

SkillBridge AI: Intelligent Career Readiness & Skill Gap Analysis Platform

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Abstract - The escalating complexity of modern software engineering requirements presents significant hurdles for graduating candidates seeking industry placement. Students frequently encounter difficulties in objectively benchmarking their technical competencies against evolving job role specifications, resulting in inefficient learning trajectories and unoptimized placement preparation. Existing digital tools suffer from architectural fragmentation, requiring job seekers to navigate independent services for resume formatting, online courses, mock interviews, and applicant tracking assessments. This work introduces **SkillBridge AI**, a unified web-based ecosystem engineered to automate career readiness evaluation and skill deficit mapping. By combining PDF/DOCX document text extraction, a priority-weighted multi-attribute decision matrix, and dynamic 6-stage roadmap synthesis, the system quantifies candidate alignment against 30 specialized software engineering domains. Identified skill gaps directly trigger curated learning recommendations (capped at two authoritative documentation sources per skill) alongside recruiter-focused intermediate and advanced portfolio project specifications. An interactive, context-aware AI Career Mentor provides multi-session interview coaching and resume optimization, offering a consolidated framework to streamline transition from campus to industry.

Keywords: Skill Deficit Analysis, Career Preparedness Index, Priority-Weighted Algorithm, Resume Parsing, Automated Roadmap Synthesis, AI Career Coaching, Placement Readiness.

1. INTRODUCTION

The rapid evolution of corporate software development stacks demands that entry-level engineering applicants demonstrate verified technical expertise across specialized domains such as Artificial Intelligence, Full-Stack Engineering, Cloud Infrastructure, and Data

Engineering. Despite identifying desired career tracks, undergraduate students frequently lack quantitative insight into the exact skill taxonomies expected by corporate recruiters. Consequently, candidates often allocate substantial time toward non-essential topics while inadvertently omitting foundational core competencies.

Contemporary digital career preparation resources exhibit severe functional fragmentation [1]. Candidates typically search job listings on recruitment networks, consult video tutorials on e-learning platforms, evaluate resume text through standalone Applicant Tracking System (ATS) checkers, and query generic artificial intelligence chatbots for interview guidance [2]. Although beneficial independently, these isolated services force candidates to manually correlate disparate data outputs, creating cognitive overload and disorganized study plans [3].

To resolve these systemic inefficiencies, this paper presents **SkillBridge AI**, a holistic application framework designed to streamline career readiness benchmarking and skill gap remediation. By parsing candidate resume documents and contrasting extracted competencies against predefined target role taxonomies or custom job descriptions, the platform computes a weighted readiness index, isolates technical skill deficits, and generates an actionable, step-by-step learning progression.

1.1 Problem Statement

Students often cannot tell how their own skills differ from what the industry expects. Consequently, they may invest effort in topics that do little to improve their employability. Available platforms usually specialise in one task, such as reviewing resumes, offering courses or listing jobs. Preparing for placements therefore means moving between several separate tools.

What is needed is a single system that evaluates a student's skills, pinpoints what is missing, and supports both learning and placement preparation.

1.2 Objectives

The primary objectives of SkillBridge AI are to:

- Quantify student career readiness using a priority-weighted scoring algorithm.
- Parse PDF/DOCX resumes to extract and normalize technical skills automatically.
- Differentiate matched skills from missing skill gaps for 30 predefined engineering roles.
- Construct a 6-stage progressive learning roadmap driven by identified skill gaps.
- Recommend concise, trusted official documentation (capped at 1–2 links per skill to eliminate clutter).
- Propose Normal (Intermediate) and Advanced recruiter-friendly portfolio project specifications.
- Provide a multi-turn, context-aware AI Career Mentor for interview preparation and resume feedback.
- Consolidate all placement preparation workflows into a unified web application.

2. LITERATURE SURVEY

Artificial intelligence, natural language processing, and machine learning are increasingly applied to career recommendations, skill gap evaluations, and personalized learning systems [1], [4].

Career recommendation systems suggest career paths based on user interests and academic backgrounds [2]. However, most existing frameworks stop at recommending a role title and fail to evaluate specific technical skill deficits [3].

AI-based skill gap tools compare candidate skill sets against job descriptions to identify missing competencies [4], [5]. However, many of these systems terminate at gap identification without providing a structured learning roadmap, hands-on project specifications, or mock interview preparation [5], [6].

Recommender systems in education propose learning content based on user profiles [3]. While personalization enhances learning efficiency, existing educational recommenders operate independently of candidate resumes and real-time job market requirements [4].

