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A Skill-Based Job Matching System for Blue-Collar Workers Using Digital Platforms

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Abstract:
Blue-collar workers play a crucial role in sectors like construction, manufacturing, logistics, and maintenance, yet they often face challenges in finding suitable employment due to a lack of access to structured digital job platforms. Many rely on informal networks or middlemen, leading to inefficiencies and limited job options. This project proposes a skill-based, user-friendly digital job portal specifically designed to address the needs of blue-collar workers. The platform enables workers to register easily, create profiles based on their skills and experience, and apply for relevant jobs using search filters such as location, job type, and experience level. Employers can post vacancies and connect directly with candidates, streamlining the hiring process. The system is built using HTML, CSS, JavaScript, PHP, and MySQL, and is optimized for mobile devices to ensure accessibility for users with limited digital literacy. The platform also includes a direct messaging feature and admin panel for monitoring activity. By bridging the gap between skilled labor and job opportunities, this portal aims to reduce unemployment, promote fair hiring practices, and contribute to economic growth [5], [11] in labour-intensive industries.

Keyword - **Job Matching System, Skill-Based Recruitment, Job Discovery Platform, Regional Job Search, Employment Matching Algorithm.**

I. INTRODUCTION

In today's fast-evolving job market, digital platforms have become essential tools for employment matchmaking. However, most existing job portals primarily cater to white-collar professionals, often overlooking the needs of blue-collar workers—individuals engaged in manual labor or skilled trades such as electricians, drivers, construction workers, and cleaners. These workers form a significant portion of the workforce, especially in developing countries, yet they face major challenges in accessing reliable and skill-matched job opportunities.

Traditional job-seeking methods such as word-of-mouth or labor contractors are often inefficient [7], unorganized, and prone to exploitation. There is a pressing need for a digital solution that addresses these gaps by offering a structured, transparent, and skill-based job matching system tailored specifically for blue-collar workers.

This paper presents the design and development of a digital job portal that focuses on connecting blue-collar workers with employers based on verified skills, experience, and location. The platform aims to empower workers by making job access simple, fair, and efficient. It also benefits employers by reducing hiring time and improving candidate suitability. By leveraging mobile technology, multilingual interfaces, and AI-based matching, the proposed system promotes digital inclusion [15],[16] and aims to reduce unemployment in the informal labor sector.

II. RELATED STUDY

A. *Online Job Portals (e.g., Naukri, Monster, Indeed):*
Established platforms like Naukri, Monster, and Indeed primarily serve the white-collar workforce [3] by focusing on resume-based job matching. These platforms assume that candidates possess formal educational qualifications or certifications that can be easily quantified and verified. While these platforms work well for professionals with standard career paths, they fail to meet the needs of blue-collar workers who may not have formal qualifications, making it difficult for them to gain visibility on these sites.

B. *Localized Employment Apps (e.g., Apna, Work India, Job Hai):*
Platforms like Apna, Work India, and Job Hai have begun catering to semi-skilled and low-skilled workers by offering regional language support and simplified registration processes [6]. These apps provide a crucial service for blue-collar workers by giving them easier access to local job opportunities.
However, most of these platforms still rely on basic keyword matching for job relevance, which is not ideal for accurately matching job seekers [2], [8] with the skills required by employers. This lack of advanced filtering and ranking algorithms often leads to mismatches and inefficient job searches.

C. *Government Initiatives (e.g., National Career Service - NCS):*
Various government-led initiatives, such as India's National Career Service (NCS), aim to connect job seekers with employers across all sectors. These platforms serve as centralized hubs for employment [4], [14] services, including job postings, resume creation, and skill development programs.

However, government platforms often suffer from low user engagement, outdated information, and complex interfaces that are difficult for non-tech-savvy blue-collar workers to navigate. Moreover, these systems fail to offer adequate skill validation mechanisms, resulting in the underutilization of available talent.

