A

Major Project Report

on

JOB PORTAL: MERN STACK WEB APPLICATION FOR JOB SEEKERS AND RECRUITERS

Submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology

By

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(2023-2024)

DECLARATION

We hereby declare that the report entitled **"Job Portal: MERN Stack Web Application for Job Seekers and Recruiters"** submitted to the **Anurag University** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology (B. Tech)** in **Computer Science and Engineering** is a record of an original work done by us under the guidance of **Dr. N. Swapna Goud, Assistant Professor** and this report has not been submitted to any other university for the award of any other degree or diploma.

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CERTIFICATE

This is to certify that the project report entitled **"Job Portal: MERN Stack Web Application for Job Seekers and Recruiters"** being submitted by **Mr. Bhupathi Krounchidhar** bearing the Hall Ticket number **20EG105605, Mr. Ashrith Nivyadin** bearing the Hall Ticket number **20EG105608, Mr. Shasank Chavali** bearing the Hall Ticket number **20EG105610** in partial fulfillment of the requirements for the award of the degree of the **Bachelor of Technology** in **Computer Science and Engineering** to **Anurag University** is a record of bonafide work carried out by them under my guidance and supervision from 2023 to 2024.

The results presented in this report have been verified and found to be satisfactory. The results embodied in this report have not been submitted to any other University for the award of any other degree or diploma.

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ABSTRACT

In today's digital age, the job search landscape has transformed. This abstract explores the concept of an online job portal, a platform designed to bridge the gap between employers seeking qualified candidates and job seekers pursuing their ideal careers. By leveraging technology, the job portal streamlines the recruitment process, offering efficient search functionalities, targeted job recommendations, and a centralized platform for application submission. This paper highlights the benefits for both employers, who gain access to a wider talent pool, and job seekers, who can discover relevant opportunities and showcase their qualifications. By fostering a more efficient and effective recruitment process, the job portal empowers both parties in the modern workforce.

Keywords: MongoDB, Express.js, React.js, and Node.js, SaaS.

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1. Introduction

Welcome to our dynamic job portal, your gateway to exciting career opportunities. With innovative features and advanced algorithms, we revolutionize the recruitment experience. Our platform seamlessly connects talented individuals with their ideal roles, fostering professional growth and success. From personalized job recommendations to streamlined application processes, we prioritize efficiency and convenience. Employers benefit from targeted candidate matches, accelerating their hiring process. We champion inclusivity, ensuring equal access to employment opportunities for all. Join us on a journey to redefine the future of recruitment and unlock your full potential.

1.1. Brief Overview of Work

Nowadays, we know that searching for jobs is so difficult in proficient areas. The portal developed for providing simple and good job searching. With the help of this portal easily the job seeker can submit their resume and get a lot of the job related to their profile. And by this website the companies or employers can also find a good and well profiled resume.

Challenges of Job Portals:

1. **Wide Reach:** Job portals offer a vast reach, connecting job seekers with opportunities across various industries and locations.
2. **Convenience:** They provide a convenient platform for both job seekers and employers to browse, apply, and post job vacancies, respectively, without geographical constraints.
3. **Cost-Effective:** Compared to traditional recruitment methods, job portals often offer cost-effective solutions for employers, reducing expenses related to advertising and recruitment agencies.

Challenges of Job Portals:

1. **Competition:** Job portals often have high competition, with numerous candidates applying for the same positions, making it challenging for individuals to stand out.

2. **Impersonal:** The digital nature of job portals can lead to a lack of personal connection between candidates and employers, potentially hindering relationship-building and communication.

3. **Overwhelming Choices:** The abundance of job listings on portals can overwhelm job seekers, making it difficult to narrow down their search and find the most suitable opportunities.

1.2. Objective

The online job Portal System that is to be developed provides the members with jobs information, online applying for jobs and many other facilities. This system provides service to the job applicants to search for working opportunities.