Recent studies on AI-assisted career counseling demonstrate that large language models (LLMs) and semantic embeddings (e.g., Sentence-BERT, Resume2Vec) can deliver tailored career advice [5], [6]. Nevertheless,

there remains a significant research gap in integrating automated resume parsing, weighted readiness scoring, progressive roadmap synthesis, resource curation, and conversational AI mentoring into a single platform.

2.1 Research Gap

Comparative evaluation of prior literature reveals key limitations in contemporary career preparation software:

- **Structural Separation:** Disconnect between document parsing utilities and job readiness scoring engines [4].
- **Unweighted Skill Counting:** Reliance on basic keyword counts that equate elementary optional skills with critical core prerequisites.
- **Resource Clutter:** Delivery of broad, unverified tutorial links rather than targeted official documentation.
- **Lack of Conversational Guidance:** Absence of context-aware conversational agents capable of simulating technical interview scenarios based on candidate gap data [1], [6].

SkillBridge AI bridges these gaps through a unified web platform integrating automated parsing, priority-weighted gap evaluation, 6-stage roadmap visualization, curated documentation filtering, tiered project suggestions, and stateful AI mentoring.

3. SYSTEM ARCHITECTURE AND METHODOLOGY

3.1 SkillBridge AI Architecture

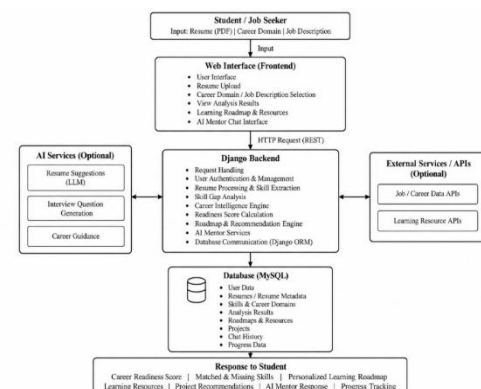


Fig 1: Overall Architecture of SkillBridge AI

3.2 Resume Analysis

The resume analysis module accepts the student's uploaded resume and extracts the technical and professional skills mentioned in it.

Extracted skills are then normalised to remove naming inconsistencies; for example, different spellings or variants of the same technology map to one standard skill entry. The resulting skill set is passed to the Career Intelligence Engine, which compares it with the requirements of the selected career or job description. This module spares students the effort of manually listing the skills present in their resumes.

3.3 Skill Gap Analysis

Skill gap analysis is the core component of SkillBridge AI. The system works with two skill sets:

- Assessed skills: the skills found in the student's resume.
- Required skills: the skills needed for the selected career domain or job description.

The two sets are compared, and each required skill is labelled as either matched or missing. The readiness calculation can be expressed as follows:

Career Readiness Score = (Matched Skills / Required Skills) × 100, so a student who matches every required skill scores 100.

This score gives a straightforward measure of how well the student's skills align with the stated requirements.

For example, if a student matches 7 of the 10 required skills:

Career Readiness Score = (7 / 10) × 100 = 70%

The most important missing skills are then used as the basis for recommendations.

3.4 Personalized Learning Roadmap

After the missing skills are determined, SkillBridge AI builds a personalized learning roadmap in which the suggested learning activities are organised around the student's skill gaps.

A roadmap entry may include:

- Missing skill
- Recommended topic
- Learning resource
- Practice activity
- Suggested project
- Progress status

With the roadmap, students can focus on the skills most relevant to their chosen career instead of following a generic curriculum.

3.5 Progress Tracking

The progress tracking module lets students monitor their preparation. A student can mark skills, roadmap activities or recommended learning tasks as complete.

The system shows which activities are finished and which remain, giving students a clear view of how far they have advanced toward their career goal.

4. IMPLEMENTATION

4.1 Technologies Used

SkillBridge AI is built with the following technologies:

Technology	Purpose
Django	Backend and application logic
SQLite	Database management
Python	Backend and AI-related processing
HTML	Web page structure
CSS	Styling
Bootstrap	Responsive user interface
Artificial Intelligence API	AI-based career assistance
Resume Processing	Resume skill extraction

4.2 System Modules

The principal modules of SkillBridge AI are described below:

4.2.1 User Authentication

This module handles user registration and login, giving students secure access to their career analysis and progress data.

4.2.2 Resume Upload and Analysis

Students upload their resumes, and the system parses them to extract the relevant skills for later analysis.

4.2.3 Career and Job Selection

Students choose a target career domain or provide a job description, which supplies the required skill information used for comparison.

