Skill Bridge: A Secure Platform for Storing and Managing Educational Qualifications

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Abstract- This research paper explores the development of a student-company direct hiring website as an innovative e-recruitment solution. The study examines the concept of e-recruitment and its significance in modern hiring practices, analyzing existing platforms to identify unique features for the proposed website. It discusses the benefits for both students and companies, outlines technical requirements, and addresses potential challenges such as data privacy and equal opportunity concerns. The paper also investigates the impact on traditional recruitment methods, scalability options, and future enhancements. Additionally, it considers legal and ethical implications and proposes a methodology for evaluating the website's effectiveness post-launch. This comprehensive approach aims to provide insights into the feasibility and potential impact of a specialized e-recruitment platform tailored for student-company interactions. The technology analyzes job needs, employer preferences, and worker talents to provide personalized employment matching using machine learning. The platforms efficiency is further increased by automated contract administration and real-time workforce availability tracking. While secure payment integration guarantees dependable and seamless transactions between employers and employees, a transparent rating and review system fosters trust. The technical underpinnings of Skill Bridge are examined in this article. These include React for providing an interactive frontend experience, Node.js with Express for creating scalable backend services, and PostgreSQL for storing structured data. To further enhance job placements, AI-powered analytics are also used to forecast trends in labor availability and demand.

Indexed Terms- Recruitment System, Data Privacy, Security, Scalability, Equal opportunity hiring, Skill Evaluation, Digital recruitment strategies intelligent job matching, real-time worker tracking, automated contracts, PostgreSQL, Node.js, Express, React, job market analytics, blockchain integration, scalable hiring solution.

I. INTRODUCTION

The job market shows rapid changes while businesses from different sectors actively seek qualified professionals who can fulfill their expanding project requirements. The current hiring approaches face multiple challenges because they consume too much time and produce unsuitable candidate matches while providing limited access to current workforce availability [1]. The IT sector along with construction and event management and security services face particular difficulties because they require an immediate workforce. Most current employment platforms do not deliver efficient real-time hiring solutions [2].

The students are side tracking due many courses offered by the university[3][4]. They are dragged under a confusion. when only 1,000 out of 100,000 undergraduate students secure corporate placements annually, we must acknowledge a systemic failure in connecting qualified candidates with suitable employment opportunities[5]. This dismal 1% placement rate reflects not necessarily a lack of talent or potential, but rather profound disconnects in how universities prepare students for professional life. Recent data reveals that approximately 20% of students from Indian Institutes of Technology (IITs) failed to secure placements during the last two placement seasons. Meaning that for every ten students applying for positions, only six successfully secured on-campus employment opportunities[6][7].

For students, this reality creates immense psychological pressure. They invest years and significant financial resources in obtaining degrees that seemingly promise career advancement, only to encounter a job market that feels impenetrable. The emotional toll of repeated rejections, combined with financial pressures and family expectations, transforms what should be an exciting transition into

a period of profound anxiety and self-doubt. Universities typically prioritize theoretical knowledge achievement, whereas employers increasingly seek candidates with practical skills, technological proficiency, and demonstrated problem-solving abilities[8]. e.g. A student might graduate with honours in computer science, for example, only to discover that employers are more interested in practical coding projects and specific technical certifications than in course grades[2]. The curriculum vitae or resume serves as the primary interface between job seekers and potential employers[9]. Without trusted verification mechanisms, companies must invest significant resources in vetting candidates, creating inefficiencies in the hiring process and disadvantaging honest students who accurately represent their capabilities. This trust deficit particularly affects students from less prestigious institutions, who face additional examination due to employers' unfamiliarity with their academic programs. Without standardized formats and verification processes, talented graduates from these institutions struggle to gain attention from recruiters who rely on institutional reputation as a proxy for individual capability[10].

Figure 1: SkillBridge Job Searching Framework: From Data Collection to Career Alignment.

Figure 1 illustrates the SkillBridge job matching framework, highlighting the systematic process through which the platform collects user data, standardizes and validates credentials, supports upskilling, and ultimately matches individuals with suitable job opportunities using structured AI-based analysis.

