



# International Journal of Research Publication and Reviews

Journal homepage: [www.ijrpr.com](http://www.ijrpr.com) ISSN 2582-7421

## FutureForge: AI-Powered Skill Optimization & Career Development Platform

**Mr. Subramanian E <sup>#1</sup>, Mithun B <sup>#2</sup>, Mohamed Dharik S <sup>#3</sup>, Navaneeth P <sup>#4</sup>, Sanjaibala S <sup>#5</sup>, Manoj K C <sup>#6</sup>**

<sup>#1</sup>Professor, Department of Computer Science and Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. Email: [esubramaniancse@siet.ac.in](mailto:esubramaniancse@siet.ac.in)

<sup>#2</sup>UG Student, Department of Computer Science and Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. Email: [mohameddharik20@gmail.com](mailto:mohameddharik20@gmail.com)

<sup>#3</sup>UG Student, Department of Computer Science and Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. Email: [mithun335577@gmail.com](mailto:mithun335577@gmail.com)

<sup>#4</sup>UG Student, Department of Computer Science and Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. Email: [navaneeth9788@gmail.com](mailto:navaneeth9788@gmail.com)

<sup>#5</sup>UG Student, Department of Computer Science and Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. Email: [sanjaianju2007@gmail.com](mailto:sanjaianju2007@gmail.com)

<sup>#6</sup>UG Student, Department of Computer Science and Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. Email: [manojclassy1010@gmail.com](mailto:manojclassy1010@gmail.com)

### ABSTRACT :

**FutureForge** is an AI-powered Skill Optimization and Career Development Platform designed to help students become industry-ready by improving their technical and professional skills. The platform analyzes student's academic backgrounds, existing skills, interests and career goals to identify strengths, weaknesses and skill gaps. Based on this analysis, it recommends personalized learning paths, relevant courses, certifications, and practical projects to help students develop the skills required for their desired careers and bridge the gap between academic learning and industry expectations.

Another major feature of FutureForge is its AI-powered resume analyzer, which evaluates resumes using ATS-based techniques and provides suggestions for improving content, structure, keywords and readability. It also compares resumes with job descriptions to identify matching and missing skills and recommend improvements. The platform includes resume building, portfolio creation, and an interactive dashboard to track learning progress, skill development, and career readiness. By integrating AI-based analysis, personalized learning recommendations and continuous progress monitoring, FutureForge helps students improve their employability, build confidence and prepare effectively for future career opportunities.

### INTRODUCTION

Skill development and career planning play a crucial role in helping students become industry-ready, ensuring effective identification of skill gaps, resume improvement and continuous learning. However, students often rely on separate platforms for learning resources, resume preparation and career guidance, which can lead to inefficient planning and a lack of personalized recommendations.

The FutureForge (AI-Powered Skill Optimization & Career Development Platform) aims to digitize, automate and enhance student skill development and career preparation by integrating Artificial Intelligence and modern web technologies. The system focuses on:

- Student profile management and skill assessment
- AI-based skill gap identification and analysis
- Resume analysis using ATS-based techniques
- Resume and job description matching
- Personalized learning paths, courses, certifications and project recommendations
- Progress tracking and career readiness analysis
- AI-powered career guidance and resume improvement suggestions

**Objective:**

1. To analyze student's skills, interests, academic backgrounds and career goals using AI.
2. To identify skill gaps and recommend personalized learning paths.
3. To implement AI-based resume analysis with ATS scoring and improvement suggestions.
4. To compare resumes with job descriptions and identify matching and missing skills.
5. To recommend relevant courses, certifications and projects based on individual skill gaps.
6. To provide an interactive dashboard for monitoring skill development and learning progress.
7. To develop a secure, user-friendly and scalable web application using the MERN stack (MongoDB, Express.js, React.js and Node.js).

---

**LITERATURE SURVEY****1) Manual and Traditional Career Guidance Systems**

- Depend on manual skill assessment and career counselling.
- Time-consuming with limited personalized guidance.
- Lack continuous progress tracking.
- Students may struggle to identify industry-required skills.
- Resume evaluation depends heavily on human assessment.

**2) Online Learning and Course Recommendation Systems**

- Provide courses, tutorials, and certifications.
- Students may struggle to select suitable resources.
- Limited integration with skill-gap analysis and resume improvement.
- Learning paths may not match individual career goals.
- Project recommendations may not address specific skill gaps.

**3) Existing Resume Analysis Systems**

- Analyze resumes using keywords, formatting, and ATS techniques.
- Identify weaknesses and suggest improvements.
- Limited integration with personalized learning paths.
- May lack detailed job-description matching.
- Resume scores may not fully reflect a candidate's abilities.

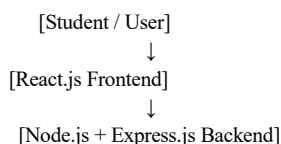
**4) Emerging AI and Full-Stack Technologies**

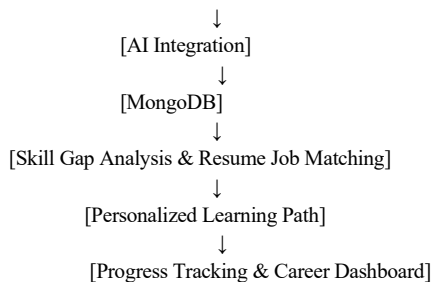
- AI supports skill analysis and personalized recommendations.
- MERN enables dynamic and responsive web applications.
- NLP helps analyze resume content.
- Recommendation systems suggest courses, certifications, and projects.
- MongoDB stores student profiles and learning records.
- Secure APIs connect the frontend, backend, database and AI services.

