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Skill Bridge AI – Skill Analyzer: AI-Powered Skill Gap Analysis & Career Readiness Platform

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ABSTRACT

SKILL BRIDGE AI is an AI-powered platform that helps students identify the gap between their current skills and the skills required for their desired job roles. The system analyzes resumes, technical skills, certifications and career interests using AI and NLP to generate a personalized skill gap report and job readiness score. It recommends suitable courses, certifications, projects, interview preparation resources and resume improvements while continuously tracking student progress. The platform also provides career guidance based on industry trends and helps students prepare for placements through personalized recommendations. By bridging the gap between academic learning and industry requirements, it improves employability and enhances career readiness.

Another major feature of Skill Bridge AI 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 interactive course catalogs, hands-on projects, AI interview preparation, and a centralized dashboard to track learning progress, skill development, and placement readiness. By integrating AI-based analysis, personalized learning recommendations and continuous progress monitoring, Skill Bridge AI 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 Skill Bridge AI (AI-Powered Skill Gap Analysis & Career Readiness 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.

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.

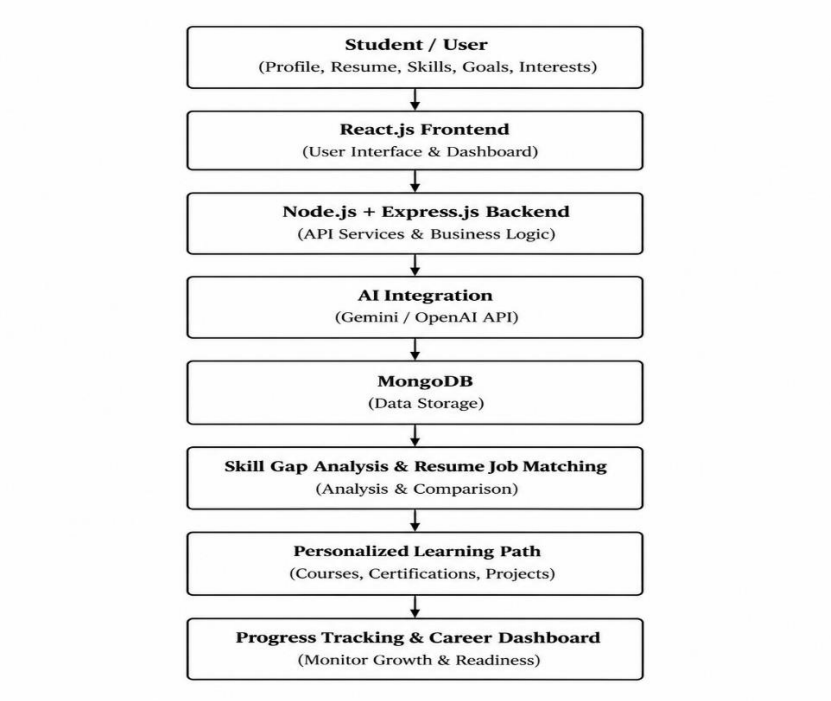
METHODOLOGY

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

Existing career development systems generally rely on manual career guidance, online learning platforms, traditional resume analysis tools, conventional career development websites, and emerging AI-based career platforms. In manual career guidance, students depend on faculty members or placement coordinators for skill assessment, career counselling, resume improvement, and learning recommendations. Although this provides individual guidance, it is time-consuming, difficult to scale, and may not provide continuous skill-gap identification and progress tracking.

Online learning platforms provide courses, tutorials, certifications, and learning assessments, with some platforms offering progress tracking. However, their recommendations are often generic and may not be closely aligned with a student's career goals, skill gaps, resume requirements, or project needs. Similarly, traditional resume analysis systems evaluate resume content, formatting, keywords, and ATS compatibility and may compare resumes with job descriptions, but they generally provide limited integration with personalized skill-gap analysis, courses, and practical projects.

Conventional career development websites provide information about career opportunities, job descriptions, and internships, helping students understand industry requirements. However, students often need to manually compare their skills with job requirements, while learning resources and career services remain distributed across different platforms. Existing AI-based career platforms improve this process by using AI for resume and skill analysis, career

recommendations, job matching, and progress monitoring. Nevertheless, many such systems provide only partial integration of career services, and advanced features may require subscriptions. AI-generated recommendations may also require verification before being followed.