D. Skill India and NSDC Reports:

Reports from the National Skill Development Corporation (NSDC) and Skill India emphasize the need for digital platforms that focus on skill-based recruitment rather than educational credentials. The NSDC estimates that more than 80% of India's workforce is employed in informal sectors [10], underscoring the importance of platforms that cater to informal laborers by recognizing their practical skills. Studies suggest that bridging the skill gap through technology-driven solutions can significantly improve job access for this underserved segment.

III. LITERATURE REVIEW

Several studies and platforms have attempted to address the employment challenges faced by blue-collar workers, yet many fall short in providing effective skill-based job matching. Traditional job portals such as Naukri, Monster, and LinkedIn are primarily focused on white-collar employment. According to Aggarwal et al. (2020), these platforms rely heavily on formal education [1] and job titles rather than practical skills, making them unsuitable for workers who depend on vocational or hands-on experience

Mobile-based employment solutions have shown promise in recent years. Platforms like Apna and BetterPlace have emerged with simplified mobile interfaces [6] and support for multiple regional languages, making them accessible to a wider user base. These platforms have improved visibility for job seekers, but studies indicate that they still lack robust features for skill verification and intelligent job matching, often leading to inefficiencies in recruitment.

Government initiatives such as the Skill India Mission and platforms run by the National Skill Development Corporation (NSDC) have made strides in skilling and certification.

Despite these efforts, several reports highlight limitations in scalability [10], [11] real-time job updates, and private-sector integration. These issues prevent wide adoption and effective job placement.

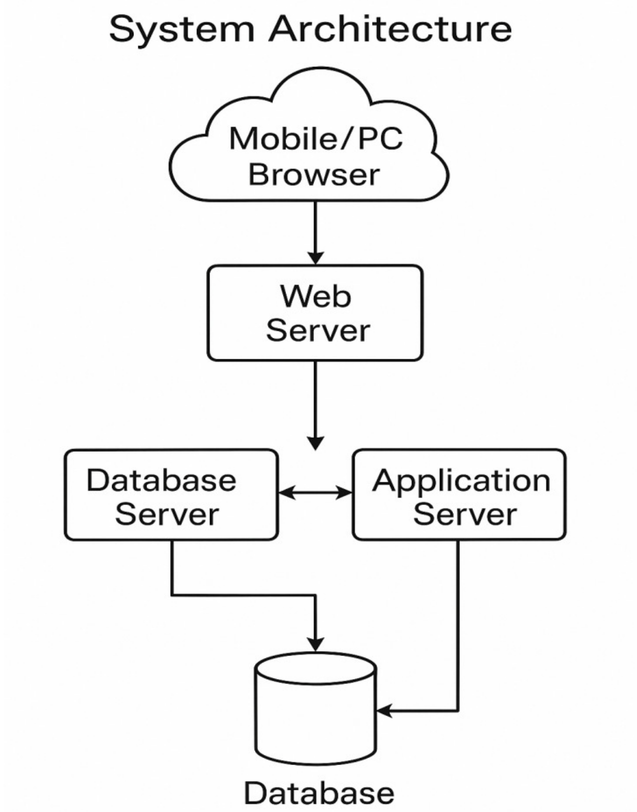
Finally, literature from international organizations like the International Labour Organization (ILO) emphasizes the vulnerability of blue-collar workers [5], [15] in the informal sector. Many of these workers lack access to digital tools and structured recruitment processes. Therefore, the need for an inclusive, user-friendly, and skill-focused digital employment platform is more urgent than ever. This literature forms the foundation for the proposed system that aims to bridge the gap between skilled blue-collar workers and suitable job opportunities through a digital platform.

IV. PROPOSED FRAMEWORK

A. System Architecture

1. User Modules

- *Worker Module*: This module allows workers to register using their mobile number, select their skills from a predefined list (e.g., electrician, plumber, carpenter), and set preferences regarding location and availability. Workers can create detailed profiles that emphasize their work experience, skill certifications, and job ratings from past employers.
- *Employer Module*: This module allows workers to register using their mobile number, select their skills from a predefined list (e.g., electrician, plumber, carpenter), and set preferences regarding location and availability. Workers can create detailed profiles that emphasize their work experience, skill certifications, and job ratings from past employers