---

**METHODOLOGY****1) System Design**

- Frontend: React.js for a dynamic, responsive user interface.
- Backend: Node.js and Express.js for business logic and REST APIs.
- Database: MongoDB for storing student profiles, skills, resumes, and progress.
- Authentication: JWT for secure login and user access.
- AI Integration: Gemini API or OpenAI API for skill analysis and career recommendations.
- Resume Analysis: AI-based resume scoring, improvement suggestions, and job matching.
- Visualization: Interactive dashboards and charts for progress tracking.
- Hosting: Cloud deployment with .env configuration for secure settings.

**2) Architecture Overview**



### 3) Modules

#### a. Authentication Module

- Handles student registration, login, and logout.
- Uses JWT-based authentication to protect user accounts and APIs.
- Supports secure access to individual profiles and learning data.

#### b. Student Profile and Career Goals Module

- Collects academic details, technical skills, interests, and experience.
- Allows students to select career goals and target job roles.
- Maintains profile information for personalized skill analysis.

#### c. AI Skill Analysis Module

- Evaluates the student's current skills against the selected career goal.
- Identifies strengths, weaknesses, and missing skills.
- Generates a personalized skill-gap analysis.
- Recommends relevant skills to improve career readiness.

#### d. AI Resume Analyzer Module

- Allows students to upload their resumes for analysis.
- Generates an indicative ATS-style score and improvement suggestions.
- Identifies missing keywords, relevant skills, and resume weaknesses.
- Compares resumes with job descriptions to highlight matched and missing skills.

#### e. Personalized Learning Recommendation Module

- Recommends suitable courses, certifications, tutorials, and practical projects.
- Generates learning paths based on identified skill gaps.
- Organizes learning recommendations according to career goals.
- Helps students focus on skills relevant to their target roles.

#### f. Resume Builder and Portfolio Module

- Helps students create and update professional resumes.
- Organizes academic qualifications, skills, projects, and certifications.
- Supports portfolio development to showcase projects and achievements.
- Helps students prepare application materials for job opportunities.

#### g. Progress Tracking and Analytics Module

- Displays completed learning activities and developing skills.
- Uses charts and dashboards to visualize learning progress.
- Tracks skill-gap improvements and resume analysis results over time.
- Provides an overview of career preparation and readiness.

#### h. AI Career Assistant Module

- Answers career-related questions and provides learning guidance.
- Suggests skills, projects, and preparation strategies for selected job roles.
- Provides recommendations based on the student's profile and goals.
- Helps students plan their next steps in career development.

#### 4. Development Flow

1. Requirement Gathering – Identify student needs, career preparation challenges, and platform features.
2. System Design and Architecture Planning – Design the MERN architecture, user interface, API structure, and AI integration.
3. Database Schema Design – Create MongoDB collections for users, profiles, skills, resumes, learning paths, and progress records.
4. Backend API Development – Develop RESTful APIs using Node.js and Express.js for authentication, profiles, resume processing and learning activities.
5. Frontend Development – Build responsive React.js pages for registration, profiles, resume analysis, recommendations and dashboards.
6. AI Integration – Integrate Gemini or OpenAI APIs for skill-gap analysis, resume feedback, job matching, and career recommendations.
7. System Testing and Validation – Test authentication, database operations, AI responses, resume processing, API integration and application usability.
8. Cloud Deployment – Deploy the frontend and backend, configure MongoDB connectivity and environment variables and verify the complete application.

---

## EXISTING SYSTEM

### 1. Manual Career Guidance Systems

#### How It Works:

- Students receive guidance from faculty and placement coordinators.
- Skills and career interests are assessed manually.
- Resume improvements and learning resources are suggested individually.

#### Drawbacks:

- Time-consuming and difficult to scale.
- Limited personalized recommendations.
- Difficult to identify skill gaps and track progress.

### 2. Online Learning Platforms

#### How It Works:

- Provide online courses, tutorials, and certifications.
- Students complete learning activities and assessments.
- Some platforms track learning progress.

#### Drawbacks:

- Recommendations may be generic.
- Limited integration with resume analysis.
- Learning paths may not match career goals.

### 3. Traditional Resume Analysis Systems

#### How It Works:

- Analyze resume content, formatting and keywords.
- Provide ATS-style scores and improvement suggestions.
- Compare resumes with job descriptions to identify matching skills and missing keywords.

#### Drawbacks:

- Limited personalized feedback.
- Weak integration with skill-gap analysis.
- Limited connection to courses and projects.

### 4. Conventional Career Development Websites

#### How It Works:

- Provide career information, job descriptions and internship opportunities.
- Help students understand industry requirements.

#### Drawbacks:

- Limited individual skill analysis and Students must compare job requirements manually.
- Resources are scattered across platforms.

### 5. Existing AI-Based Career Platforms

#### How It Works:

- Analyze resumes and skills using AI.
- Recommend career paths and learning resources.
- Provide job matching and progress dashboards.