PROPOSED SYSTEM

The proposed Skill Bridge AI system is an AI-powered skill gap analysis and career readiness platform designed to provide students with a centralized and personalized approach to career preparation. The system provides secure role-based authentication and allows students to maintain their academic details, technical skills, interests, experience, and career goals. These profile details are securely stored and used as the basis for personalized career guidance and skill analysis.

The system analyzes a student's existing skills against the requirements of their selected career goal and identifies their strengths, weaknesses, and missing industry-relevant skills. Based on this analysis, it provides personalized recommendations to improve the student's career readiness. The platform also includes an AI-powered resume analyzer that evaluates uploaded resumes using an indicative ATS-style score, identifies weaknesses, suggests improvements, and compares the resume with job descriptions to identify matching and missing skills.

Based on the identified skill gaps and career goals, Skill Bridge AI recommends suitable courses, certifications, tutorials, and practical projects. These resources are organized into personalized learning paths so that students can prioritize the skills and activities most relevant to their target roles. The system also provides a resume builder and portfolio facility through which students can organize their educational qualifications, technical skills, projects, certifications, and achievements for job applications.

The platform continuously monitors learning activities and skill development through interactive dashboards and analytics. Students can track their progress, improvements in identified skill gaps, resume quality, and overall career preparation. The system is developed using the MERN stack, consisting of MongoDB, Express.js, React.js, and Node.js, with Gemini API or OpenAI API integration for AI-powered skill analysis, resume evaluation, job matching, and personalized recommendations. Secure API access, environment configuration, and cloud deployment are used to support a reliable and scalable application.