This paper takes a deeper look into the core technology behind Skill Bridge, including its AI-based job matching model, built-in security features, and the challenges it may face during implementation. By combining the power of artificial intelligence with automation, WorkBridge is designed to transform workforce management-making hiring faster, more scalable, and better suited for today's fast-paced digital world [10].

II. LITERATURE REVIEW

The process of applying for a job in its traditional way which includes looking for it in newspaper, phone books and across family, colleagues, and so on ap pears to be ineffective. Also, the task of posting a job vacancy and the task of reaching the best candidates in its manual form is not sufficient. The manual recruitment for both parties was expensive in all respects. Starting from the tools that the job seekers use to search for a job and from the point of view of the job providers that they need to pay often to announce for a job vacancy. However, these ads cannot reach all the experienced candidates that the institution or company needs[11][12]. This process needs to be repeated until they find the suitable candidate. However, applying to companies in the paper form is not very effective. For example, suppose we have a person X who applied for a job in 2019 and left his CV where he did not get that job, but in the year 2020 a new job was announced and he in return during a year achieved a new skill. The question: Does the company realize among the many employment requests that it has received that the CV of that person X appears to be beneficial for them and how possible this person can add or amend his CV to the company and apply easily? "The Internet has drastically changed the face of recruitment. Job providers now can actively announce their job vacancy by using a well-implemented E-recruitment program to find better quality candidates and to improve their hiring decisions, in less time and at a low er cost." The answer to this is always in the hands of the modern technology that has imposed itself. Yes, technology has changed the world and taken traditional methods to a better situation. Now, the job seekers can advertise themselves, show off their skills and abilities, compete with others and search for opportunities in their desired field. Companies can also advertise their opportunities at minimal costs[13]. This new way is known as online recruitment system or E-recruitment. The following section will define such system and will talk more about its advantages.

With improved verification capabilities and a lower chance of fraud, digital credentials have become a safe and effective substitute for conventional paper-

based certifications. According to a paper by Stefan Brands (2002), digital credentials provide much more functionality and security than physical documents, even if they serve the same purpose[14]. Numerous studies have emphasized the significance of data security in educational institutions, highlighting the increasing risks of data breaches and cyberattacks. According to Jones & Liu (2020), in order to safeguard sensitive student and staff data, academic institutions must use advanced encryption and security procedures due to their growing susceptibility. Furthermore, Smith & Brown (2019) stress the need of following FERPA and GDPR rules, highlighting the critical role that regulatory compliance plays in protecting personal data[15].

Many studies have examined how educational technology (EdTech) might improve learning experiences. Anderson & Thomas (2018) show how digital tools like gamification, interactive learning, and virtual classrooms increase student engagement. Martin & Cooper (2019) point out that effective digital resource management further optimizes education delivery by emphasizing how centralized solutions improve accessibility and lessen administrative burdens. Furthermore, the importance of digital collaboration technologies like version control and real-time document sharing in promoting cooperation between students and teachers is covered by Roberts & Evans (2021)[16]. When taken as a whole, these studies highlight how crucial it is for contemporary educational institutions to integrate strong security measures, EdTech solutions, and digital resource management in order to ensure both operational efficiency and an enhanced learning environment[17][18].

III. METHODOLOGY

The goal of the AI integration process for SkillBridge is to improve the efficiency, security, and verification of educational credential management. By identifying discrepancies, forgeries, or changed credentials, the system will use machine learning techniques for document validation, guaranteeing the legitimacy of uploaded certificates. Certificate details will be extracted and analyzed using AI-based optical character recognition (OCR), automating the verification process and reducing the need for human interaction. By comparing certificate metadata with institution records, deep learning models can significantly improve verification accuracy and stop fraudulent

submissions. SkillBridge can identify suspicious activity, like several people trying to upload identical credentials or organizations issuing an abnormally large number of certificates, by utilizing AI-driven anomaly detection[19].

