet hardware needs. I wish set up cloud servers that can handle many users at the same time. Backup servers are in place to protect data and reduce downtime. A few technical challenges, like integration issues, have been addressed by revising my development timeline. Overall, the technical feasibility is strong, and I am confident that the system can be built with the resources and skills available.

### 4.3 Outline Budget

I use free tools like Visual Studio Code and MongoDB for development. I also have a domain that costs $10 per year. For hosting my project, I use a DigitalOcean student credit, which helps me avoid extra hosting fees right now. If the project grows, I plan to move to a paid hosting plan.

My main expense comes from API usage. OpenAI charges about $0.002 for every 1,000 tokens with GPT-3.5 Turbo. GPT-4 can cost between $0.03 and $0.06 per 1,000 tokens. Gemini API costs around $0.125 to insert 1,000 characters, $0.25 to insert a message, and $0.375 to output 1,000 characters. I have set a small budget margin in case my usage increases.

## 5 System Architecture

### 5.1 Class Diagram

A diagram of a company

AI-generated content may be incorrect.

Figure 14 : Class Diagram

### 5.2 ER Diagram

A diagram of a diagram

AI-generated content may be incorrect.

Figure 15 : ER Diagram

### 5.3 High-level Architectural Diagram

A screenshot of a computer screen

AI-generated content may be incorrect.

Figure 16 : High Level Architectural Diagram

## 6. Development Tools and Technologies

### 6.1 Development Methodology

I use a structured approach based on the waterfall model. I divided my project into phases as planning and analysis, design, implementation, testing, and deployment. When I began, I set clear goals for each phase.

**1. Planning and Analysis**

I collected requirements from my project proposal, initiation document, and user surveys. I also read research papers on AI in career guidance. My goal was to confirm the scope of my project. So far, this phase matched my plan. I produced a requirements outline and identified main risks, such as API integration challenges and data security.

2. **Design**

I created class diagrams, entity-relationship diagrams. This helped me see how each component connects. I planned to finish design in two weeks, but it took three because I discovered new requirements during the process. I updated my schedule to reflect this delay.

3. **Implementation**

I’m writing code for both the frontend and backend. I use coding standards to keep the code consistent. My plan was to integrate APIs last, but I decided to do small integrations early to catch potential errors.I updated my risk list to show that early testing of APIs helped avoid big problems.

4. **Testing**

I’ll perform unit tests, integration tests, and basic security checks. I had planned a single testing phase at the end, but I realized it is better to test regularly. This approach will improve product quality and let me fix issues as soon as I find them.

5. **Deployment and Maintenance**

My plan is to demonstrate the system locally first. If I need wider testing, I will deploy to the cloud using a student credit. I have not deployed a full version yet, but I am on track. I adjusted my schedule to allow more time for final tests.

### 6.2 Programming Languages and Tools

I chose Python for the backend because it is simple and has strong library support. I use frameworks like FastAPI for server-side logic. This makes it easier to handle requests and manage data. My frontend is built with JavaScript using React and Next.js. These frameworks let me create a fast, interactive interface that runs smoothly.

For styling, I use Tailwind CSS. I like Tailwind because it helps me design a clean, responsive layout without writing too much custom code. HTML is, of course, part of the structure for all pages. I rely on Git for version control. This method helps me track changes and revert if something goes wrong.

I write and debug code in Visual Studio Code. I also use Postman to test APIs. These tools were in my original plan, and I have stayed on track. I have not needed to purchase any additional software. My risk list included the possibility of needing a paid IDE, but so far, free tools have been enough. My learning has focused on improving my React skills and managing Python backend services.

### 6.3 Third Party Components and Libraries

I use several third-party components to make the platform more effective. The main ones are AI services from OpenAI and Gemini. They offer natural language processing and other features that help me analyze resumes, give feedback on interview answers, and provide personalized career guidance. I had planned to integrate these APIs toward the end, but I decided to do small tests early. This change let me identify and fix integration issues before they became big problems.

On the frontend, I rely on React and Next.js for building the user interface. I also use libraries for data handling and state management. For styling, I often use Tailwind CSS, which speeds up my design process. On the backend, I have libraries that connect to MongoDB, handle user authentication, and manage file uploads.

So far, these third-party components meet my quality expectations. I had some minor issues with certain versions of the libraries, but I updated my risk list and solved them by switching to stable releases. My schedule had to shift slightly for these fixes, but I remain on track overall.