SYSTEM REQUIREMENTS

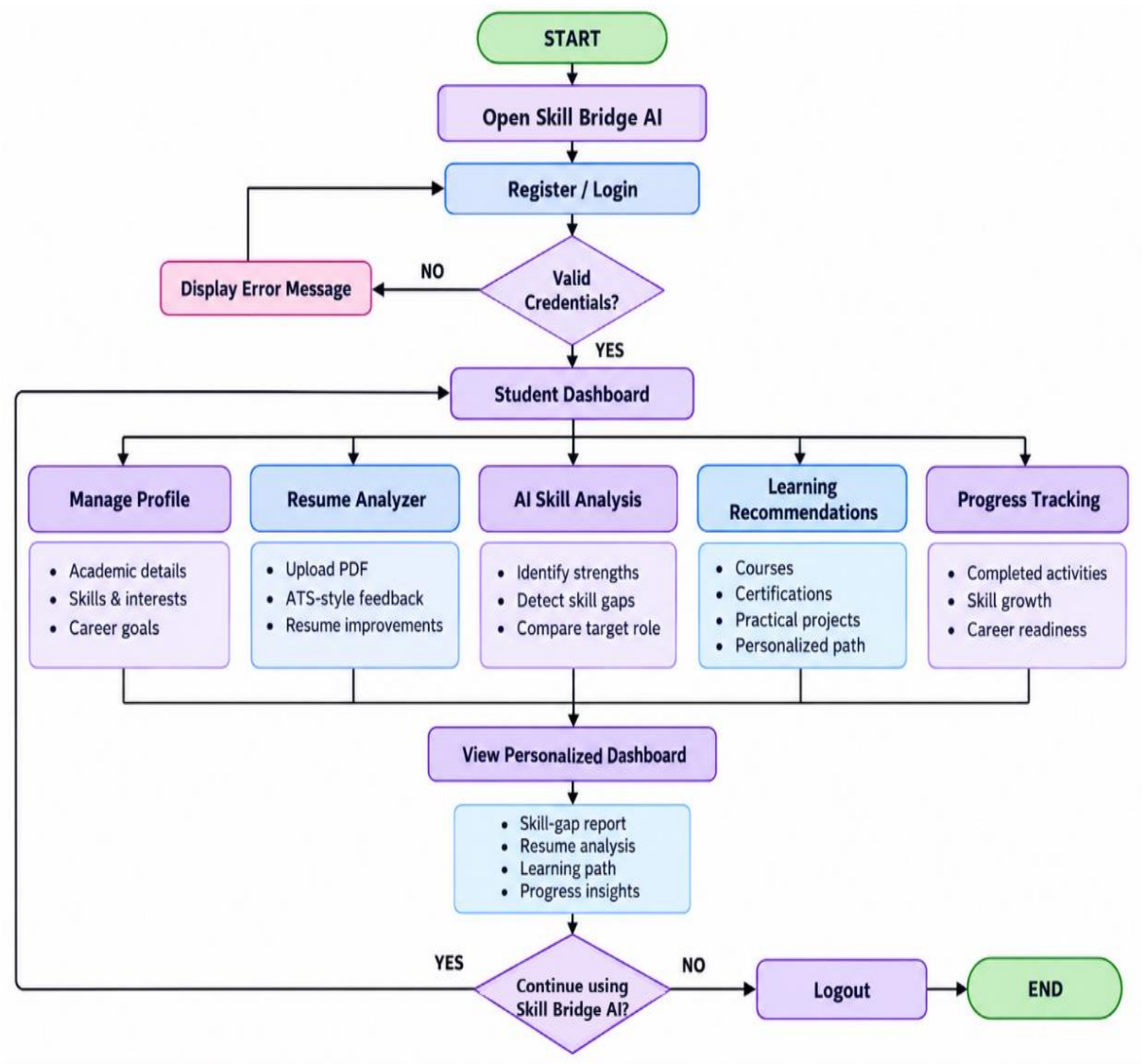
s1. Hardware Requirements

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
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)

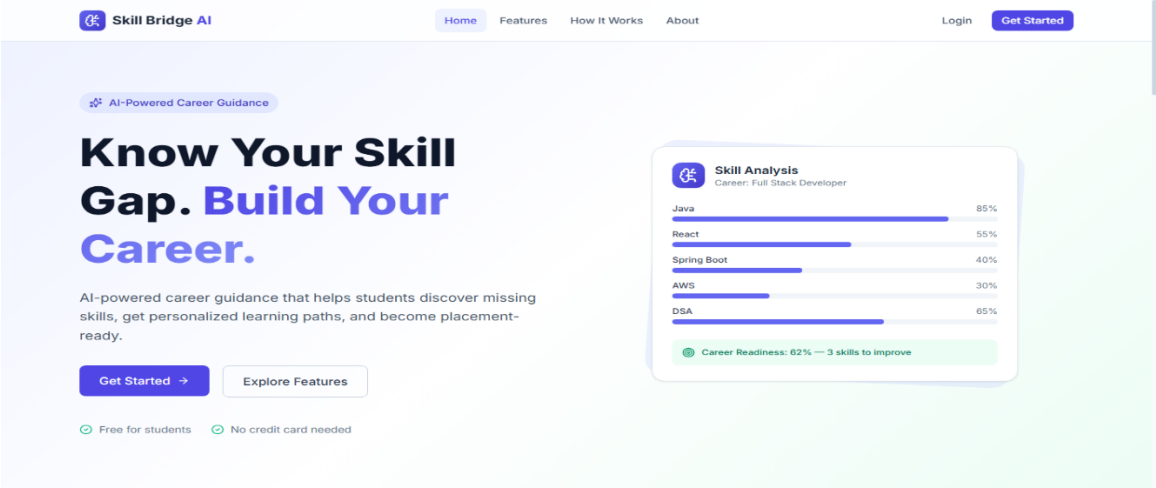
PROCESSING



MODE OF DESCRIPTION

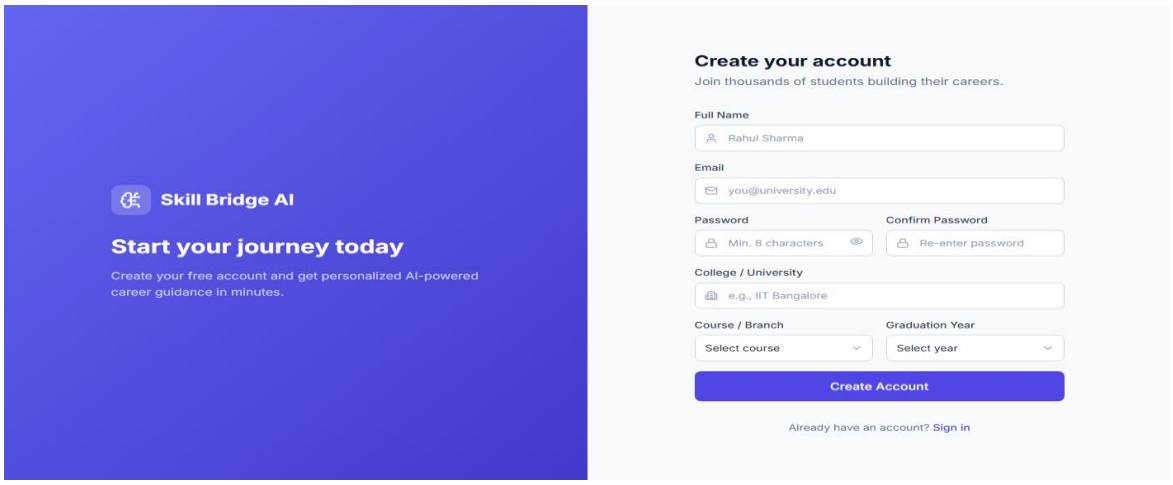
1. Landing Page
2. Registration page and Login page
3. Dashboard page
4. AI-Based Skill Analysis Page
5. AI Resume Analyzer Page
6. Personalized Learning path Recommendation page
7. Job Matching and Interview Preparation Page
8. Course Catalog and Certifications Page
9. Project Recommendation page
10. Settings and ChatBot Pages

