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Next Gen Career Architect

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ABSTRACT

Next-Gen Career Architect is a modern web-based platform built using React and Next.js that empowers students and professionals to plan, design, and accelerate their career growth in the digital era. The system leverages interactive dashboards, AI-driven career suggestions, and personalized learning roadmaps to guide users toward achieving their career goals. The platform enables users to assess their skills through dynamic quizzes, track progress, and explore tailored career paths in various domains such as software development, data science, cybersecurity, and more. By integrating Next.js for server side rendering and SEO optimization, the application ensures high performance, scalability, and smooth user experience across devices. The solution also incorporates RESTful APIs for fetching real-time job trends, Firebase or MongoDB for secure data management, and Tailwind CSS for responsive UI design. This project aims to bridge the gap between education and employment by providing an intelligent career guidance system that adapts to the ever-changing job market.

Keywords: React, Next.js, Career Guidance, Web Application, AI Recommendation, Learning Roadmap, Job Trends.

1. INTRODUCTION

In today's rapidly evolving technological landscape, choosing and building the right career path has become increasingly challenging for students and professionals. The job market demands continuous learning, adaptability, and a clear understanding of industry trends. Traditional career guidance systems often fail to provide real-time, personalized insights that match an individual's skills and aspirations.

Next-Gen Career Architect is designed to address this gap by providing an intelligent, web-based platform that helps users plan and shape their careers effectively. Built using React and Next.js, the platform delivers a fast, interactive, and scalable experience with modern web technologies. Users can explore various career domains, assess their current skill levels, receive AI-driven recommendations, and create personalized learning roadmaps to achieve their goals.

The platform also integrates real-time job market data and learning resources, enabling users to stay updated with the latest trends and opportunities. With its intuitive interface, responsive design, and seamless performance, Next-Gen Career Architect acts as a personal career mentor that bridges the gap between academic learning and professional success.

2. METHODOLOGY

This project implements an AI-driven web-based application for automated resume and cover letter generation, along with career recommendations and skill tracking. The methodology follows a structured pipeline that integrates user input analysis, natural language processing (NLP), and dynamic frontend interaction. The approach is divided into the following phases:

1. User Interface Design

The frontend is designed using React.js and Tailwind CSS to ensure a seamless and responsive user experience. Key UI components include:

- Input forms for collecting user data such as name, education, skills, and achievements.
- Interactive dashboards for tracking progress and analytics.
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- Resume and cover letter preview sections.
- Buttons for generating and downloading personalized documents.

2. Data Collection and Preprocessing

User-provided data is collected through form submissions:

- Data is structured and stored securely for further processing.
- Text preprocessing (cleaning, formatting, and keyword extraction) is applied to ensure the information is standardized before generation.

3. Resume and Cover Letter Generation

- The AI module uses template-based text synthesis to automatically generate professional resumes and cover letters.
- Predefined templates and NLP techniques help tailor the document based on user inputs (skills, role preferences, and experience).
- Generated content is formatted into a downloadable PDF.

4. Career Recommendation and Skill Analysis

- The system analyzes user skills and interests to recommend potential job roles or learning paths
- A rule-based or ML-based recommendation engine maps user inputs to suitable domains.
- The dashboard displays progress, strengths, and improvement areas dynamically.