2. Admin Panel

- *The administrative panel is responsible for managing user accounts, verifying job posts, monitoring user activities, and resolving feedback or disputes. Admins also perform regular checks to ensure that all profiles and job postings meet the platform's quality standards*

B. Job Matching Algorithm

❖ The system uses a skill-tag-based matching algorithm that ranks job seekers based on:

- Skill relevance: The system identifies how closely a worker's skills match the job requirements posted by employers. This algorithm ensures that only workers with the right competencies are suggested for a given job.
- Proximity to job location: The algorithm factors in the worker's location and compares it to the job location, ranking workers who are closer to the job site higher in search results.
- Availability: Workers can set their availability for work (e.g., full-time, part-time, immediate start).
  The system ensures that only workers available at the required times are presented to employers.

- Past job ratings or reviews: Workers who have completed jobs on the platform receive ratings and reviews from employers. These reviews help improve the worker's reputation, and the system uses this feedback to recommend workers with higher ratings.

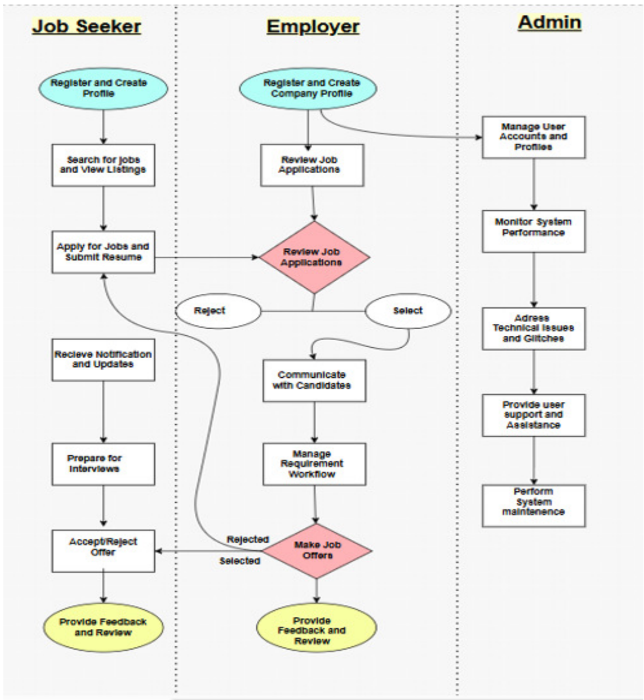
❖ *For Example--:* The job matching algorithm is designed to connect job seekers with suitable job opportunities based on three main criteria**:** *skills***,** *location*, and *experience level***.**

- First, the algorithm compares the job seeker's skills with the required skills listed in each job post. If at least *60% of the required skills* match, it is considered a skill match.
- Second, the system checks if the job seeker's preferred *location matches* the job location. A direct match in location adds higher relevance to the result.
- Third, the algorithm evaluates the job seeker's *work experience*. If the seeker has equal to or more experience than the employer's requirement, it's considered a valid match.
- Optionally, a *scoring system* can be applied to rank job listings. For example, 50 points are awarded for a skill match, 30 for a location match, and 20 for an experience match.
- After calculating the score for all job listings, the algorithm *sorts the results* in descending order of their total score. The *top-scoring jobs* are then displayed to the user as the most relevant recommendations.