1) Landing Page:



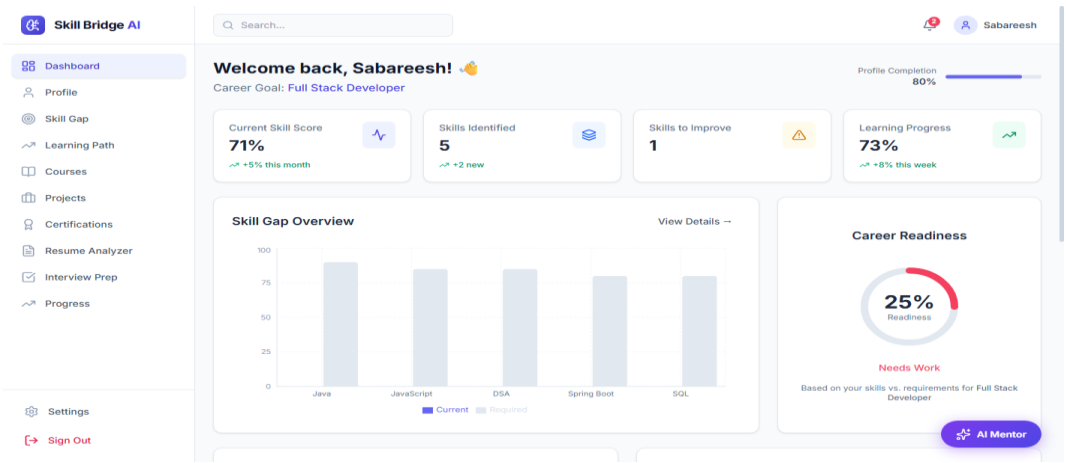
The Landing Page is the main entry point of the Skill Bridge AI platform. It provides a modern, user-friendly interface highlighting AI-powered skill gap analysis, resume analysis, and personalized career development. Users can explore platform features, register, log in, and access skill evaluations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

2) **Registration and Login page :**



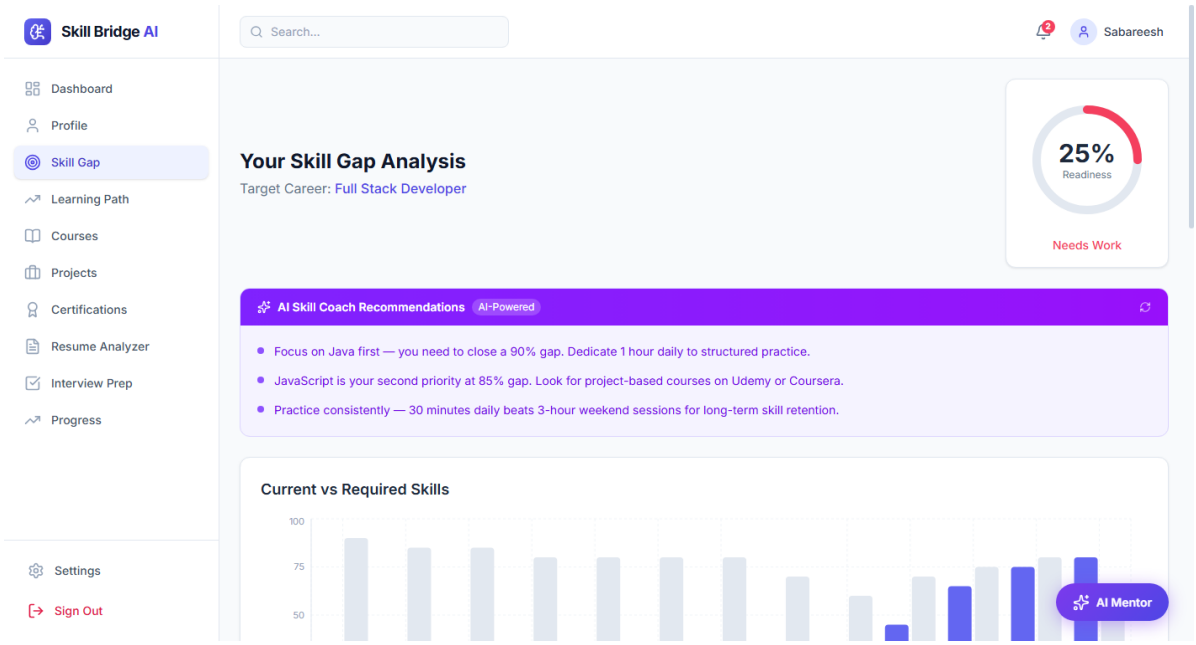
The Registration and Login Page allows users to create accounts using personal and academic details or securely log in with their credentials. It provides academic credentials, graduation tracking, and secure authentication, enabling access to Skill Bridge AI's AI-powered career development features.