Job Portal will allow job providers to establish one to one relationship with candidates. This Portal will primarily focus on the posting and management of job vacancies. This system is designed such that ultimately all vacancies will be posted online and would offer employers the facilities to post their vacancies online. It helps to review and manage the resulting applications efficiently through the web. Employers can also find the resume according to key skills in a very less amount of time.

1.3. Scope

As for the Indian market, there are ample opportunities for the job portal sites, as a greater number of educated and skilled young people are coming out each and every year. Also, as the growth rate of India is zooming to be at a healthy rate over 7%, so it is a boom time for corporations also. So, a greater number of lucrative careers will be available for the job seekers. So, it is now the right period for the job portal sites to think out of the box, and to make most of the opportunities available.

1.4. Problem Definition

Many job seekers face challenges in finding suitable employment opportunities that align with their skills, experience, and career aspirations. Likewise, employers encounter difficulties in efficiently sourcing and selecting qualified candidates from a vast pool of applicants. Traditional recruitment methods often lack effectiveness and are time-consuming, leading to frustration for both job seekers and employers.

1.5. Problem Illustration

Consider Sarah, a recent graduate eager to kick start her career in marketing. Despite her qualifications, she struggles to find relevant job openings amidst the sea of listings on various job portals. She spends hours tailoring her resume and cover letter for each application, only to receive minimal responses or rejections without feedback. Meanwhile, Mark, a hiring manager at a marketing firm, faces his own challenges. Sorting through hundreds of resumes, he struggles to identify the most suitable candidates efficiently. The lack of a streamlined process leads to delays in filling crucial positions and potentially missing out on top talent. Both Sarah and Mark represent the common frustrations experienced by job seekers and employers, highlighting the need for a more effective and user-friendly job portal solution.

1.6. Objective of The Project

The objective of our project is to develop a cutting-edge job portal that revolutionizes the recruitment landscape by addressing the common challenges faced by both job seekers and employers. Through innovative features and advanced technology, our platform aims to streamline the job search process for candidates while providing efficient and effective hiring solutions for employers. Our primary goal is to create a user-friendly interface that enhances the overall experience, offering personalized job recommendations based on individual skills, preferences, and career goals. Additionally, we seek to foster inclusivity by ensuring equal access to opportunities for candidates from diverse backgrounds, while also providing tools for employers to promote diversity and inclusion in their hiring practices. By prioritizing data security and privacy, we aim to build trust among our users and maintain compliance with industry regulations. Ultimately, our project aims to redefine the recruitment industry by creating a dynamic and inclusive ecosystem where talent meets opportunity, driving mutual success and growth for individuals and organizations alike.

2. Literature Survey

Literature relevant to the usability of online job search websites is diverse and explores many popular job search engines around the world. Job search websites provide users with information for using the internet effectively in career planning and job search assistance (D'Silva, 2020; Hosain et al., 2020; Hui et al., 2021; Reile & Harris-Bowlsbey, 2000; Rong, 2019; Sabha, 2018) [12]. Online job search websites enhance the employment process and help employers post jobs, allowing job seekers to explore job positions in their fields of interest and submit applications online (Sabha, 2018) [4]. Some popular job search engines are Indeed, Monster and LinkedIn as they allow you to explore job postings from multiple recruiters (Rong, 2019) [7].

Using job search engines has changed the job search behaviours of people around the world. To examine those behaviours, Garg and Telang (2012) focused on search modes such as agencies, print media, internet job boards (e.g., Monster.com, hotjobs.com), online social networks, and circles of friends and family. Collecting survey data from 109 unemployed job seekers in India, Garg and Telang (2012) [6] found that job seekers spent the most time (41%) browsing for jobs and submitting their applications (43%).