4.2.4 Skill Gap Analysis

This module compares the student's existing skills with the required skills and shows which competencies are matched and which are missing.

4.2.5 Career Readiness Score

A readiness score is computed from the ratio of matched skills to required skills.

4.2.6 Learning Roadmap

Based on the missing skills, this module produces a structured learning path.

4.2.7 Project Recommendation

The system proposes projects that let students practice the missing skills and add value to their resumes.

4.2.8 AI Career Mentor

The AI mentor offers interactive help with resume improvement, interview preparation, project guidance and general career questions.

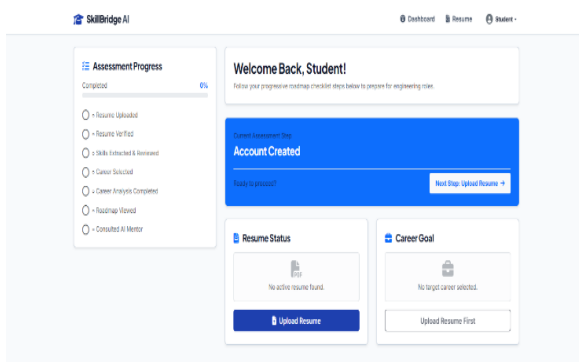
4.2.9 Progress Tracking

This module logs completed learning activities so students can follow their preparation progress.

4.3 Frontend

The frontend is built with React and gives students an interactive interface for uploading resumes, entering job descriptions, choosing career domains, viewing skill analysis results, opening roadmaps and chatting with the AI Career Mentor.

Bootstrap provides a responsive, easy-to-use layout.



4.4 Backend

Django serves as the backend framework, handling user requests, authentication, resume processing, skill analysis, roadmap generation, recommendations and database communication.

It acts as the central processing layer connecting the frontend with the other system components.

4.5 Database

SQLite stores the application data, including records on users, resumes, skills, career requirements, roadmaps, recommendations and progress.

Its simplicity and light weight make SQLite well suited to development and academic project use.

4.6 AI Integration

SkillBridge AI integrates AI services to deliver personalized career support, covering resume suggestions, interview question generation, project recommendations and conversational career guidance.

These AI features operate alongside the structured skill analysis carried out by the backend, which makes the recommendations more tailored to each student.

5. RESULTS AND DISCUSSIONS

5.1 Results

The SkillBridge AI platform developed in this work offers a single environment for student career preparation. Given a resume and a target career domain or job description, it carries out a skill-based analysis.

The system produces the following main outputs:

- Skills extracted from the student's resume.
- Skills that match the requirements.
- Skills that are missing.
- A career readiness score.
- A personalized learning roadmap.
- Suggested learning resources.
- Project ideas.
- Resume improvement tips.
- Interview practice questions.
- Career guidance from the AI Career Mentor.
- Tracking of learning and skill progress.

5.2 Result Analysis

The proposed system brings several career preparation activities together in one platform. Students can compare a resume with a job's requirements and obtain courses, projects and interview questions directly, instead of matching postings to resumes and searching for courses, projects and interview questions separately.

Skill gap analysis helps students see how far they currently are from their chosen career. The readiness score gives a quick summary of skill alignment, while the roadmap outlines a path for steadily building the missing skills.

The AI Career Mentor additionally supports students with resume suggestions, interview tips, project ideas and career guidance, and progress tracking helps them keep their preparation organised.

Overall, the system offers a practical way to reduce the fragmentation that students face in career preparation.

6. CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

SkillBridge AI is an AI-driven solution for career readiness and skill gap assessment that helps students prepare for internships and placements. It combines resume analysis, skill gap identification, readiness scoring, a personalized learning roadmap, resource discovery, project suggestions, interview preparation and progress tracking in one platform.

The system evaluates a student's current skills by comparing them with those required for the selected career area or job profile. It highlights the skills that match, detects those that are absent and recommends ways to acquire the missing ones. The AI Career Mentor further assists with resume improvement, interview questions, project advice and career guidance.

Together, these features reduce the disjointed effort students face when preparing for a career, provide a structured view of skill requirements and improve placement readiness.

Ultimately, SkillBridge AI aims to ease students' transition from campus to workplace through individualized, actionable career insights.

6.2 Future Scope

Future enhancements include:

- Real-time job description scraping via web APIs.
- Audio/video mock interview analysis using speech-to-text models.
- Automated coding test evaluations.
- Integration with professional networking APIs for direct job matching.

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