3) Dashboard page:



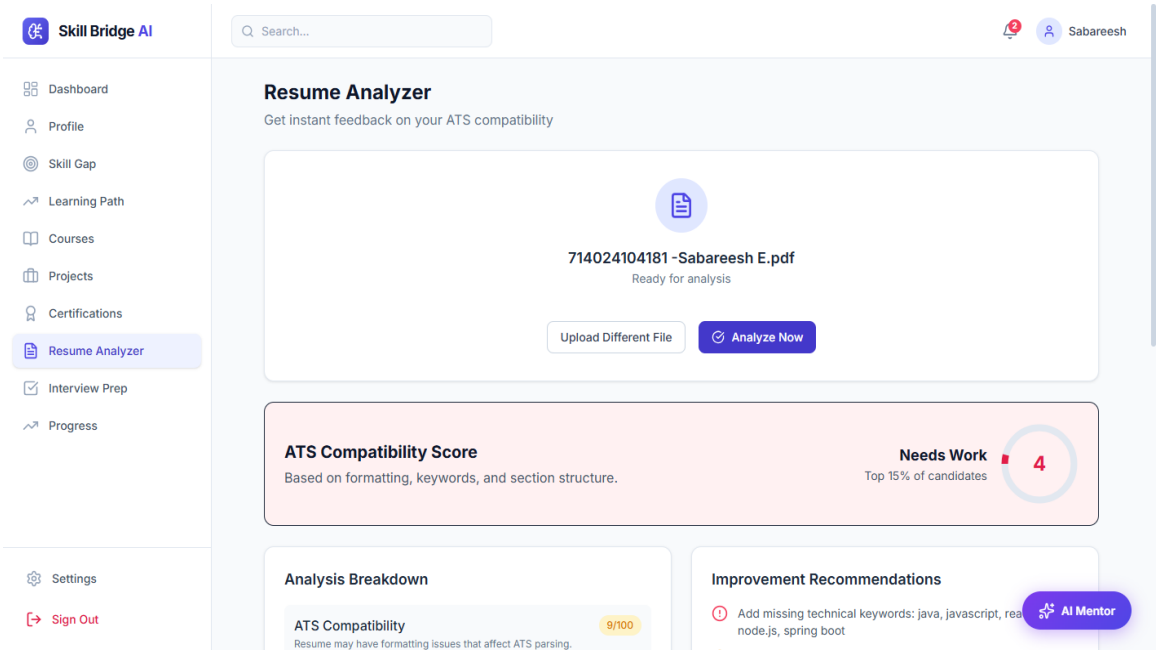
The Student Dashboard provides a centralized view of student's career development and learning progress. It displays current skill scores, ATS resume scores, skill gaps identified, and career readiness percentages. It also offers AI-powered insights, recommended next steps, and quick access to skill analysis, courses, interview preparation, projects, and continuous progress tracking.