Ahmed et al. (2015) [3] surveyed 250 students from multiple universities across Pakistan. Their findings showed that e-recruitment was popular because the students reported positive perceptions of online job portals. Minimal cost, less time, and unlimited access to the most relevant and diverse kinds of jobs were the main motivators for online job seekers in their adoption of online job portals. Leelavathi et al. (2020) [2] developed a survey that included 24 statements to examine Indian job seekers' perceptions when interacting with different job websites. Their study found the Naukri website was the most preferred because the participants saw this portal as a job seeking avenue in India. Wadhawan and Sinha (2018) also examined Naukri.com to explore the factors affecting young job searchers' perceptions of the website. They developed a questionnaire that included 28 statements to measure variables such as user friendliness, perceived ease of use, information provision, and fairness perception to identify which factors determined young job seekers' perceptions of job portals in their

job search process. The findings showed a significant difference among job seekers' age groups, showing that younger job seekers expected job portals to be easy to use.

Using a mixed-method design, System Usability Scale (SUS), and cognitive walkthrough sessions, Agazzi (2020) assessed the usability of LinkedIn in applying for a job and/or joining a professional community. The SUS data revealed that at least 30% of participants were satisfied with LinkedIn's feature "applying for a job," while the other 67.5% underscored LinkedIn's community feature, stating it could enhance their knowledge and expertise. However, the participants recommended a quicker application process through the website, such as adding an "easy apply" tab next to every job advertisement.

D'Silva (2020) [8] examined the job seekers' satisfaction with online recruitment portals of different companies and found out that 46.1% (70 out of 152) of respondents reported that companies that utilized effective e-recruitment tools could select the right people for the job vacancies. Similarly, Hosain et al. (2020) [11] reported that when organizations use the appropriate social media platforms, such as LinkedIn, for job advertising and recruitment, these platforms provide the organizations with valid information on choosing the right candidates for the positions. Hosain and Liu (2020) examined the usability of LinkedIn in Bangladesh from the employers' perspective.

They used a purposeful sampling of 153 graduate internship-seeking candidates who had active LinkedIn accounts and a convenience sampling of 49 employers who had organizational LinkedIn profiles. The researchers contacted those 49 employers, asking them to hire graduate students based on their LinkedIn profile information. Sixty-six graduate students were hired for paid internships by the 49 employers. After completing their recruitment process, the employers were asked to fill out a questionnaire that sought responses about the criteria they considered when selecting the candidates. The findings revealed the employers hired the graduate students based on the qualifications listed on LinkedIn because the website provided easy access to the participants' profiles.

Shahbazi and Hedayati (2016) [2] examined the usability features of the Indeed.com website regarding the content of the job advertisements for the "Digital Librarian" position through a qualitative study that involved content analysis of 596 job advertisements from 10 countries. They identified four popular job categories, namely IT librarian (38%), digital librarian (36%), metadata librarian (17%), and digital archivist (9%). Based on their findings, Shahbazi and Hedayati (2016) reported the usability of the Indeed.com website in identifying the necessary skills expected from a digital librarian, such as good communication and problem-solving skills to work with library visitors.

In Rong's (2019) study, four expert evaluators tested the usability of three job search sites: Monster.com, Indeed.com, and Glassdoor.com, which have been consistently ranked in the top ten job portals in the last three decades. To assess the usability of those websites, experts used traditional heuristic evaluation and then new specialized heuristic evaluation methods (Rong, 2019) [3]. By deploying such methods, many critical usability problems were identified, such as a lack of options to set up a website account for job applications at any time and the ability to save, edit, or delete their information or documents before submitting.

Although studies on online job search portals have examined the usability of the websites by applying different methodologies, there is still a lack of research that assesses job search engines using standard usability surveys. Usability testing of websites through valid and reliable surveys is important and, as Lazar and Preece (2002) explained, usability testing can improve the interactive nature of websites, their effectiveness, and ease of using them from the user's perspective. Moreover, usability testing of a website provides the owners of those portals with direct feedback for making improvements (D'Silva, 2020) [5]. These improvements were especially important during the outbreak of the coronavirus pandemic because there was an increased need for online job search engines due to unemployment in the India hitting 16% or higher since the onset of the pandemic (Kochhar, 2020). This study fills the gap by measuring the effectiveness, efficiency, and subjective satisfaction of users of a leading job search engine, Indeed.com, in the midst of the COVID-19 global pandemic

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Theoretical Framework: Usability Construct of System Acceptability Model

