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A Holistic Guidance System for Academic and Industrial Alignment

Karishma Raut[1],Kunal Chaudhari[2], Harshad Kolekar[3], Karan Kale[4]
[1-4]
(CSE (AI & ML), Viva Institute of Technology / Mumbai University, India)

Abstract: *The Smart Career Guidance Kiosk for Rural Students is a low-cost, offline, and multilingual system developed to address the lack of structured career counselling facilities in rural and semi-urban regions. Many students face challenges in making informed academic decisions due to limited access to professional counsellors, internet dependency and language barriers. The proposed kiosk operates as a standalone embedded system using locally hosted software and offline career dataset. It analyses user inputs such as education level, academic stream, interests and skill sets using a rule-based weighted recommendation algorithm to generate personalized career guidance. The system features a simple user-friendly interface with multilingual and audio support to accommodate students with varying levels of digital literacy. Designed for deployment in rural schools, Gram Panchayat offices, NGOs, and community learning centres.*

Keywords: *Smart Career Guidance System, Rural Students, Offline Kiosk System, Career Recommendation, Multilingual Application*

1. Introduction

Career Guidance is a critical component in shaping students' academic and professional futures. However, in rural regions, students lack access to structured career counselling after completing their 10th or 12th standard education . Factors such as the absence of professional counsellors, unreliable internet connectivity, language barriers, and limited awareness of diverse career opportunities frequently result in academic dropouts, unemployment, or misaligned career paths. With the rapid expansion of skill-based and technology-driven professions, providing accessible and reliable career guidance has become increasingly important. Most existing career guidance platforms are internet-dependent, Englishcentric, and designed primarily for urban users, making them unsuitable for rural deployment.

To overcome these limitations, this paper presents the Smart Career Guidance Kiosk for Rural Students — an offline, multilingual, and self-guided solution. The proposed kiosk integrates embedded hardware with a locally hosted web-based application to deliver personalized career guidance without requiring internet connectivity or human intervention. By enabling students to explore suitable career options based on their education level, interests, and skills, the system aims to bridge the career awareness gap and promote informed decision-making in rural communities.

2. Literature Survey

In recent years, there has been a growing need for personalized career guidance systems to help students make informed decisions, particularly in areas where access to professional counsellors is limited. With the rise of intelligent systems and AI, several researchers have explored methods to provide automated, data-driven career recommendations.

2.1 Intelligent Career Guidance System (Mohiuddin et al., 2025) [1]

This study introduces an intelligent career guidance system leveraging machine learning techniques for personalized recommendations. The system analyses students' skills, interests, and education levels to suggest suitable career paths, enabling adaptive guidance that improves as more data is collected.

2.2 Intelligent Career Guidance System Using Machine Learning (Sneha H. S. et al., 2022) [2]

Sneha et al. proposed a model that automates career predictions using machine learning, evaluating potential career options based on predictive algorithms and demonstrating the potential for offline implementation in rural areas.

2.3 Smart Career Assistance Portal Using AI (Sameeha Afrin A. et al., 2025) [3]

This portal integrates AI with real-time industry insights, dynamically updating career recommendations. Its methodology can be adapted to offline kiosks through preloaded datasets for rural deployment.

2.4 Career Guidance Portal (Kritika Vishwakarma & Peeyush Kumar Pathak, 2025) [4]

The authors focus on a portal with digital libraries and skill assessment tools, underscoring the value of personalized assessment aligned with the SCGK's step-by-step self-guided counselling objective.

2.5 Natural Language Driven Career Prediction System (Sakir H. Faruque et al., 2024) [5]

This NLP-based system enables natural-language interaction for career prediction, offering insights into user-friendly interface design and adaptive recommendation algorithms suitable for kiosk implementation.

2.6 AI Career Guidance Tool (Joshi et al., 2024) [6]

This paper presents an AI-based platform highlighting the feasibility of automated guidance systems and their potential to scale across multiple locations — a core aspect of deploying SCGK in rural regions.

2.7 AI-Powered Career Guidance System (El-Khalili et al., 2025) [7]

This work discusses recent advancements in AI-driven career guidance, emphasising structured data utilisation and recommendation accuracy to support offline kiosks relying on rule-based scoring.