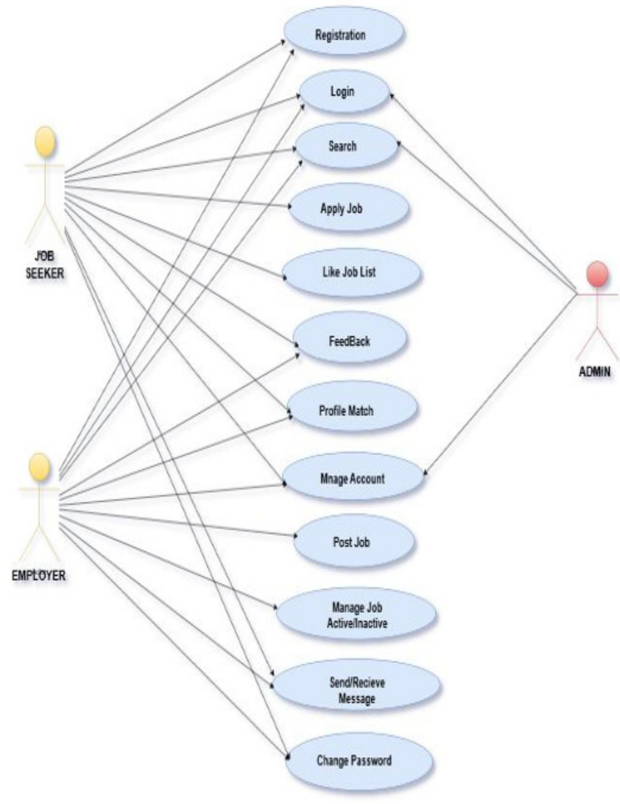
C. Key Features

- *Multi-language Support:* To ensure accessibility for users who speak different languages, the platform provides support for multiple regional languages, enabling workers from diverse backgrounds to use the system effectively.
- *Mobile-First Design:* The platform is designed with mobile devices in mind, ensuring that it is lightweight, responsive, and accessible on low-end smartphones.
- *No Resume Required:* Instead of traditional resumes, the system relies on skill-based profiles, allowing workers to showcase their experience and competencies through a simple interface.
- *In-App Communication:* The system includes an integrated chat and call feature, allowing seamless communication between workers and employers, facilitating interview scheduling, clarifications, or job-related queries.
- *Review System:* A two-way rating system enables workers and employers to review each other. This helps build trust and credibility, enhancing the reputation of both parties within the platform.

V. DATA FLOW



VI. USE-CASE SCENARIO



VII. DISCUSSION

A. Implications and Benefits

- *Enhanced Matching Accuracy:* By prioritizing verified skills and location-based job criteria, the system reduces the mismatch between job seekers and job requirements. This focus on concrete skills rather than traditional resumes enables employers to identify the best candidates more efficiently [3],[7]

- *Empowerment of Blue-Collar Workers:* The platform is tailored to the unique needs of blue-collar workers, many of whom may be digitally underrepresented. Providing a user-friendly, mobile-first interface encourages wider adoption and helps workers gain access to a more diverse range of job opportunities.
- *Digital Inclusion and Economic Growth:* By integrating multilingual support and simplified user experiences, the system contributes to broader digital inclusion. This not only benefits individual workers but may also stimulate local economies by reducing unemployment [16] and improving job quality in the informal sector.

B. Challenges and Limitations

- *Digital Literacy and Accessibility:* Although the system is designed for ease of use, varying levels of digital literacy among blue-collar workers could inhibit widespread adoption. Training or community outreach might be necessary to overcome this barrier.

- *Skill Verification and Trust:* The absence of a traditional resume necessitates robust mechanisms for skill verification and reputation building. Ensuring the authenticity of worker profiles through user reviews or local verifications remains a critical challenge, potentially impacting system credibility.
- *Infrastructure and Connectivity Constraints:* The effectiveness of a mobile-first job portal is directly tied to the availability and reliability of internet infrastructure, particularly in rural or underdeveloped regions. Addressing connectivity issues will be vital to ensure seamless service delivery.

VIII. SECURITY ANALYSIS

Security is a critical component of any online platform, especially when dealing with sensitive user data such as personal details, job history, and communication between job seekers and employers. The following security measures are proposed to ensure the safety and privacy of user data in the job portal system:
Job seekers and employers are educated through the platform about safe practices such as avoiding phishing links, not sharing OTPs, and reporting suspicious activities.

1. *User Authentication and Authorization*

The platform implements secure login and registration using encrypted passwords [14] (e.g., hashed with bcrypt). Role-based access control (RBAC) ensures that users (job seekers, employers, and admins) can only access features relevant to their roles.

2. *Data Protection and Privacy*

All sensitive data is stored in the database with appropriate encryption. The system uses HTTPS to secure all data transmission [13] between the client and server, preventing man-in-the-middle (MITM) attacks.