#### Drawbacks:

- Limited integration of all career services.
- Advanced features may require subscriptions.
- AI recommendations may need verification.
- Skill development and resume progress may not be tracked together.

## PROPOSED SYSTEM

### 1. Role-Based Authentication

- Provide secure student registration, login, and logout functionality.
- Implement JWT-based authentication to protect user accounts and personal data.
- Validate user credentials and manage authenticated sessions securely.

### 2. Student Profile Management

- Allow students to manage academic details, technical skills, interests, and career goals.
- Maintain structured student profiles for personalized career guidance.
- Store profile information securely in MongoDB.

### 3. AI-Based Skill Gap Analysis

- Analyze student's existing skills against their selected career goals.
- Identify strengths, weaknesses and missing industry-relevant skills.
- Provide personalized recommendations to improve skill levels.

### 4. AI Resume Analysis and Job Matching

- Analyze uploaded resumes and generate an indicative ATS-style score.
- Identify resume weaknesses and suggest improvements.
- Compare resumes with job descriptions to identify matching and missing skills

### 5. Personalized Learning Recommendations

- Recommend relevant courses, certifications, tutorials, and practical projects.
- Generate personalized learning paths based on identified skill gaps.
- Help students prioritize learning activities according to their career goals.

### 6. Resume Builder and Portfolio

- Enable students to create and update professional resumes.
- Organize educational qualifications, technical skills, projects and certifications.
- Support portfolio development to showcase achievements and project experience.

### 7. Progress Monitoring and Analytics

- Track completed learning activities and skill development.
- Display progress through interactive charts and dashboards.
- Monitor improvements in skill gaps, resume quality and career preparation.

### 8. Secure and Scalable Architecture

- Use the MERN stack (MongoDB, Express.js, React.js, and Node.js) to develop the application.
- Integrate Gemini API or OpenAI API for AI-powered analysis and recommendations.
- Implement secure API access, environment configuration and cloud deployment.

## Advantages

- Minimizes manual effort in career planning and resume preparation.
- Identifies skill gaps and provides personalized learning recommendations.
- Improves resume quality through AI-based feedback and job matching.
- Helps students select relevant courses, certifications, and projects.
- Enables continuous monitoring of skill development and learning progress.
- Provides centralized access to career preparation tools and resources.

## SYSTEM REQUIREMENTS

### 1. Hardware Requirements

| Component | Minimum Specification         | Recommended             |
|-----------|-------------------------------|-------------------------|
| Processor | Intel Core i3                 | Intel Core i5 or higher |
| RAM       | 4 GB                          | 8 GB                    |
| Storage   | 500 MB (for code + DB access) | 2 GB or more            |
| Display   | 1366x768                      | 1920x1080               |

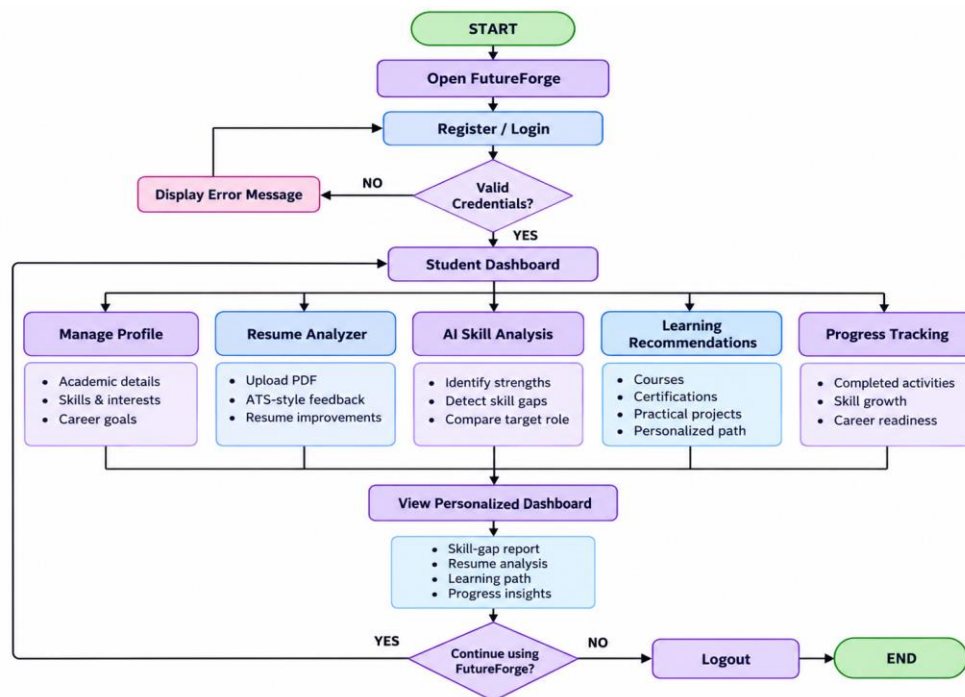
### 2. Software Requirements

| Category         | Technology Used         |
|------------------|-------------------------|
| Operating System | Windows / Linux / macOS |

| Category          | Technology Used                                   |
|-------------------|---------------------------------------------------|
| Frontend          | React.js, HTML5, CSS3, JavaScript                 |
| Backend           | Node.js, Express.js Framework                     |
| Database          | MongoDB (NoSQL Database)                          |
| Tools / Libraries | Mongoose, Axios, React Router , Recharts , Multer |
| Server            | Node.js / Express.js Server                       |
| IDE / Editor      | Visual Studio Code                                |
| Browser           | Chrome / Edge / Firefox (latest versions)         |