### 6.4 Algorithms

Algorithms analyze user data, generate recommendations, and give real-time feedback. One key algorithm scans resumes for keywords and checks them against job descriptions. This helps users see if their resume aligns with the roles they want. I use simple pattern matching combined with basic statistical methods.

Another algorithm filters job listings based on user preferences like location, skills, and desired salary. This filtering is straightforward, but I still test it to make sure it returns relevant results. I also have an algorithm for the interview preparation module. It processes user responses, looks for signs of clarity or confusion, and then offers feedback.

Lastly, I’m going to implement a recommendation algorithm that suggests career paths and training resources. It uses data from user profiles, resume scores, and interview results. I planned to build a complex system, but so far I have kept it simple. I updated my final deliverables to reflect this simpler approach. If time allows, I will enhance the algorithm later. Overall, these algorithms work together to create a cohesive user experience.

## 7. Discussion

### 7.1 Overview of the Interim Report

In this interim report, I review the progress of the FutureForceAI project since its start. I discuss the tasks I have undertaken such as gathering requirements, designing the system, and beginning initial coding and the outcomes of these tasks. I also comment on the quality of the products produced, changes made to my risk list, and adjustments to my schedule. I explain the IT resources I have used and the learning I have achieved so far. My final deliverables have been updated to include refined user requirements, system architecture, and chosen technologies. This report guides my work and highlights areas for future improvements.

### 7.2 Summary of the Report

This report covers all major aspects of my project from start to the current stage. I explain the background, system analysis, and requirements specification. I also describe feasibility studies, system design, and the tools and technologies I have used. My progress is compared with the original plan, and I have updated my deliverables to match what I have learned. I have met most targets, though some tasks took longer than expected due to technical challenges. I used free tools and local hosting as planned, with a future plan to move to a paid cloud service.

### 7.3 Challenges Faced

I faced several challenges, including delays in API integration and system connectivity issues. Some tasks took longer than planned due to unforeseen technical problems. I updated my risk list and adjusted my schedule accordingly. I addressed these issues by revising my plans and seeking additional online resources to improve my approach.

### 7.4 Future Plans/ Upcoming Work

My future work includes refining the system design and completing the remaining coding tasks and complete all features of the prject and inegrate all tools to the platform. I plan to improve API integration and move from local hosting to a cloud-based solution using DigitalOcean student credits. I will also conduct further user tests and continue learning advanced techniques to ensure the platform’s success.

## 8. References

1. Dharmatti, S., Jain, S., Khandekar, S., Vora, P., & More, M. (2022). “Interview Practice – Voice-Based Chatbot.” International Journal of Advances in Engineering Research, 23(5), 141–143.

2. Monreal, J. B., & Palaoag, T. (2024). “Use of Artificial Intelligence in Career Guidance: Perspectives of Secondary Guidance Counselor.” Nanotechnology Perceptions, 20(3), 436–449.

3. Sowjanya, Y., Keerthana, M., Suneeksha, P., & Harsha, D. S. S. (2023). “Smart Resume Analyser.” International Journal of Research in Engineering and Science, 11(3), 409–418.

4. Mavuso, N. C., Jere, N., & vanGreunen, D. (2023). “A Customized Artificial Intelligence Based Career Choice Recommender System for a Rural University.” African Conference on Information Systems and Technology.

5. Mahroof, A., Rajapaksha, S., Gamage, V., Rajendran, K., & Wijendra, D. (2020). “An AI Based Chatbot to Self-Learn and Self-Assess Performance in Ordinary Level Chemistry.” In 2020 2nd International Conference on Advances in Computing (ICAC) (IEEE).

6. Rahman, M., et al. (2023). “Artificial Intelligence in Career Counseling: A Test Case with ResumAI.” arXiv.

7. Westman, S., et al. (2021). “Artificial Intelligence for Career Guidance – Current Requirements and Prospects for the Future.” IAFOR Journal of Education: Technology in Education, 9(4), 43–48.

8. PJ, N., TN, J., Omanakuttan, A., & Komath, T. (2023). “Intelligent Resume Analyzer.” International Research Journal of Modernization in Engineering, Technology, and Science, 5(4).

9. Waghmare, K., et al. (2024). “AI Bot for Interview Preparation.” International Research Journal of Modernization in Engineering, Technology, and Science, 6(4).

10. Mononen, A., et al. (2023). “Forecasted Self: AI-Based Careerbot-Service Helping Students with Job Market Dynamics.” Engineering Proceedings, 39(99).

11. OpenAI. OpenAI API Pricing. Retrieved from https://openai.com/pricing

12. Gemini. Gemini API Documentation