Usability has become one of the most vital subjects of both HCI research and practice because it denotes a desired quality of interactive systems and/or products (Tractinsky, 2018) [2]. However, to assess the benefit of usability to HCI, the meaning of this concept should be well understood (Hartson & Pyla, 2012) [2]. The International Organization for Standardization (9241- 11) defines usability as "the extent to which a product can be used by specified users to achieve specific goals with effectiveness, efficiency and satisfaction in a specified context of use" (Barnum, 2011, p. 11). Since usability draws from different properties of the product to be tested, it serves as an umbrella construct and a building block for developing a testable theory on usability (Stage, 2018; Tractinsky, 2018) [1].

Additionally, this construct serves as a basis for scientific or practical measurements of a system or a product (Tractinsky, 2018) [1]. However, the concept of usability alone cannot serve as a tenet that can form a foundation of the usability theory (Stage, 2018). This is because despite its intensive use in HCI research over many years, the potential of usability to form a theory is not well examined (Stage, 2018; Tractinsky, 2018). In the field of human-computer interaction, the practical acceptability of any system, especially its usability, is very important (Nielsen, 1993; Stage, 2018). Thus, this model fits this study because, from the perspective of usability engineering, the usability attribute of the model is vital as it combines diverse methods (easiness, efficiency, memorability, and satisfaction) that are designed to improve the design, development, and evaluation of systems (Nielsen, 1993).

Purpose of the Study and Research Questions

The purpose of this study was to evaluate users' experience with the Indeed.com website. The following research questions guided this study:

1. To what extent do the participants effectively complete predefined tasks on Indeed.com?

2. To what extent do the participants efficiently complete the pre-defined tasks on Indeed.com?

3. To what extent are the participants satisfied with Indeed.com?

Researchers Positionality

This research project was designed by a diverse team of researchers with backgrounds in educational technology, research and assessment, instructional design, and user experience (UX). The research team was supervised by a professor because during the research process, three of the team members were completing their doctoral degrees during the research process. As researchers, we participated in UX studies designed by other professionals and conducted additional research projects separate from this current one while the current research project was underway. When searching for jobs in our respective fields, we have also used many job search engines. In using those portals, we noticed some issues, such as their navigation and unintuitive features. This fact prompted us to evaluate those engines to enhance their usability for other users.

Our diverse backgrounds brought unique perspectives to the research process and reinforced the study's credibility (Porteli, 2008; Surmiak, 2020) [8]. Our experiences of working with diverse learners in different educational settings were also beneficial in promoting the researchers' cognizance of different abilities of individual learners.

Table 2.1. Comparison of Existing Methods

No.	Paper Title	Author Name	Key Points	Remark
1	Improving Job Search Success Through Personalized Recommendations: A User-Centric Approach	Li (2023)	Explores AI-powered recommendation systems for personalized job searches.	Highlights the potential of AI to improve job search efficiency.
2	The Impact of Job Portals on Job Search Behaviour: A Longitudinal Study	Brown (2020)	Conducts a longitudinal study on how job portals have changed job search behaviour, analysing user preferences and search patterns.	Provides valuable insights into how job seekers utilize job portals for their job search journey.
3	The Rise of Mobile Recruitment: Optimizing Job Portals for the Mobile User	Khan (2021)	Analyses the importance of mobile optimization for job portals.	Focuses on the critical role of mobile optimization in today's job market.
4	Beyond Borders: Leveraging Job Portals for International Recruitment	Garcia & Schmidt (2022)	Investigates how job portals can be used for international recruitment, considering factors like language translation and cultural differences.	Highlights the potential of job portals to connect employers and job seekers across geographical boundaries.

3.PROPOSED METHOD

We aim to create a dynamic and intuitive job website that revolutionizes the way job seekers and employers connect in the digital age. By leveraging cutting-edge technology and innovative features, our platform aims to streamline the job search process, empower users with personalized job recommendations, and facilitate meaningful interactions between candidates and employers.