## PROCESSING

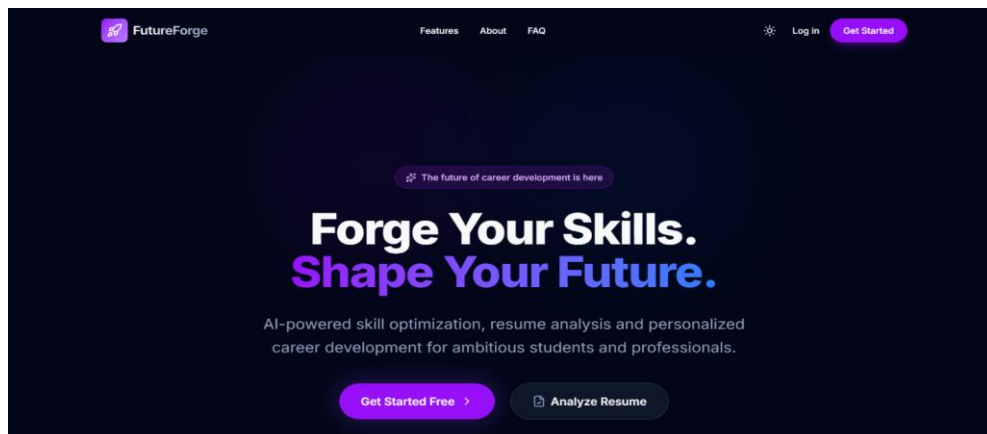
\*



## MODE OF DESCRIPTION

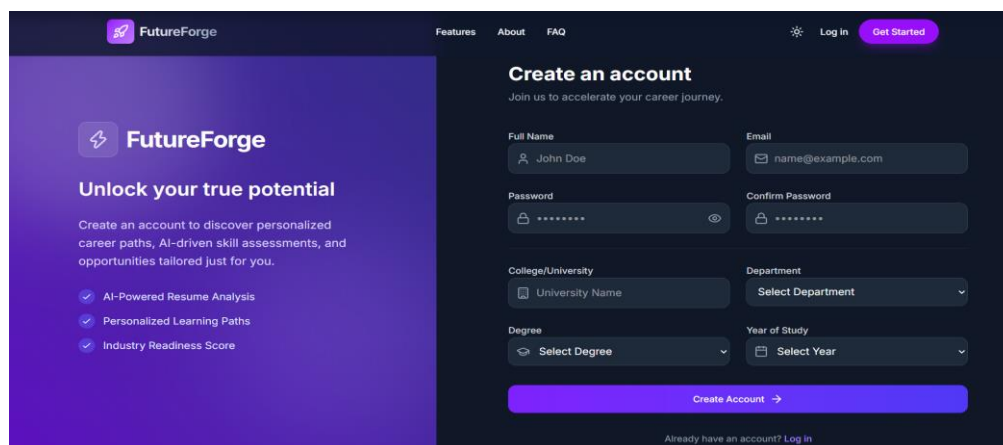
1. Landing Page
2. Registration page and Login page
3. Dashboard page
4. AI-Based Skill Analysis Page
5. AI Resume Analyzer Page
6. Personalized Learning path Recommendation page
7. Job Matching Page
8. Resume Builder Page
9. Project Recommendation page
10. Carrier Guidance Page
11. Progress Page
12. Settings and ChatBot Pages

### 1) Landing Page:



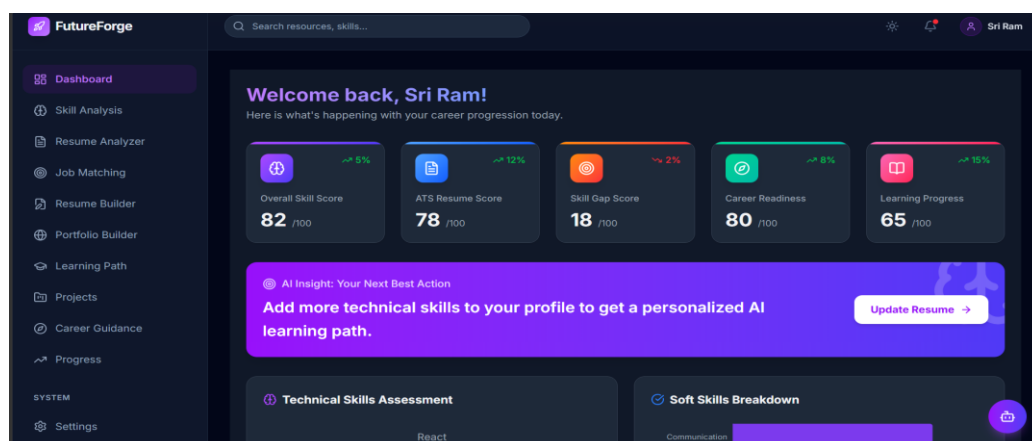
The Landing Page is the main entry point of the FutureForge platform. It provides a modern, user-friendly interface highlighting AI-powered skill optimization, resume analysis, and personalized career development. Users can explore platform features, register, log in, and access resume analysis through the available navigation options.