4) Skill Analysis Page:



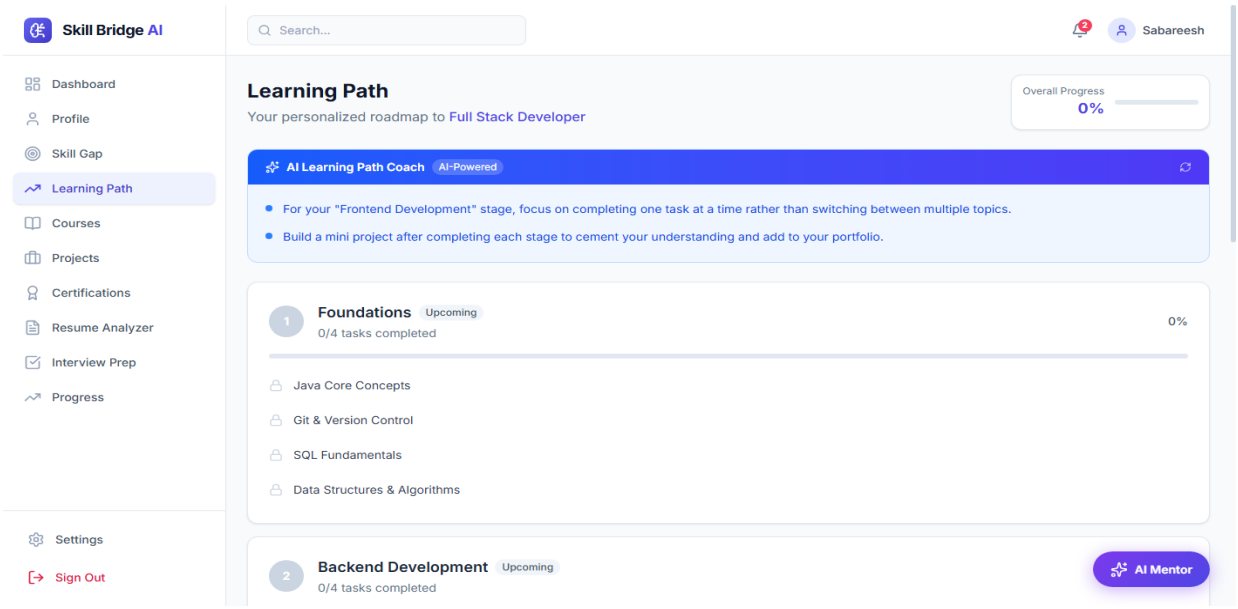
The AI Skill Gap Analysis Page evaluates student's technical and soft skills against target career profiles and displays overall skill proficiency through interactive charts. It identifies key strengths and high-priority skill gaps, providing actionable AI coaching recommendations to help students focus on developing competencies required for placements.

5) Resume Analyzer Page:



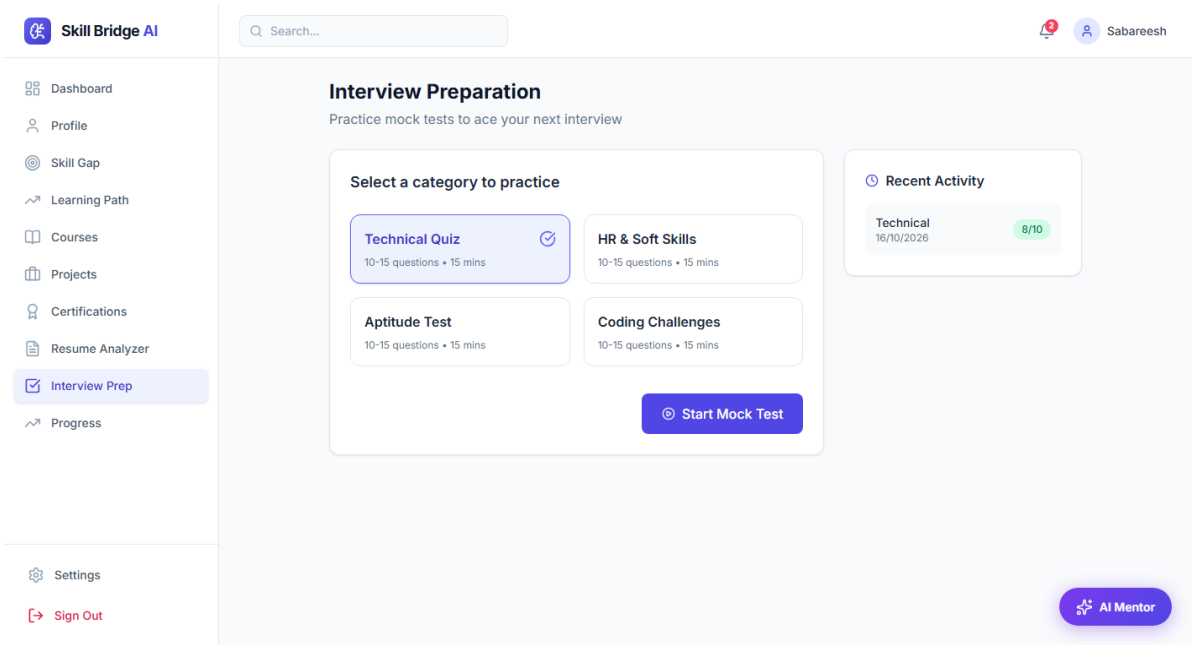
The AI Resume Analyzer Page allows students to upload their resumes in PDF or DOCX format for comprehensive ATS-based evaluation. It analyzes resume content, provides an indicative ATS compatibility score, breakdown metrics, and prioritized improvement suggestions to help students optimize their resumes for job applications.

