

# SkillsBridge

An AI-Powered Job Readiness Platform

## Problem in Current Job Market

Candidates apply blindly without understanding skill requirements

Employers struggle to find “job-ready” candidates

Lack of **personalized guidance** on what to learn to crack specific jobs

Mismatch between **academic knowledge and industry expectations**

## Our Solution

**Smart Job Matching** using Skill Vector Mapping

**AI-Based Skill Gap Detection**

**Personalized Upskilling Recommendations** (Courses, Certifications)

**Assessment & Mock Interview using AI (LLaMA + Gemini)**

**Goal – Transform Applicants into Job-Ready Professionals**

## Module-Wise Algorithm Flow

### 1. User Profile & Skill Input Module

#### Algorithm:

1. User registers and enters skills manually or uploads resume.
2. AI extracts skills → Generates **User Skill Vector**
3. Store in database.

### 2. Job Description Processing & Ranking

#### Algorithm Steps:

System fetches **Top 10 most relevant Job Descriptions (JDs)** using **Resume Parsing + Skill Matching**.

AI **extracts required skills** from each JD → Generates **JD Skill Vector  $V_j$** .

For each JD, compute **Relevance Score** based on user's current skill vector.

**Rank JDs** in descending order of match score.

**Top-ranked JD is selected for Interview Scheduling.**

System initiates **AI Mock Interview / Gemini-based evaluation** based on the **best-matched JD**.

### 3. Upskilling Recommendation Module

#### Algorithm:

1. Detect missing skills from **Gap Vector**.
2. **Search Course DB / AI Suggestion (LLaMA)** to fetch learning content.
3. Generate a **Personalized Learning Path** with priority-wise skills.
4. Show **Recommended Learning Timeline + Progress Tracking**

### 5. Assessment & AI Interview Module

#### Algorithm:

1. **Schedule Mock Interview with AI** once learning progress reaches threshold.
2. AI generates **role-based interview questions** from top-matched JD.
3. AI evaluates answers and **provides real-time feedback & improvement tips**.
4. System **updates readiness score** and suggests retry or move to job application.

# Test Cases

S.No	Module	Input	Expected Output
1	User Registration	New user signs up with email/password	Account created successfully
2	Resume Upload	Upload resume file (PDF/DOC)	Resume parsed successfully
3	Skill Entry	User enters skills manually	Skills saved automatically after cleaning & preprocessing
4	Job Search	User searches for jobs	Top 10 relevant job listings displayed automatically
5	Job Recommendation	User profile and skills	Platform suggests suitable jobs automatically
6	Upskilling Suggestion	Partial match with job requirements	Recommended courses/resources shown
7	Learning Path Display	User selects suggested courses	Personalized learning timeline displayed
8	Assessment Attempt	User completes a test/quiz	Test submitted and score shown
9	Mock Interview	User schedules AI mock interview	Interview conducted and feedback provided
10	Progress Tracking	User completes learning modules	Progress status updated

# Functional morphism

## Functional Morphism – SkillsBridge

### Definitions:

- Let  $f: U \rightarrow S \rightarrow$  Map **users** to their **skill sets**.
- Let  $g: J \rightarrow S \rightarrow$  Map **job descriptions** to **required skills**.
- Let  $h: S \times S \rightarrow C \rightarrow$  Compute **compatibility score** between user and job.

### Composition:

$$h(f, (U)g(J)) = \textit{Compatibility Score}$$

- If score < threshold  $\rightarrow$  Trigger **Upskilling Module**:

$$\alpha: G \rightarrow R$$

Where  $G$ = Skill Gap Vector,  $R$ = Recommended Learning Resources.

# Mathematical model

## Mathematical Model – SkillsBridge

### 1. Sets and Entities

- Users:  $U = \{u_1, u_2, \dots, u_m\}$
- Job Descriptions:  $J = \{j_1, j_2, \dots, j_n\}$
- Skills:  $S = \{s_1, s_2, \dots, s_k\}$

### 2. Skill Representation

- User Skill Vector:  $\mathbf{V}_u = [v_1, v_2, \dots, v_k]$
- Job Skill Vector:  $\mathbf{V}_j = [r_1, r_2, \dots, r_k]$

### 3. Compatibility Score

- $C \in [0, 1] \rightarrow 1$ , perfect match

### 4. Skill Gap Vector

$$G = \max(\mathbf{V}_j - \mathbf{V}_u, 0)$$

### 5. Upskilling & Assessment

- After completing learning:  $\mathbf{V}'_u = \mathbf{V}_u + \alpha \cdot G$ ,  $\alpha \in [0, 1]$
- User is **ready to apply** if  $C(\mathbf{V}'_u, \mathbf{V}_j) \geq \theta$

# UML Diagram

## SkillsBridge — Component Diagram