Natural Language Processing (NLP) will improve the effectiveness of SkillBridge's data retrieval and user engagement procedures. Chatbots and virtual assistants driven by AI will help users navigate the site, respond to their questions, and walk them through the certificate administration and verification processes. To enhance the user experience, NLP algorithms can also assist in classifying and arranging certificates according to the institution, type of course, or date of issuance[20]. AI-driven recommendation systems can examine a user's current certifications and career path to identify appropriate learning paths or possibilities for upskilling. These astute recommendations will guarantee tailored direction, assisting users in making defensible choices about their professional and educational development.

Blockchain-based smart contracts will strengthen the integration of AI into the verification process, guaranteeing transaction transparency and confidence. In order to detect any credential fraud or illegal changes, AI models will continuously scan blockchain transactions for irregularities. By examining past credential data, machine learning algorithms can identify usage trends and improve fraud protection strategies. Furthermore, only reputable institutions will be able to issue verifiable certifications within SkillBridge's ecosystem thanks to AI-based risk assessment algorithms that analyze historical issuance behavior to assess institutional legitimacy.

AI-powered encryption methods will be used to preserve data integrity and compliance with privacy laws like GDPR and HIPAA. Differential privacy techniques and secure multi-party computing (MPC) will be used to safeguard user data while enabling organizations and employers to validate credentials without disclosing private information. In order to prevent unwanted access and improve security, AI-driven access control systems will dynamically modify authorization settings based on user behavior. Predictive analytics can also assist organizations in tracking trends in credential usage, spotting possible areas where certification issuance

and verification procedures might be strengthened[20].

Maintaining SkillBridge's efficacy and security over time will require constant model training and system tuning. Real-time data will be used to retrain AI models on a regular basis so they can adjust to new threats and changing industry norms. There will be a feedback loop created where user interactions and verification results help to improve the precision and effectiveness of AI. AI performance will be evaluated through frequent testing and audits, guaranteeing the system's continued dependability and transparency. The platform will provide a scalable, effective, and reliable way to manage and validate educational credentials by incorporating AI-driven automation, security, and intelligence into SkillBridge.

Skill Bridge adopts a mixed-method research approach, combining real human stories with data-driven insights to shape every decision. We gather qualitative feedback from users to understand their experiences, frustations and goals, while simultaneously analyzing quantitative metrics like match rates, engagement levels, and time-to-hire. Our System design is rooted in a case study model, examining real-world hiring trends and workforce demands to inform smarter ,AI enhanced solutions[20].
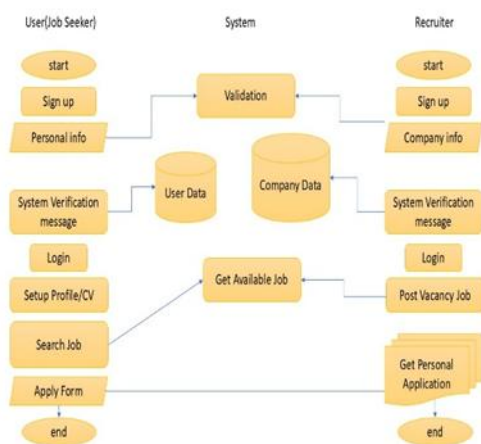
Figure 2: Recruitment Data Flow

Figure 2 illustrates the SkillBridge recruitment data flow, outlining the structured process from data collection to job matching. It captures essential stages such as gathering user data, standardizing and validating credentials, facilitating upskilling opportunities, and ultimately matching candidates with suitable job roles. The diagram highlights how SkillBridge leverages AI and structured workflows to create an efficient and reliable hiring pipeline for both students and recruiters[21].
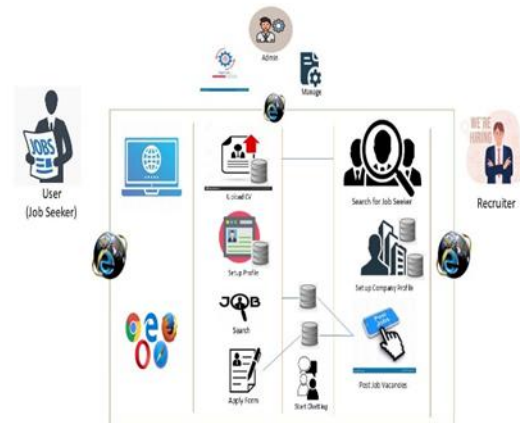
Figure 3: Online Recruitment Architecture Design

The architecture of the online recruitment system in SkillBridge is designed to ensure a seamless and intelligent connection between job seekers and employers. It follows a modular, layered approach, beginning with user registration and profile creation where students input their academic credentials, skills, and interests. This data is securely stored in an encrypted database and structured for easy access and retrieval. The backend incorporates AI algorithms that analyze user profiles and dynamically assess their suitability for various job roles. Real-time data processing enables instant feedback, improving the responsiveness of the system.