6) Learning Path Recommendation page:



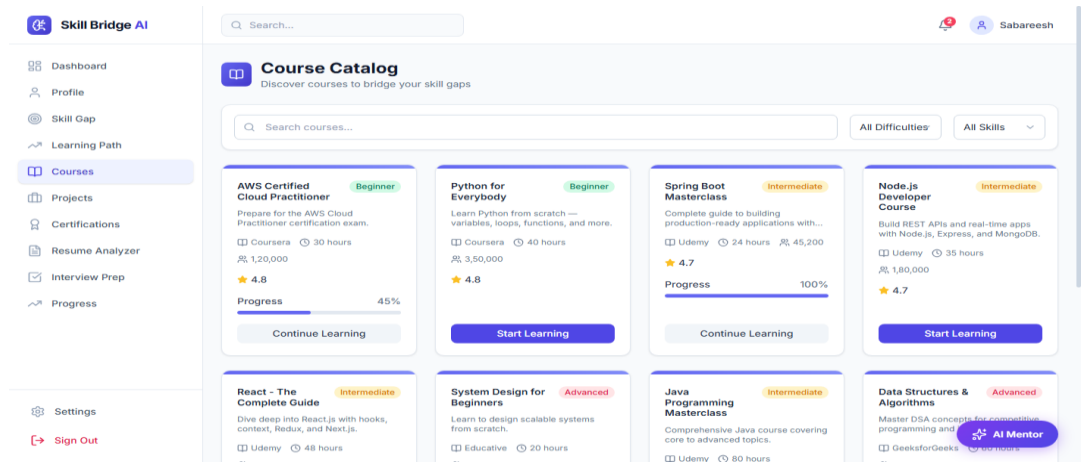
The AI Learning Path Page provides a personalized roadmap based on students' career goals and skill gaps. It organizes learning activities into systematic stages and milestones, recommends relevant technologies and practical tasks, and displays completion progress to help students achieve their career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

7) Interview Preparation Page:



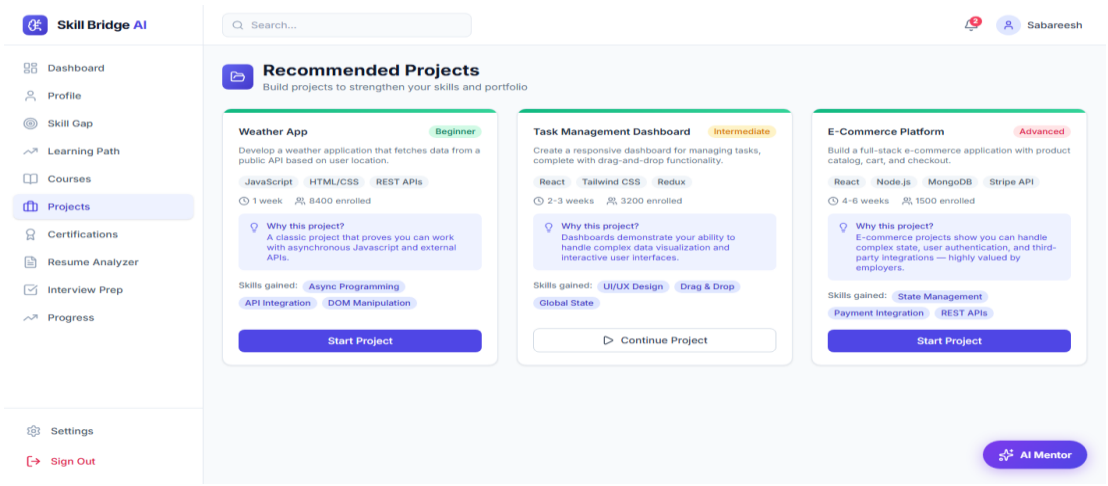
The Interview Preparation Page enables students to practice role-specific technical quizzes, soft skills, aptitude tests, and coding challenges. It provides real-time scoring, question reviews, and AI-powered performance feedback to help students prepare thoroughly for placement interviews.