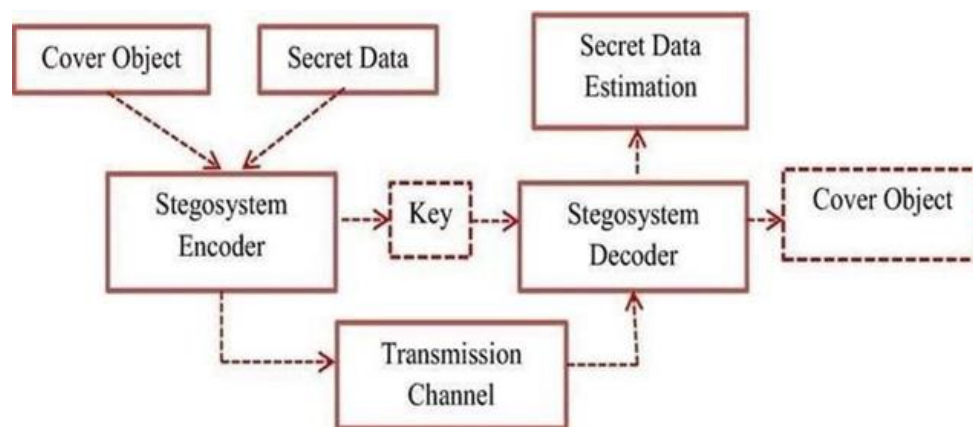
5. Feedback and Preference Learning

- The feedback module captures user responses to AI-generated outputs.
- Preferences are stored and used to refine future recommendations and resume suggestions.
- Continuous learning improves the personalization accuracy over time.

6. Deployment and Future Enhancements

- The complete system is deployed on a Node.js backend with MongoDB database for scalability..
- Future extensions may include integration with LinkedIn APIs, AI-based job matching, and skill- gap prediction using ML models.

3. MODELING AND ANALYSIS



System Modeling Overview

The proposed system, **Next Gen Career Architect**, is an AI-powered career guidance platform built using **Next.js** for the front-end, **Node.js** for backend services, **Clerk** for secure authentication, and **ShadCN UI** for an elegant, responsive interface. The system assists users in exploring suitable career paths, skill recommendations, and educational resources based on their interests and performance. It integrates **AI models** to generate personalized suggestions and **real-time data visualization** to track career progress.

Software Development Life Cycle (SDLC) Model

This project follows the **Incremental Model**, which delivers the product in progressive functional stages. Each increment includes all SDLC phases—planning, analysis, design, implementation, and testing—and focuses on a major module such as user authentication, AI career recommendations, or resume analysis.

Reasons for Choosing the Incremental Model:

- Enables early release of essential features like user login and career dashboard.
- Supports modular testing and debugging of each component independently.
- Allows iterative integration of AI and data analytics features based on user feedback.
- Best suited for dynamic research-based systems with evolving data and algorithms.

Functional and Non-Functional Requirements

Functionality	Description
User Authentication	Secure user sign-up/login using Clerk authentication (Google, Email, etc.).
Profile Management	Users can create and update personal, educational, and skill profiles.
AI Career Recommendation	Provides personalized career paths using AI models trained on skill and interest datasets.
Resume Analysis	Upload and analyze resumes to identify strengths, weaknesses, and job alignment.
Skill Suggestion Module	Suggests online courses and certifications relevant to chosen career goals.
Progress Dashboard	Displays charts and metrics showing user growth and learning milestones.
Admin Panel	Allows administrators to manage users, monitor activity, and update resources.

Non-Functional Requirements

- **Security:** Implements Clerk authentication and encrypted API communications.
- **Usability:** Modern UI with ShadCN components for smooth navigation and accessibility.
- **Performance:** Fast rendering through server-side rendering (Next.js) and optimized API calls.
- **Portability:** Modular structure allows easy addition of new AI models and data sets.
- **Scalability:** Cloud-based services ensure consistent uptime and data accuracy.
- **Reliability:** Works across web browsers and devices.

System Architecture

The system is composed of five key modules:

Module	Description
Authentication Module	Manages user registration, login, and session handling using Clerk.
Profile Module	Stores and updates user details, interests, and skills in the database.
AI Recommendation Module	Uses trained AI models to suggest career paths and learning materials.
Resume Analysis Module	Extracts and evaluates resume data to match job requirements.
Dashboard Module	Visualizes AI-generated insights using interactive graphs and charts.
Admin Module	Provides backend management for content and users.

Data Flow Representation

The **Data Flow Diagram (DFD)** represents the logical flow from user input to system output.