These studies collectively emphasise the growing importance of AI and machine learning in career guidance, the value of adaptive recommendation systems, and the need for user-friendly interfaces, providing a strong foundation for the Smart Career Guidance Kiosk [1]–[7].

3. Proposed Methodology

3.1 Proposed System

The Smart Career Guidance Kiosk for Rural Students is an offline, self-guided career counselling system designed specifically for rural environments. It functions as a centralised career guidance platform enabling independent exploration of suitable academic and professional paths. A locally hosted career database stores career descriptions, required education levels, recommended courses, skill requirements, job roles, salary ranges, and institutions. User inputs are analysed using a rule-based weighted recommendation mechanism to generate personalised career suggestions. The system is deployed as a standalone physical kiosk using embedded hardware and a locally hosted web application [11],[12],[13].

3.2 Methodology

The development follows a structured methodology focused on offline functionality, usability, and accessibility [11],[15].

3.2.1 System Design and Architecture

The system is designed as a self-contained kiosk using embedded hardware and a locally hosted web application ensuring complete offline operation, integrating a Raspberry Pi, display unit, speaker, and storage media.

3.2.2 Data Collection and Dataset Design

Career-related data is structured into an offline JSON-based database including career descriptions, education levels, courses, skills, certifications, job roles, salary ranges, and institutions — scalable and easily updatable.

3.2.3 Career Guidance Flow

Users follow a step-by-step process selecting education level, academic stream, interest domains, and existing skills as the basis for career analysis and recommendation.

3.2.4 Career Recommendation Algorithm

A rule-based weighted scoring algorithm analyses user inputs. Parameters such as interest match, skill match, stream eligibility, and user preference are assigned weights to compute a final score, and careers are ranked accordingly.

3.2.5 Software Development

The frontend is developed using React with Vite for fast rendering. JavaScript implements backend logic while the offline database is accessed locally. The application runs in Chromium kiosk mode on Raspberry Pi OS.

3.2.6 Multilingual and Audio Support

The system supports multiple Indian languages with offline text-to-speech functionality to enhance usability for students with limited literacy.

3.2.7 Testing and Deployment

The system is tested under offline conditions evaluating response time, recommendation accuracy, language switching, and stability for deployment in rural schools, NGOs, and Panchayat offices.

3.3 Project Plan and Architecture

The kiosk is planned as a low-cost, self-contained solution for rural schools, Gram Panchayat offices, NGOs, and community learning centres. The system architecture follows a modular design comprising a user interaction layer, application logic layer, data storage layer, and hardware layer. User inputs are processed locally using a rule-based recommendation engine, delivering results through a simple multilingual interface with optional audio support.

4. Results and Discussion

The Smart Career Guidance Kiosk was successfully implemented and evaluated under offline operating conditions. Testing demonstrated stable performance, quick response time, and ease of use, confirming suitability for rural deployment.

4.1 React Web Interface

The React-based web interface is designed to be simple, intuitive, and accessible for students with varying levels of digital literacy. It guides users step-by-step through the career guidance process and supports multilingual interaction, ensuring smooth navigation and fast rendering.