### 2) Registration and Login page :



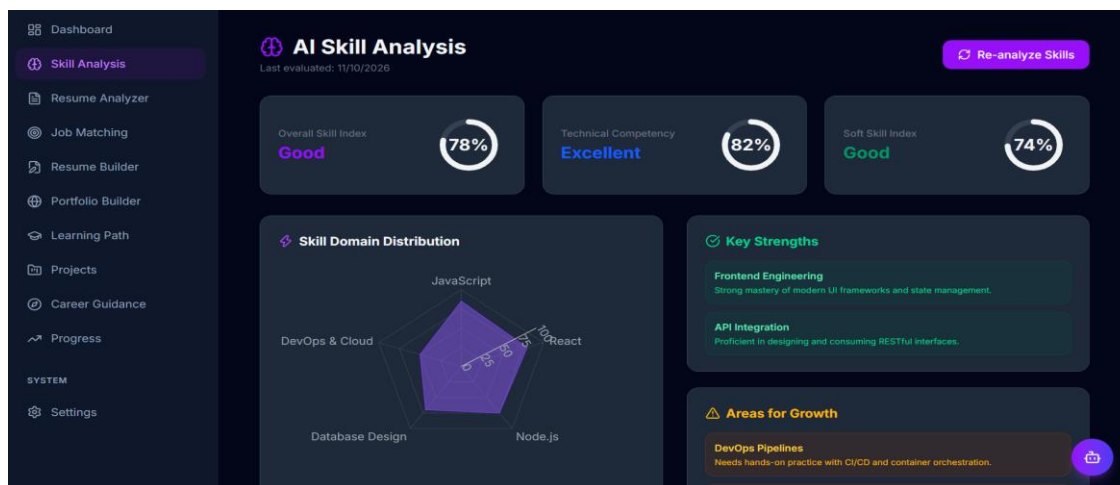
The Registration and Login Page allows users to create accounts using personal and academic details or securely log in with their credentials. It provides password confirmation, Remember Me and Forgot Password options, enabling access to FutureForge's AI-powered career development features.

### 3) Dashboard page:



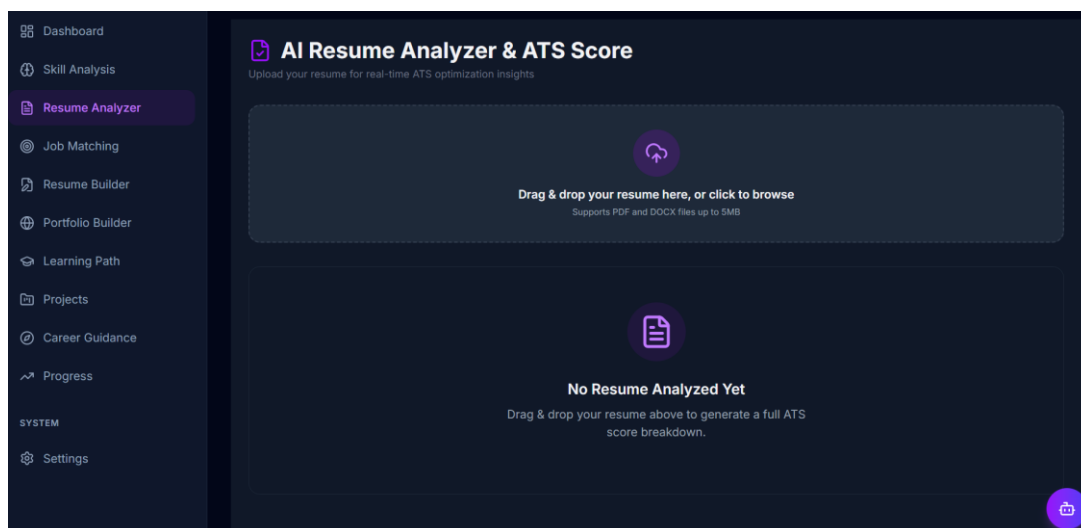
The Student Dashboard provides a centralized view of student's career development and learning progress. It displays skill scores, ATS resume scores, skill gaps and career readiness. It also offers AI-powered insights and quick access to skill analysis, resume tools, job matching, personalized learning paths, projects, career guidance and progress tracking.