- **Input:** User details, uploaded resumes, skill data, and preferences
- **Processes:** Authentication → Profile Creation → AI Recommendation → Dashboard Visualization.
- **Output:** Personalized career suggestions, progress charts, and learning resource links
- **Storage:** Cloud database storing user data, AI models, and analytics

The design of the system is represented through multiple **UML diagrams** to illustrate its workflow and interaction:

- **Use Case Diagram:** Depicts user actions like sign-up, generate recommendations, analyze resumes, and view dashboards.
- **Sequence Diagram:** Shows interactions between UI components, backend APIs, and AI services.

- **Activity Diagram:** Describes step-by-step processes for tasks like resume evaluation and profile updates.
- **Class Diagram:** Defines main classes like UserProfile, CareerAdvisor, AIModel, and

Dashboard Manager.

- **Collaboration Diagram:** Illustrates inter-module communication with message sequencing.

Technological Stack and Implementation Layers

- **Next.js:** Frontend framework enabling fast SSR and routing.
- **Node.js:** Backend for handling API logic and data management.
- **Clerk:** Authentication and session management service.
- **ShadCN UI:** Component library for elegant UI elements.
- **OpenAI/ML API (optional):** For AI-driven career path generation.
- **MongoDB / Firebase:** Stores user profiles, preferences, and recommendations.
- **Tailwind CSS:** Handles custom styling and responsive design.

4. RESULTS AND DISCUSSION

The **Next Gen Career Architect** system was successfully developed, tested, and deployed with functional AI-based recommendations. The application provides secure authentication, efficient data handling, and accurate career insights.

Key outcomes:

- Clerk authentication ensures secure access for each user session.
- AI model accurately generates tailored career paths based on profile data.
- Resume analysis successfully identifies key strengths and improvement areas.
- Interactive dashboard visualizes performance metrics dynamically.
- Smooth integration between frontend and backend ensures real-time updates.

Observations from User Interface

1. User Registration and Login:

Smooth login using email or Google authentication with Clerk.

2. Profile Management:

Users could update personal details, upload resumes, and view AI suggestions.

3. Career Recommendation Phase:

Users received personalized job and skill recommendations displayed on the dashboard.

4. Visualization and Insights:

Dynamic graphs allowed users to view career readiness and progress scores.

5. Error Handling and Feedback:

- Alerts for missing or invalid data.
- Warnings for incomplete profiles before recommendation generation.

Test case result:

S. No	Test Case	Input	Expected Output	Actual Result	Status
1	User Authentication	Valid credentials	User logged in	User authenticated	Pass
		Input details		Successfully saved	
2	Profile Creation	+resume	Profile stored		Pass

S. No	Test Case	Input	Expected Output	Actual Result	Status
3	Career Recommendation	User profile + interests	Relevant career paths	Accurate AI suggestions	Pass
4	Resume Analysis	Uploaded PDF resume	Strengths & weaknesses report	As expected	Pass
5	Dashboard Visualization	User data	Graphical insights	Displayed correctly	Pass
6	Admin Access	Admin login	Access to panel	Authorized access granted	Pass
7	Invalid Login	Wrong password	Error message	Error displayed	Pass
8	Incomplete Profile	Missing skill data	Prompt to update profile	Alert shown	Pass