3. *SQL Injection and Input Validation*

To prevent SQL injection attacks, all database queries are handled using prepared statements. Input fields are validated and sanitized both on the client and server sides to avoid malicious code execution.

4. *Session Management*

Secure session management techniques are implemented using server-side sessions or secure cookies with appropriate expiry times. Inactivity timeouts and automatic logouts add an extra layer of protection.

5. *Admin Control and Monitoring*

The admin panel includes monitoring tools [12] to detect and block suspicious activity, such as fake job postings, spam applications, or brute-force login attempts.

6. *Backup and Recovery*

Regular data backups are maintained to ensure data integrity and availability in case of system failure, attacks, or accidental data loss.

7. *Security Awareness*

Job seekers and employers are educated through the platform about safe practices such as avoiding phishing links, not sharing OTPs, and reporting suspicious activities.

IX. FUTURE RESEARCH DIRECTIONS

While this project provides a foundational solution for bridging the employment gap among blue-collar workers, there are several areas where further research and development can enhance its impact and scalability.

1. *Integration of AI-Based Skill Verification:* Future research can focus on integrating AI models that automatically assess and verify user skills through uploaded videos, certifications, or real-time skill tests. This will improve the accuracy of job matches and build trust with employers.
2. *Multilingual Voice-Based Navigation:* To support workers with limited literacy, future versions of the platform can include voice-based search and navigation [17] in multiple regional languages, enhancing accessibility for users across diverse linguistic backgrounds.
3. *Blockchain for Transparent Hiring Records:* Blockchain technology [14] could be explored to securely maintain employment history, skill certifications, and employer reviews, reducing fraud and building a reliable trust layer for both job seekers and recruiters.
4. *Predictive Job Recommendation Systems:* Advanced machine learning techniques could be used to analyze user behavior and job market trends to offer predictive job suggestions [2] and career growth pathways for workers.
5. *Integration with Government Portals and Schemes:* Further research can explore integrating the platform with national employment exchanges [4], skilling programs, and social welfare schemes to offer holistic employment support.
6. *Mobile App Enhancements and Offline Access:* Future work may include a lightweight mobile app version with offline access [6] features, allowing users in rural or low-connectivity areas to still use essential platform services.
7. *Real-Time Market Analytics for Employers:* Research into real-time analytics dashboards [8] for employers could help track job application trends, skill gaps, and availability of workers by region, aiding smarter hiring decisions.

X. CONCLUSION

In conclusion, the proposed skill-based job matching system offers an effective digital solution to connect blue-collar workers with suitable job opportunities based on their skills, experience, and location. The platform is designed to be simple, mobile-friendly, and accessible in multiple languages, making it easy for workers with limited education or digital skills to use. It also helps employers find the right candidates quickly and efficiently. This system has the potential to reduce unemployment, improve job access for the informal workforce, and promote fair and inclusive hiring in the blue-collar job market.

A critical feature is multilingual support, which accommodates the linguistic diversity of workers in regions with multiple languages. By offering the platform in various languages, it helps eliminate language barriers and encourages digital inclusion for workers who may not be proficient in the dominant language of the platform.

Unlike traditional job portals that emphasize formal educational qualifications, this system shifts the focus to practical skills. By doing so, it provides blue-collar workers with an opportunity to demonstrate their competencies and levels the playing field for those without formal certifications [1]. This skills-based matching system improves hiring efficiency and helps employers find more suitable candidates. Furthermore, the platform's design fosters equitable access for workers who may not have had opportunities in the formal labor market, empowering them to secure stable, long-term employment. The system reduces reliance on inefficient intermediaries and provides workers with direct access to employers, promoting a more transparent and efficient job market.

On a larger scale, this system has the potential to reduce unemployment by streamlining the job search process, leading to economic growth [5],[11] and better job stability in the informal economy. The ability to match workers based on proximity and availability can also reduce mismatch in the labor market, improving work-life balance for workers while helping employers find highly qualified candidates quickly.