#### 4) Skill Analysis Page:



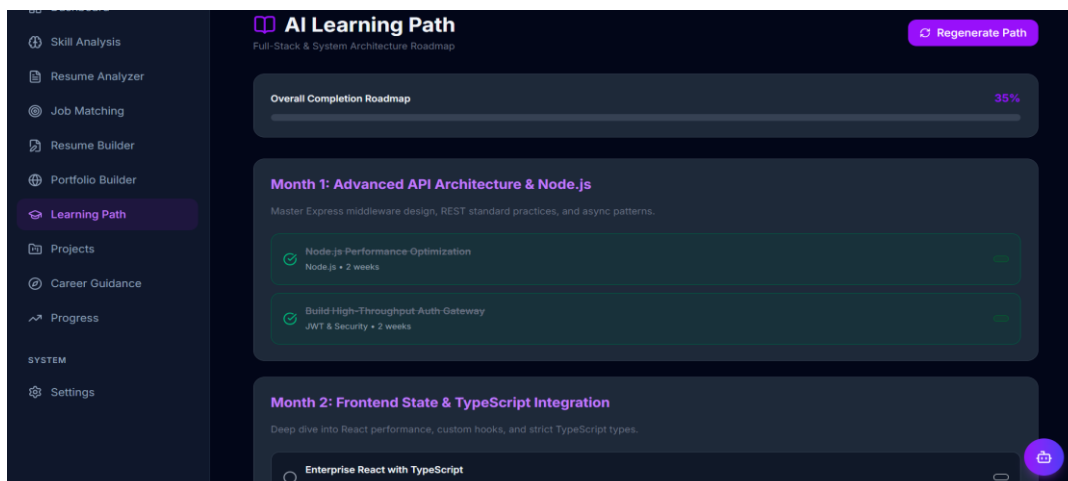
The AI Skill Analysis Page evaluates student's technical and soft skills and displays overall skill scores through interactive charts. It identifies key strengths and areas for improvement, helping students understand their current abilities and focus on developing skills required for their desired careers.

#### 5) Resume Analyzer Page:



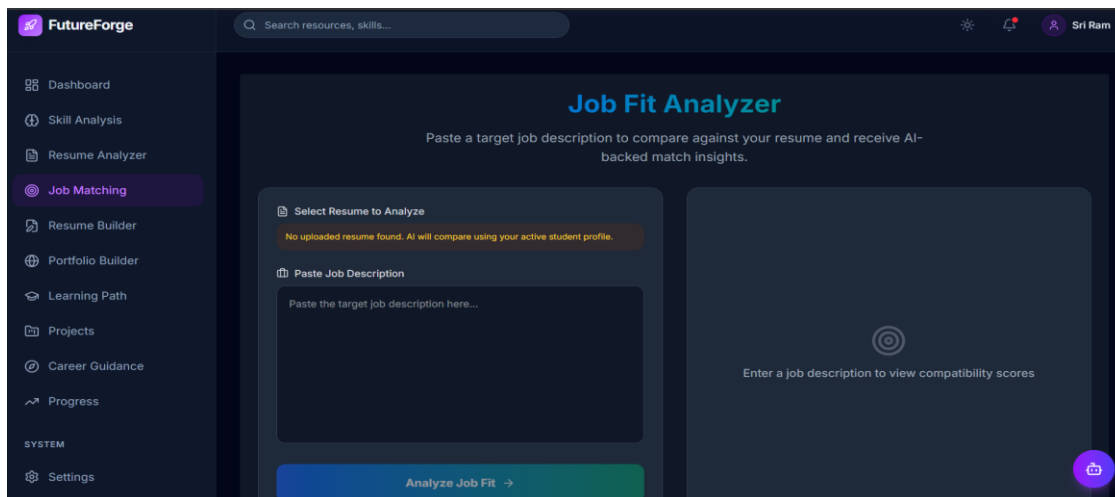
The AI Resume Analyzer Page allows students to upload their resumes in PDF or DOCX format for ATS-based evaluation. It analyzes resume content, provides an indicative ATS score and identifies areas for improvement to help students enhance their resumes and improve their job application readiness.

#### 6) Learning Path Recommendation page:



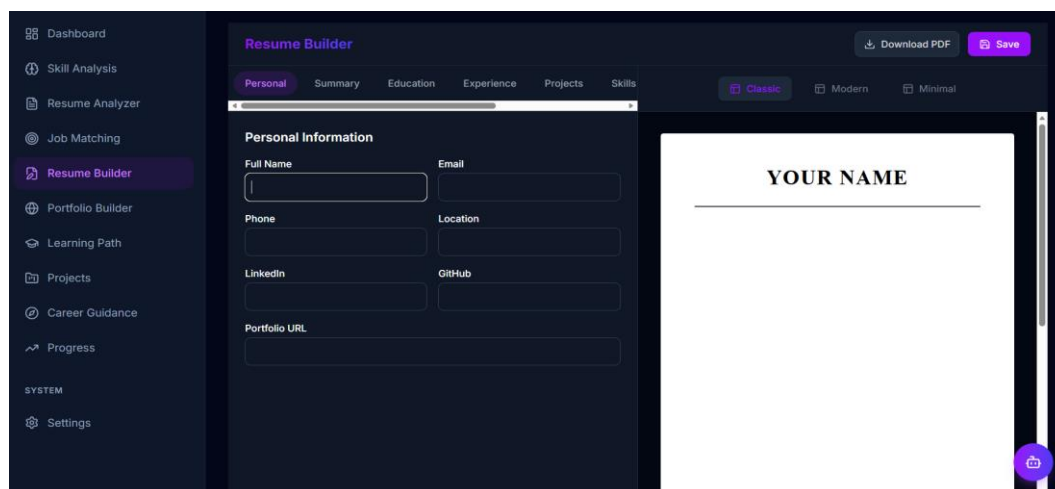
The AI Learning Path Page provides a personalized roadmap based on students' career goals and skill gaps. It organizes learning activities into monthly milestones, recommends relevant technologies and practical tasks and displays completion progress to help students develop skills systematically and achieve their career objectives.