We are committed to delivering a seamless user experience, fostering a vibrant community of professionals, and serving as a trusted resource for individuals and businesses alike. Our vision is to empower every user to discover their dream job and unlock their full potential, while helping employers find the best talent to drive their organizations forward. Together, we aspire to reshape the future of recruitment and empower individuals to pursue rewarding career opportunities with confidence and ease

1. Concept Tree

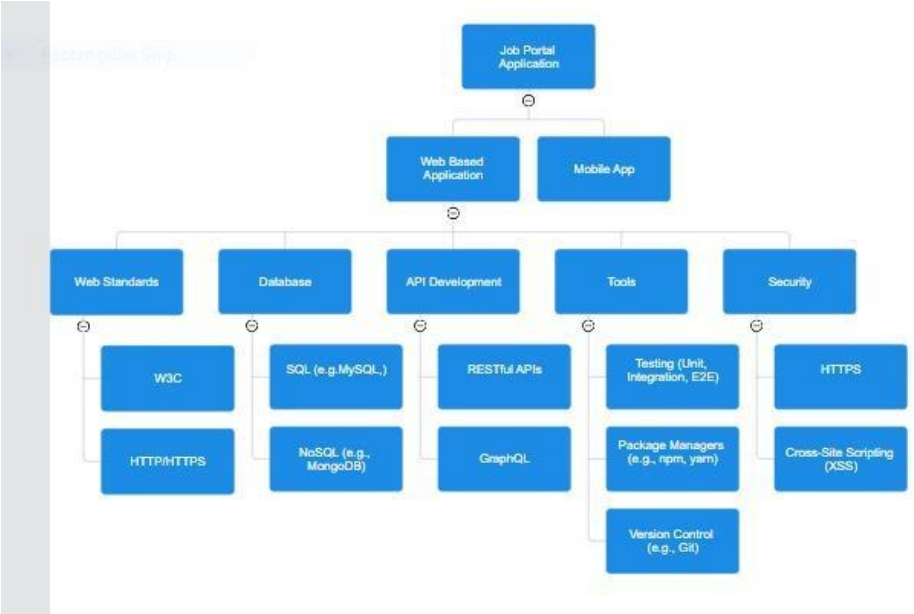


Figure 3.1.1 Concept Tree

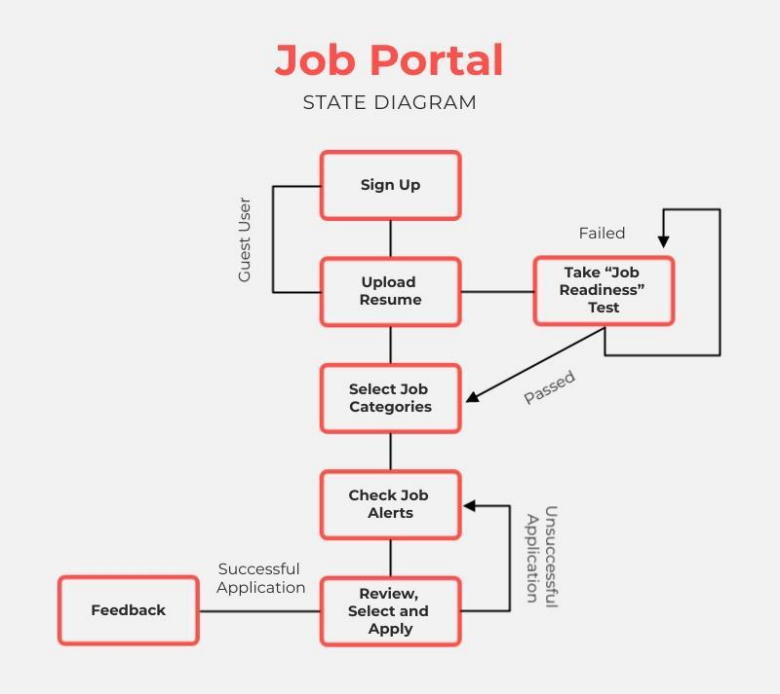


Figure 3.1.2 Proposed Method Diagram

3.1.1 Proposed Method for MERN Stack Job Portal Web Application

1. Requirements Gathering:

- Conduct thorough research to understand the needs and preferences of job seekers and employers.
- Identify key features and functionalities required for the job portal, such as user authentication, job listing management, resume uploading, search and filtering options, and communication tools.