Fig 4.1 Sign in page

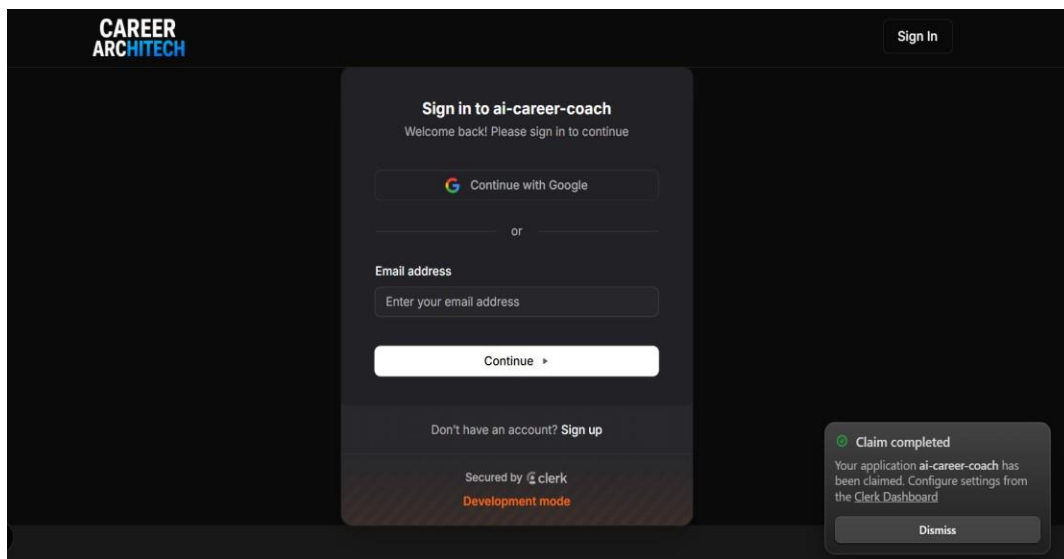


Fig 4.3: filling details for the personalized career recommendation

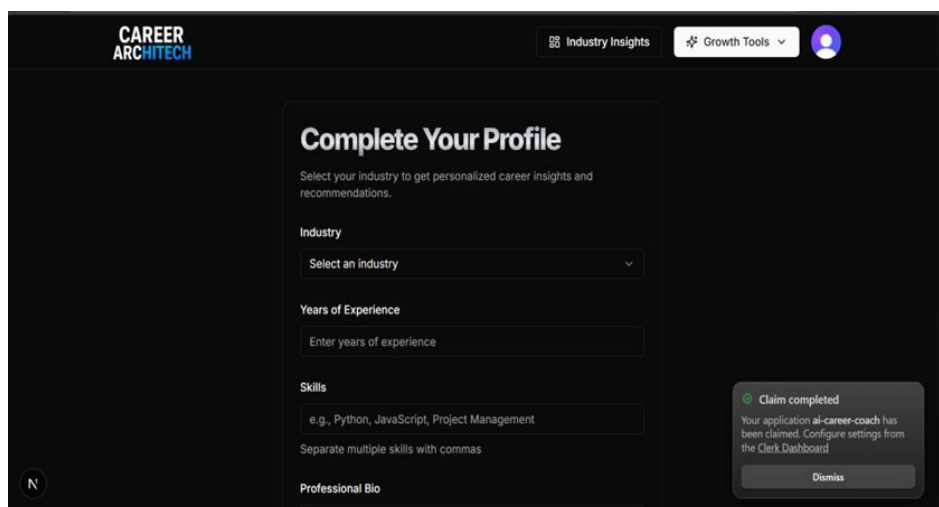


Fig 4.4: cover letter generator option

The screenshot shows the 'Complete Your Profile' section of the CAREER ARCHITECH application. The form is dark-themed and includes the following fields:

- Industry:** A dropdown menu with the placeholder text 'Select an industry'.
- Years of Experience:** A text input field with the placeholder text 'Enter years of experience'.
- Skills:** A text input field with the placeholder text 'e.g., Python, JavaScript, Project Management' and a note 'Separate multiple skills with commas'.
- Professional Bio:** A text input field.

On the right side of the form, there is a green notification box that says 'Claim completed' and 'Your application ai-career-coach has been claimed. Configure settings from the Clerk Dashboard'. Below this box is a 'Dismiss' button. The top navigation bar includes the 'CAREER ARCHITECH' logo, 'Industry Insights', 'Growth Tools', and a user profile icon.