#### 7) Job Matching Page:



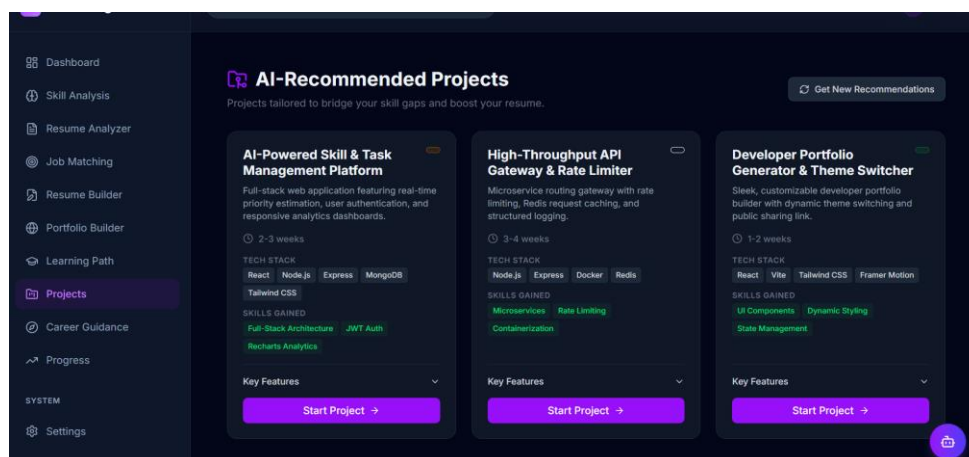
The Job Matching Page compares a student's resume and skills with a target job description. It identifies matching and missing skills, provides AI-powered compatibility insights and helps students understand the improvements needed to meet job requirements.

#### 8) Resume Builder page:



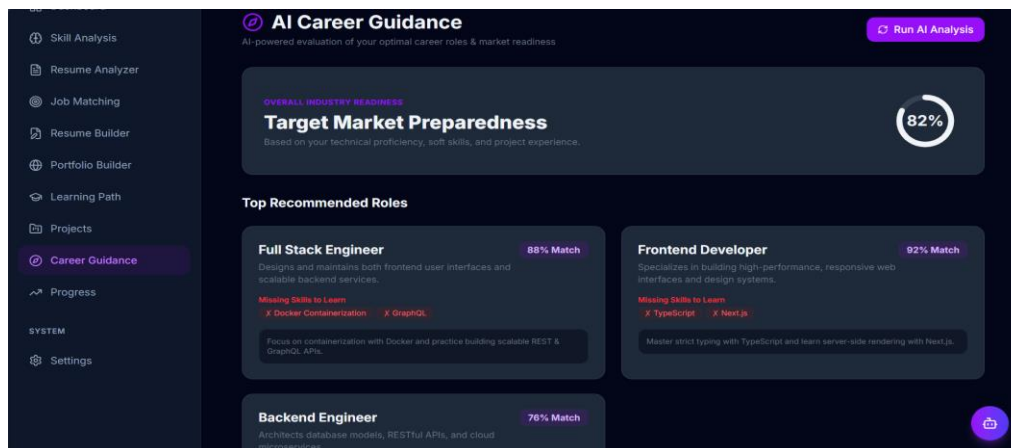
The Resume Builder Page allows students to create professional resumes by entering personal information, education, work experience, projects and technical skills. It provides multiple resume templates and a live preview to customize the layout. Students can save their resumes and download them in PDF format for job applications.

#### 9) Project Recommendation page:



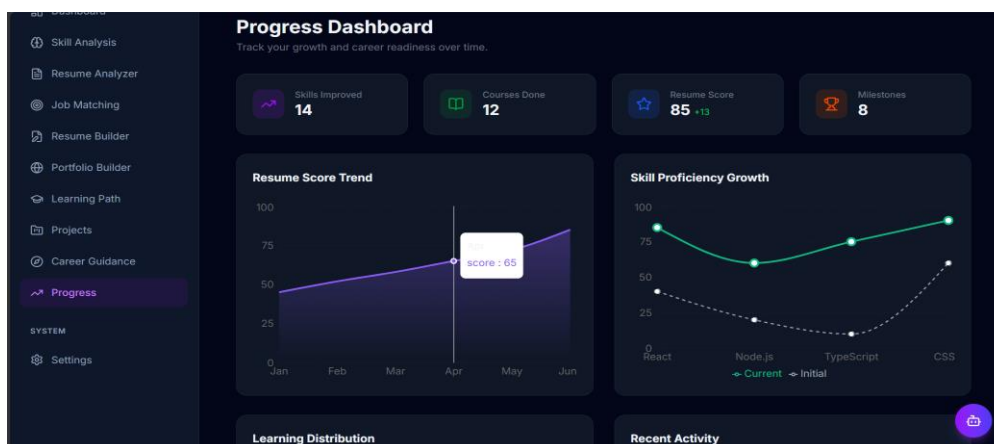
The AI-Recommended Projects Page suggests practical project ideas based on student's skill gaps and career goals. It displays project descriptions, required technologies, estimated completion time, and skills gained. These recommendations help students gain hands-on experience, strengthen their technical skills and improve their resumes for future career opportunities.