2. Technology Stack Selection:

- Choose the MERN stack (MongoDB, Express.js, React.js, Node.js) for its flexibility, scalability, and ease of development.
- Select additional libraries and frameworks as needed, such as Redux for state management in React.js.

3. Database Design:

- Design the MongoDB database schema to store user profiles, job listings, resumes, and other relevant data.
- Define relationships between different collections to ensure data integrity and efficient query operations.

4. Backend Development (Node.js and Express.js):

- Set up the Node.js environment and install necessary dependencies using npm or yarn.
- Create RESTful API endpoints to handle CRUD (Create, Read, Update, Delete) operations for user authentication, job listing management, and other functionalities.
- Implement middleware for request validation, authentication, and error handling.
- Integrate with MongoDB using Mongoose for data manipulation and querying.

5. Frontend Development (React.js):

- Set up the React.js environment using Create React App or similar tools.
- Design user interfaces for different components, such as login/signup forms, job listing cards, search filters, and user profiles.
- Implement client-side routing using React Router to navigate between different pages and views.
- Integrate with backend API endpoints to fetch and display data dynamically.

6. Job Listing Management:

- Develop functionality for employers to post job listings, including job title, description, requirements, and application instructions.
- Implement features for job seekers to search, filter, and apply for job listings based on their preferences and qualifications.

7. Resume Management:

- Allow job seekers to upload and manage their resumes/profiles, including updating personal information, skills, and work experience.
- Implement validation checks to ensure that resumes meet specified criteria and formats.

8. Testing and Quality Assurance:

- Conduct thorough testing of both frontend and backend components, including unit tests, integration tests, and end-to-end tests.
- Perform usability testing with target users to gather feedback and identify areas for improvement.
- Address any bugs or issues discovered during testing and ensure the application meets quality standards and requirements.

9. Deployment and Maintenance:

- Deploy the web application to a hosting platform, such as Heroku, AWS, or Azure.
- Set up continuous integration and deployment pipelines for automated deployment and updates.
- Establish monitoring and logging mechanisms to track application performance, errors, and user activity.

3.2. Methodology

Usability testing employs different research methods to evaluate users' performance and acceptance of products and systems (Barnum, 2020; Csontos, 2019; [7] Vaezi et al., 2016; Wichansky, 2000) [9]. This study used a mixed-method research design to collect quantitative and qualitative data through online moderated usability testing, observations, think-aloud processes, demographic questions, the SUS survey, and semi-structured interviews (See Figure 3.2.1). Mixed methods research is a type of research that includes collecting, analysing, and integrating quantitative and qualitative research in a single study (Creswell & Plano-Clark, 2007)[3]. The rationale for choosing this form of research was to provide a better understanding of a research problem rather than using only either a qualitative or quantitative research approach.