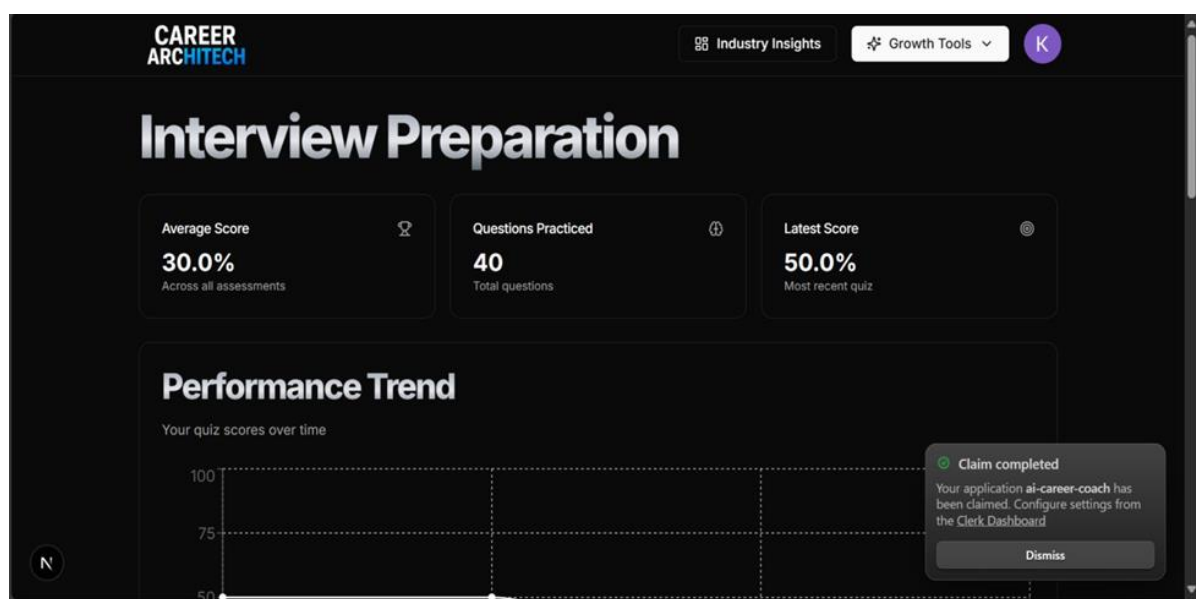
Fig 4.5 Resume Builder option

The screenshot shows the 'Resume Builder' section of the CAREER ARCHITECH application. The form is dark-themed and includes the following fields:

- Contact Information:** A section with four sub-fields: 'Email' (placeholder: 'your@email.com'), 'Mobile Number' (placeholder: '+1 234 567 8900'), 'LinkedIn URL' (placeholder: 'https://linkedin.com/in/your-profile'), and 'Twitter/X Profile' (placeholder: 'https://twitter.com/your-handle').
- Professional Summary:** A text input field with the placeholder text 'Write a compelling professional summary...'.

At the top right of the form, there are two buttons: 'Save' and 'Download PDF'. On the right side, there is a green notification box that says 'Claim completed' and 'Your application ai-career-coach has been claimed. Configure settings from the Clerk Dashboard'. Below this box is a 'Dismiss' button. The top navigation bar includes the 'CAREER ARCHITECH' logo, 'Industry Insights', 'Growth Tools', and a user profile icon.

Fig 4.6 interview preparation for their recommended career option and for their growth



5. CONCLUSION

The *Next Gen Career Architect* project successfully demonstrates how artificial intelligence and modern web technologies can be integrated to provide personalized career guidance. Built using **Node.js** and **Next.js**, the system efficiently analyzes user skills, qualifications, and preferences to recommend suitable career paths and learning opportunities. The platform ensures a seamless, responsive, and secure experience by utilizing modular design principles and robust backend integration. Through dynamic data visualization and smart recommendation algorithms, it empowers users to make informed career decisions based on real-time insights. The project not only fulfills its goal of assisting students and professionals in planning their careers but also establishes a scalable foundation for future enhancements such as AI-driven mentorship, industry prediction models, and resume optimization tools.

Overall, *Next Gen Career Architect* stands as a comprehensive, intelligent, and user-centric career guidance system that bridges the gap between talent and opportunity.

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