#### 10) Career Guidance page:



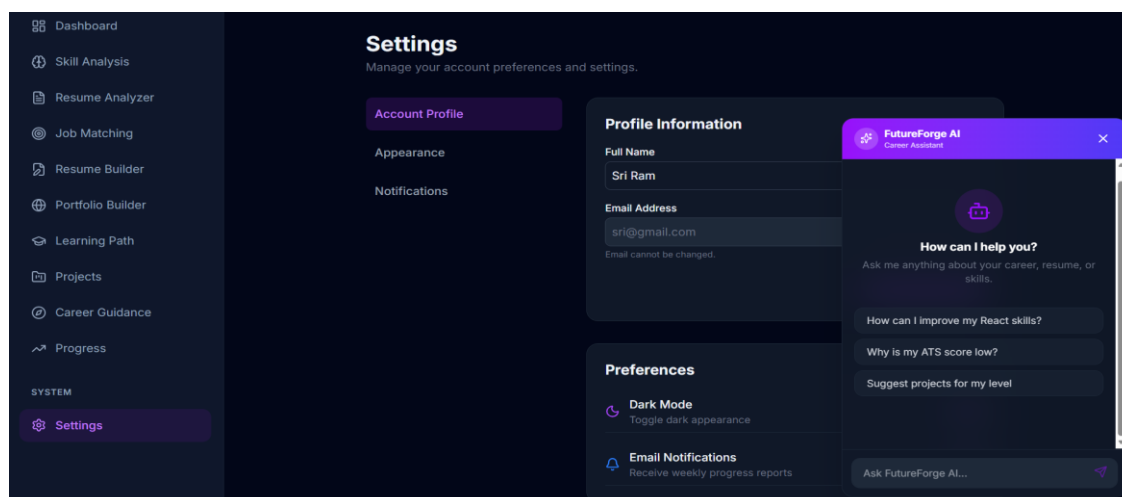
The AI Career Guidance Page analyzes student's technical skills, soft skills, and project experience to assess their industry readiness. It recommends suitable career roles with job-match percentages, identifies missing skills, and provides improvement suggestions to help students prepare for their desired careers.

#### 11) Progress page:



The Progress Dashboard tracks student's skill development and career readiness over time. It displays key metrics such as improved skills, completed courses, resume scores, and achieved milestones through interactive charts. It helps students monitor their learning progress, evaluate skill improvements and identify areas that require further development.

#### 11) Settings page and Chatbot page:



The Settings Page allows students to manage their account information, customize the appearance, enable dark mode and control email notifications. The AI Chatbot provides interactive career assistance by answering questions related to technical skills, resume improvement, ATS scores and career development. It also suggests suitable projects and skill improvement strategies, helping students receive personalized guidance and make informed career decisions.

---

## CONCLUSION

The FutureForge (AI-Powered Skill Optimization and Career Development Platform) provides an efficient, intelligent, and centralized solution for student career development. Developed using the MERN stack and AI integration, it helps students improve their technical and professional skills through personalized guidance and automated analysis. The platform effectively supports key functionalities such as skill-gap identification, AI-powered resume analysis, job matching, personalized learning recommendations, resume building, and career progress tracking.

By integrating AI-based skill assessment and intelligent recommendation tools, FutureForge helps students identify their strengths and weaknesses, improve their resumes, and select suitable courses, certifications and practical projects. Features such as interactive dashboards, portfolio development, and learning progress monitoring enhance the overall career preparation experience and support informed decision-making.

Overall, FutureForge reduces the difficulties associated with manual career planning, improves skill development, and provides personalized insights to help students achieve their career goals. It bridges the gap between academic learning and industry requirements, making it a practical, scalable, and user-friendly platform for improving employability and preparing students for future career opportunities.

---

## REFERENCES

1. BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding. Devlin, J., Chang, M.-W., Lee, K., and Toutanova, K. (2019). *Proceedings of NAACL-HLT*. <https://aclanthology.org/N19-1423/>
2. CareerOneStop. *Skills Matcher: Identify Skills for Your Career*. U.S. Department of Labor. <https://www.careeronestop.org/>
3. ESCO. *European Skills, Competences, Qualifications and Occupations Classification*. European Commission. <https://esco.ec.europa.eu/>
4. LinkedIn. *Economic Graph and Workforce Skills Research*. <https://economicgraph.linkedin.com/>
5. Manning, C. D., Raghavan, P., and Schütze, H. (2008). *Introduction to Information Retrieval*. Cambridge University Press. <https://nlp.stanford.edu/IR-book/>
6. ONET Resource Center. *Occupational Information and Skills Database*. National Center for ONET Development. <https://www.onetcenter.org/>
7. Ricci, F., Rokach, L., and Shapira, B. (Eds.). (2011). *Recommender Systems Handbook*. Springer. <https://doi.org/10.1007/978-0-387-85820-3>
8. Stanford University. *Artificial Intelligence and Natural Language Processing Research Resources*. <https://nlp.stanford.edu/>
9. World Economic Forum. *The Future of Jobs Report 2025*. <https://www.weforum.org/publications/the-future-of-jobs-report-2025/>
10. Zide, J., Elman, B., and Shahani-Denning, C. (2014). "LinkedIn and Recruitment: How Profiles Differ Across Occupations." *Employee Relations*, 36(5), 583–604.