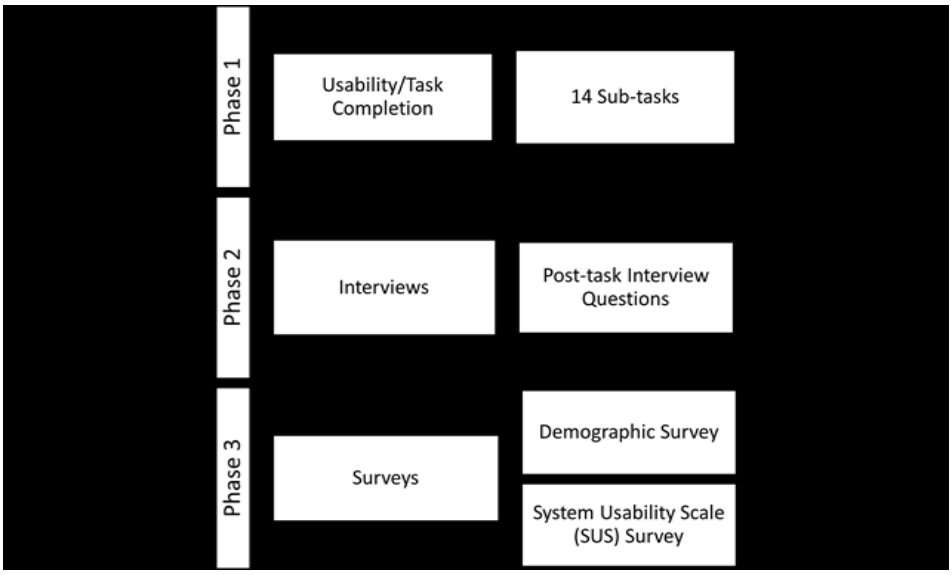


Figure 3.2.1 Research Phases

3.3. Data Collection:

Data collection began in January of 2024. We started to reach out to potential participants via email. We employed a purposeful sampling method when selecting participants, choosing the ones who were currently seeking jobs in their respective fields. Three undergraduate and nine graduate students at a university received an invitation to participate in the study through their student email addresses. To ensure diversity in the participants, we recruited students from various educational, ethnic, and racial backgrounds. Prior to conducting the task sessions, the participants signed consent forms. Out of the 12 participants, there were five male (41.67%) and seven female users (58.33%). The majority of the participants (70%) were international students from different States More detailed data on the demographics of the participants is presented in Figure 3.3.1. The participants were in the age ranges of 18-24 (2), 25-34 (4), 35-44 (5), and 45-54 (1). The participants identified as undergraduate, master's, or doctoral students pursuing degrees in various colleges, including education, engineering, health and human sciences, liberal arts and sciences, and visual and performing arts (see Figure 3.3.1)