8) Course Catalog Page:



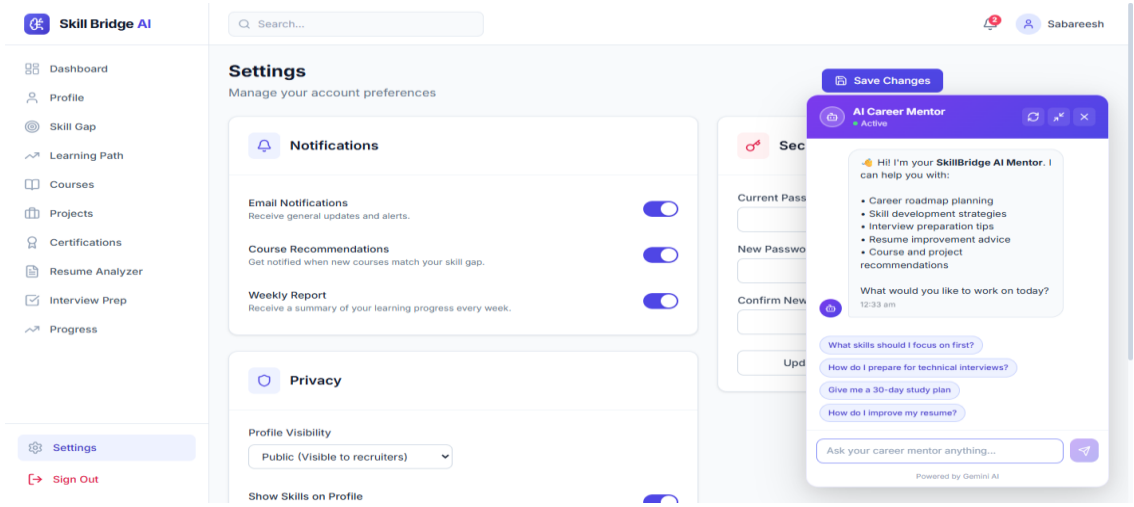
The Courses and Certifications Page offers curated learning resources and professional certification programs tailored to individual skill deficiencies. Students can explore courses across various difficulty levels, track completion milestones, and earn credentials to validate industry-ready competencies.

9) Project Recommendation page:



The AI-Recommended Projects Page suggests hands-on project ideas based on student's skill gaps and career aspirations. It details project descriptions, required tech stacks, estimated completion times, and acquired skills, enabling students to build portfolio-grade projects for placements.

10) Settings page and Chatbot page:



The Settings Page allows students to manage account preferences, notification settings, and privacy controls. The integrated AI Career Mentor provides interactive real-time assistance powered by Gemini AI, answering questions on technical skills, interview preparation, resume optimization, and personalized study roadmaps.

CONCLUSION

The Skill Bridge AI (AI-Powered Skill Gap Analysis and Career Readiness Platform) provides an efficient, intelligent, and centralized solution for student career development. Developed using modern full-stack web technologies and AI integration, it helps students identify and bridge skill gaps through automated analysis and personalized guidance. The platform effectively supports key functionalities including skill-gap identification, AI-powered resume analysis, interview preparation, course and project recommendations, and career progress tracking.

By integrating AI-based skill assessment and intelligent recommendation tools, Skill Bridge AI helps students identify their strengths and weaknesses, optimize their resumes, and acquire essential industry skills. Features such as interactive dashboards, learning paths, and progress analytics enhance the overall placement preparation experience and support informed career decision-making.

Overall, Skill Bridge AI minimizes manual effort in career planning, accelerates skill acquisition, and provides personalized insights to help students achieve their career ambitions. It bridges the gap between academic learning and industry requirements, making it a scalable and impactful platform for improving student employability.

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