REFERENCES

1. R. de Groot et al., "Job Posting-Enriched Knowledge Graph for Skills-based Matching," *arXiv*, Sept. 2021. [Online]. Available: https://arxiv.org/abs/2109.02554
2. J. Zhao et al., "Embedding-based Recommender System for Job to Candidate Matching on Scale," *arXiv*, Jul. 2021. [Online]. Available: https://arxiv.org/abs/2107.00221
3. N. Dawson et al., "Adaptively selecting occupations to detect skill shortages from online job ads," *arXiv*, Nov. 2019. [Online]. Available: https://arxiv.org/abs/1911.02302
4. S. Otani, "Nonparametric Estimation of Matching Efficiency and Elasticity on a Private On-the-Job Search Platform: Evidence from Japan, 2014-2024," *arXiv*, Oct. 2024. [Online]. Available: https://arxiv.org/abs/2410.17011
5. S. Jones & K. Sen, "Labour Market Effects of Digital Matching Platforms: Experimental Evidence from Sub-Saharan Africa," IZA DP No. 15409, Jun. 2022. [Online]. Available: https://docs.iza.org/dp15409.pdf
6. Srinivas Makkena, "Enhancing Blue Collar Jobs: Development of a Location-Based Mobile Job Portal for Repair Services," *ACM*, Jun. 2025. [Online]. Available: https://doi.org/10.5555/3744154.3744161
7. A. Dhiman & Arora, "Analysis of Blue-Collar Workers' Intention to Use a Job-Seeking Application," *IJTech*, 2023. [Online]. Available: https://ijtech.eng.ui.ac.id/article/view/6689
8. Q. Sheehan & C. A. Le Dantec, "Making Meaning from the Digitalization of Blue-Collar Work," *PACM HCI*, Oct. 2023. [Online]. Available: https://doi.org/10.1145/3610194
9. CloudApper, "The Use of AI in Recruiting Blue Collar Workers," *CloudApper Blog*, Jun. 2025. [Online]. Available: https://www.cloudapper.ai/talent-acquisition/the-use-of-ai-in-recruiting-blue-collar-workers
10. Mercy Corps & Bayt.com, "Inclusive job matching – Blue-collar workers," *BEAM Exchange*, 2017–2020. [Online]. Available:https://beamexchange.org/.../inclusive_job_matching_yil_jordan_mercy_corps.pdf
11. DP-WEE project, "Status of Blue Collar Workers on Job Matching Platform," Feb. 2023. [Online]. Available:https://digitalplatformsandwomen.ifmrlead.org/.../Status-of-Blue-Collar_Report.pdf
12. Google Kormo Project, "The Use of Advanced Technology in Job Matching Platforms," *World Bank Docs*, 2023. [Online]. Available: https://thedocs.worldbank.org/.../Digital-Job-Matching-Platforms-S4YE-Draft-Note-for-Discussion.pdf
13. IRJMETS, "QuickHire – Web Based Platform," Apr. 2024. [Online]. Available: https://www.irjmets.com/.../irjmets70500301355.pdf
14. UNDP, "Blue-collar task matching platform," *Private Finance for the SDGs*, 2024. [Online]. Available: https://sdgprivatefinance.undp.org/.../blue-collar-task-matching-platform
15. ResearchGate, "Blue-Collar Workers Adaptation to Digitalization," Jun. 2025. [Online]. Available: https://www.researchgate.net/.../Blue-Collar_Workers_Adaptation_to_Digitalization
16. ACM Survey, "Examining the Use of Online Platforms for Employment: A Survey of ..." *ACM*, 2020. [Online]. Available: https://doi.org/10.1145/3411764.3445350
17. LinkedIn Blog, "The Rise of Digital Blue-Collar and Grey-Collar Workers," Sep. 2024. [Online]. Available: https://www.linkedin.com/pulse/evolving-environment-rise-digital-blue-collar-grey-collar-workers-e5ryf
18. Wikipedia, "Afriwork," updated Jun. 2025. [Online]. Available: https://en.wikipedia.org/wiki/Afriwork
19. Pew Research Center, "Research: Blue-Collar Workers," 2025. [Online]. Available: https://learnworkecosystemlibrary.com/.../research-blue-collar-workers-pew-research-center