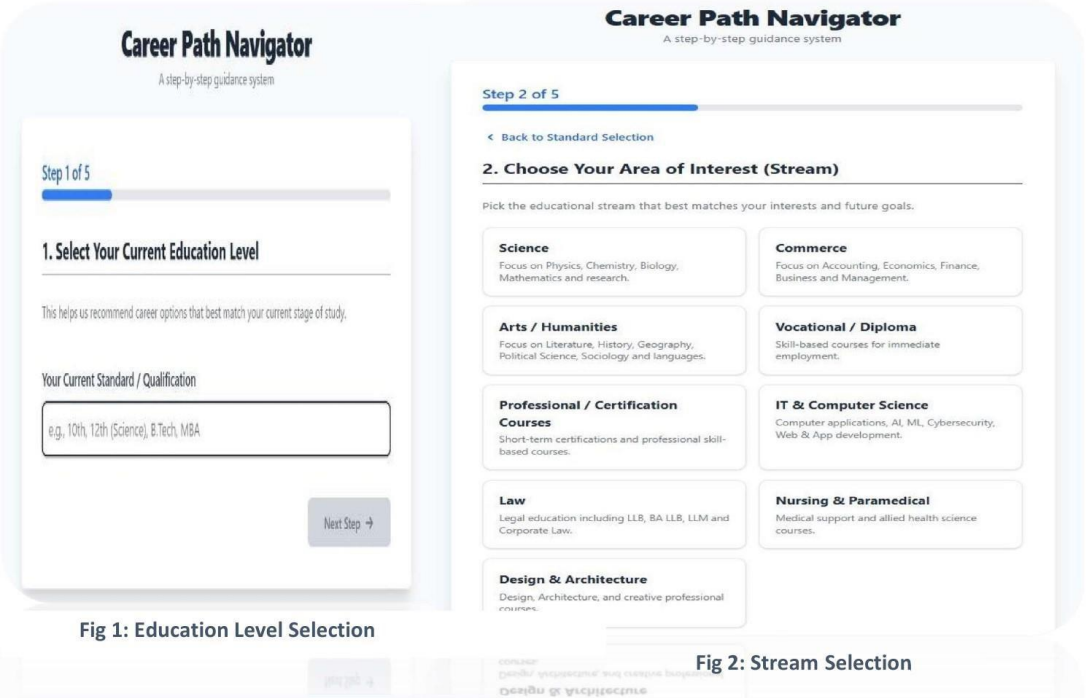

Fig 1: Education Level Selection

Fig 2: Stream Selection

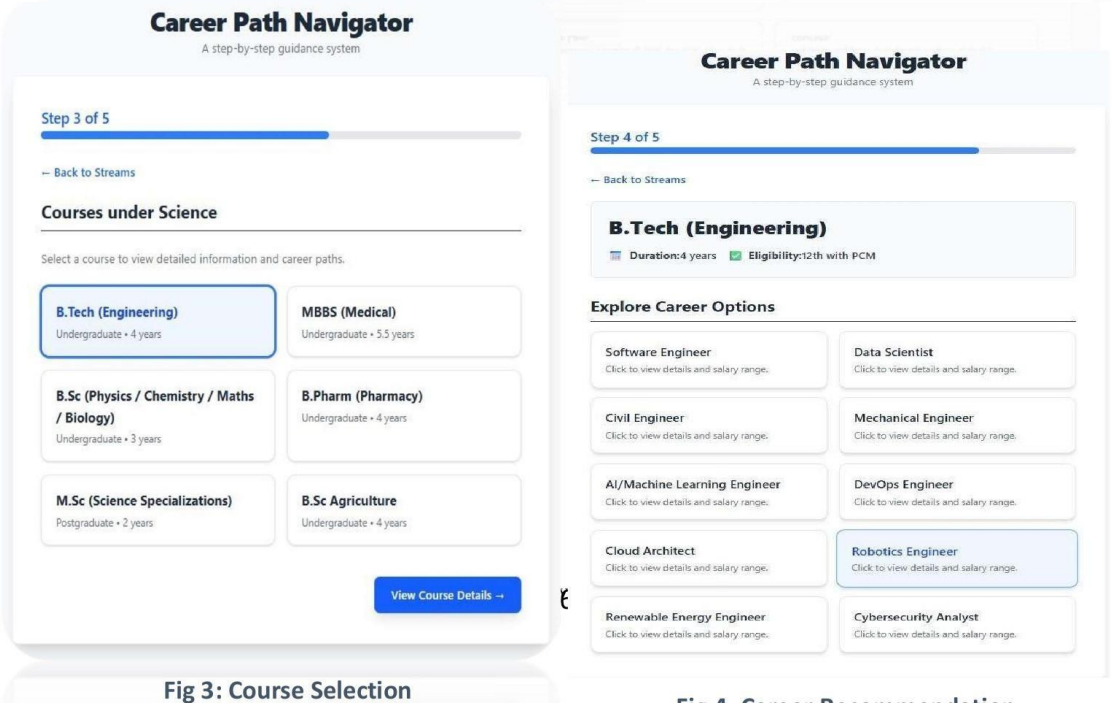

Fig 3: Course Selection

Fig (1) Education Level Selection (Step 1) & Fig (2) Stream Selection (Step 2) of the Career Path Navigator interface.

The five-step Career Path Navigator workflow covers: (1) Education Level Selection; (2) Stream Selection from options including Science, Commerce, Arts/Humanities, IT & Computer Science, Law, Nursing, Vocational/Diploma, and Design & Architecture; (3) Course Selection; (4) Career Recommendation with roles, skills, and salary; (5) Detailed Career Overview.