To further enhance the recruitment pipeline, the architecture integrates a validation module to authenticate user-uploaded documents using verification tools. Once validated, the system aligns user profiles with available job listings based on predefined criteria such as skills, certifications, and location preferences. A matching engine utilizes machine learning techniques to recommend the most relevant opportunities. Additionally, the platform supports recruiter-side access for posting job openings, shortlisting candidates, and managing communication. This end-to-end architecture ensures a smart, transparent, and scalable recruitment ecosystem suitable for modern digital hiring needs[22].

Economic and Social Impact:
SkillBridge goes beyond being a digital repository—it's creating meaningful social impact by empowering students and young professionals to take charge of their academic and career journeys. By offering a centralized, secure platform to store and showcase skills, certifications, and achievements, SkillBridge helps bridge the gap between learning and real-world opportunities. Students from underrepresented or rural areas, who often struggle with access to proper documentation or recognition, now have a chance to present verified digital profiles that speak to their potential. This increases their visibility to recruiters and institutions, promoting greater inclusivity and equity in the job market.

The platform also supports continuous development through workshops and upskilling events, ensuring users are not only job-ready but future-ready. As students build their profiles and track their growth over time, they gain confidence and clarity about their professional paths. For organizations and academic institutions, SkillBridge reduces administrative burden and improves credential verification, making collaboration and hiring more efficient. The ripple effect of this is improved employment outcomes, better resource utilization, and a more transparent talent ecosystem—contributing positively to both individual growth and societal development.
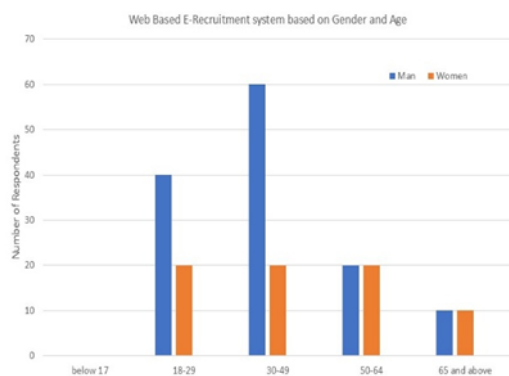

Figure 4: Performed Web based E-Recruitment system by gender and age.

Figure 4 illustrates the distribution of participants who have interacted with the SkillBridge e-recruitment platform, segmented by gender and age groups. This chart provides insights into user demographics, highlighting how different age brackets and gender identities are engaging with digital recruitment tools. The data showcases participation trends and helps assess inclusivity and accessibility across diverse user segments.

Socially, SkillBridge has played a pivotal role in democratizing access to employment resources by catering to a broad spectrum of users, regardless of age or gender. By offering a user-friendly interface and adaptive features, the platform ensures equitable participation for both younger users entering the job market and experienced professionals seeking new opportunities. This inclusivity encourages diverse talent discovery and fosters a culture of fairness and opportunity in the digital recruitment space, reinforcing SkillBridge's commitment to empowerment and equity.

CONCLUSION

This paper is trying to build solutions using modern computer systems to build an online recruitment website that helps all of the process parties to reach each other and to meet their needs freely. Our paper aims to build a website that specifically targets graduates of university or who are expected to graduate from all programs and departments. This proposed website will help them to market themselves and their skills by preparing their profiles and uploading their CVs. Also, it helps them to search for companies or institutions that provide jobs with the possibility of filling an employment application and provide a medium of communication between the job applicant and its provider. In this paper some relevant previous works have been studied and have benefited from these experiences[23].

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