Fig (3) Course Selection (Step 3) & Fig (4) Career Recommendation (Step 4) showing B.Tech Engineering career options.

4.2 Output

The system successfully provides personalised career recommendations using the rule-based weighted scoring algorithm and offline JSON database. Career suggestions are presented immediately after analysis without internet connectivity, with high recommendation relevance, fast response time, and stable system performance.

students to explore suitable options without internet connectivity. The results confirm high recommendation relevance, fast response time, and stable system behaviour. All analyses are performed using an offline JSON database containing pre-existing career data, ensuring the system functions completely without internet connectivity. The system immediately presents personalized career recommendations based on the student's inputs, helping them make informed decisions about their future education and career paths.

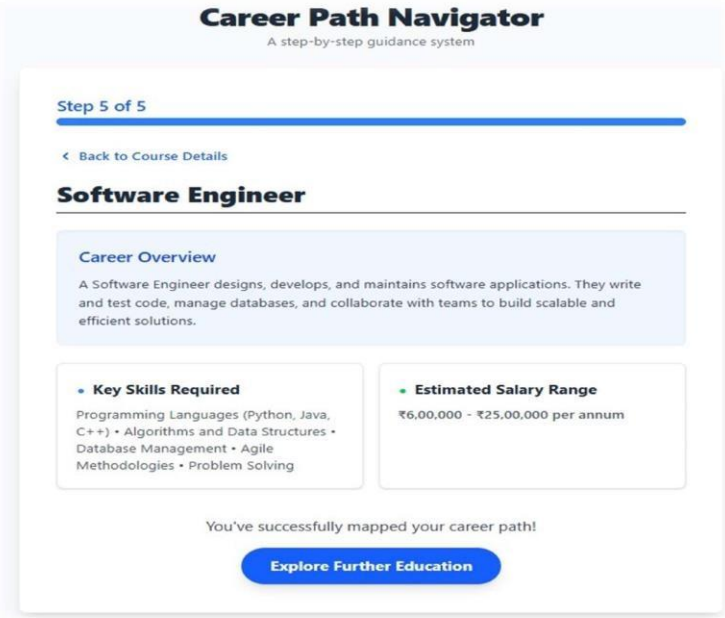

Fig (5) Career Overview screen (Step 5) displaying the Software Engineer career path with key skills and estimated salary range of ■6,00,000–■25 ,00,000 per annum.

4.3 Comparison with Existing Systems

Table 1 presents a comparative analysis of the Smart Career Guidance Kiosk against existing career guidance systems across key deployment and functionality criteria.

Feature	Existing Systems	Smart Career Kiosk
Internet Required	Yes	No
Deployment Mode	Web Portal	Physical Kiosk
Rural Suitability	Limited	High
Multilingual Support	Limited	Yes
Audio Guidance	Rare	Yes

Cost	Medium	Low-cost (Raspberry Pi)
Recommendation Type	AI/ML	Rule-Based Weighted Scoring

Table (1) Comparison with Existing Systems

5. Future Scope

The Smart Career Guidance Kiosk can be enhanced by expanding its career dataset to include more courses, skills, and emerging job roles. Integrating AI/ML can provide adaptive, personalised recommendations, while periodic internetbased updates keep the system current. A mobile application version would extend accessibility beyond kiosks, and linking with government schemes offers actionable pathways for students. Adding voice interaction and NLP will make the system more inclusive, and aggregated usage data can support educational planning [21],[22],[25],[27].

6. Conclusion

This paper presented the Smart Career Guidance Kiosk for Rural Students (Career Mate), an offline, multilingual, and self-guided career counselling solution designed to bridge the career awareness gap in rural and semi-urban regions. By combining embedded hardware, a locally hosted web application, and a rule-based weighted recommendation algorithm, the system delivers personalised career guidance without internet connectivity or professional intervention. The Reactbased interface provides an intuitive, step-by-step guidance experience with multilingual and audio support, making it accessible to students with varying digital literacy levels. Experimental results demonstrate stable performance, fast response time, and high recommendation relevance under offline conditions. The kiosk offers a scalable, low-cost, and inclusive solution for deployment in rural schools, Gram Panchayat offices, NGOs, and community learning centres, contributing meaningfully to informed educational decision-making in underserved communities.

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