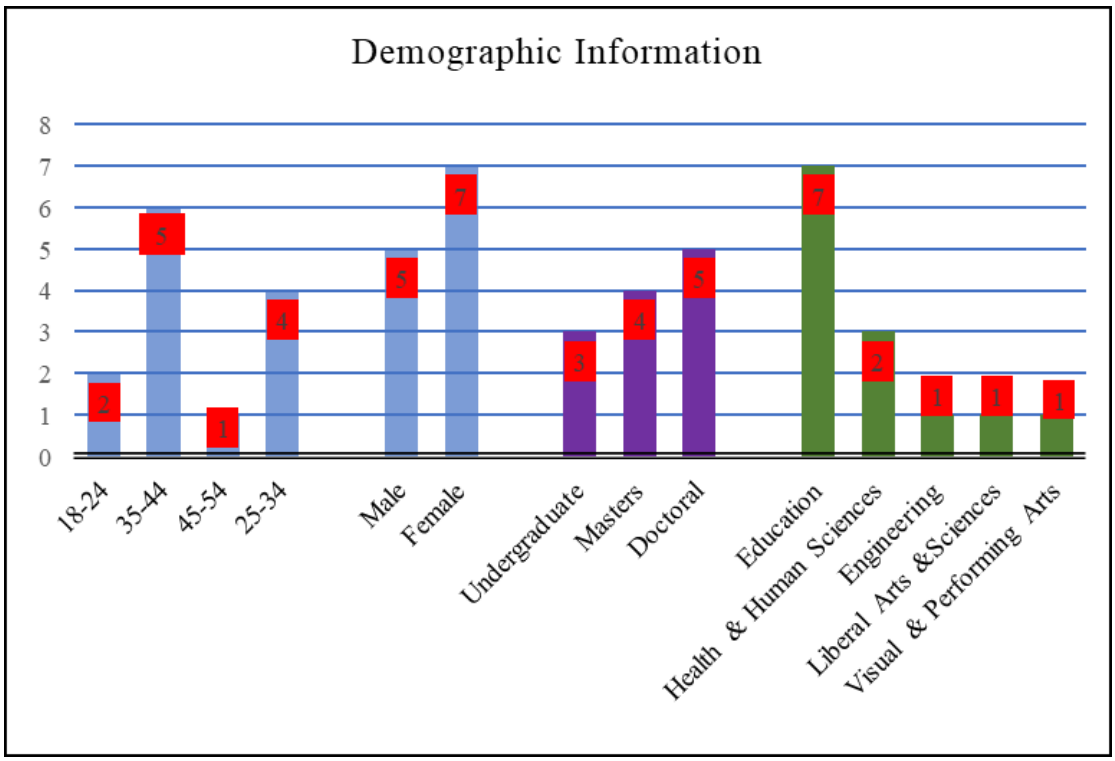


Figure 3.3.1 Demographic Information

3.4 Qualitative Data Collection

According to Barnum (2020), when collecting qualitative data for usability studies, the remote-testing method is essential due to its potential for reaching out to users in moderated or synchronous or in unmoderated or asynchronous formats. Therefore, this study used online synchronous moderated remote testing with the researchers in the office and the participants at their homes. Qualitative data were collected through observations of remote moderated usability testing and post-interview questions responses. The session was established through a collaborative meeting software, Zoom, that allowed the participants to share their screen. The data were collected in different phases. In the first phase, the participants were asked to complete the given tasks. In the second phase, we conducted post-task interviews.

Phase 1: Usability/Task Completion

Each researcher observed four students and recorded the task completion sessions using Zoom, asking the participants to share their screens. Each task session, including post-task interview sessions, lasted 15-30 minutes. During the session, each student was asked to perform a set of predefined tasks. The purpose of the observation was to take notes on the users' behaviours when they performed the tasks while thinking aloud. Upon completion of the observations, we kept a tally of the performance observations conducted by each team member.

We developed 14 tasks for the participants to complete.

1. Open Indeed.com.

2. Sign in to Indeed.com.

3. If you are a new user, create an account.

4. Assume you are looking for a job paying at least 60,000 in your field of study.

5. Find jobs posted in the last 7 days.

6. Find full-time jobs in your field in Illinois.

7. Sort the jobs listed in your field of study in the state of Illinois by relevance.

8. Sort jobs by mid-level experience.

9. Find the average annual salary for the job title you have selected.

10. Find top companies for your job in India.

11. Find the highest paying cities for your job.

12. Find the best companies in India.

13. Find the reviews**.**

14. Find that company's response to COVID-19.

Phase 2: Post-Task Interviews

After completion of the tasks, we asked students to answer nine post-task interview questions.

1. How would you describe the assigned tasks?

2. Was the time sufficient to complete the tasks?

3. What did you like about the website?

4. What didn't you like about the website?

5. Would you consider using the website to look for a job in the future?

6. What other things would you consider when you search for a job? Would this website allow you to find what you were searching for?

7. What do you think about the user interface? Do you like the design of the website?

8. Have you used a similar job search website before? If yes, could you please tell us whether you prefer Indeed.com over the other job search engines? Why? Why not?

9. Do you have any final comments or recommendations?

Quantitative Data Collection

Quantitative data for this study included calculating the time spent on task completion and the system's efficiency when users performed the tasks (see Phase 1 and Phase 2). To collect additional quantitative data, this research also used the SUS to measure the participants' satisfaction with Indeed.com.

The SUS was invented by John Brooke at the Digital Equipment Corporation to measure usability of a website or system (Brooke, 1996). The SUS is a 10-item survey in which respondents indicate their level of satisfaction with each item on a scale from 1 (strongly disagree) to 5 (strongly agree). The odd-numbered items (1, 3, 5, 7, and 9) are positively worded and the even-numbered items (2,4,6,8, and 10) are negatively worded.

The SUS post-test questionnaire was selected for several reasons. First, it has been widely used in several usability studies (e.g., Bangor et al., 2008; Tullis & Stetson, 2004). Secondly, previous research (e.g., Brooke, 1996; García-Peñalvo et.al., 2019; Tullis & Stetson, 2004) has also ascertained the effectiveness, efficiency, reliability, and validity of this survey. Moreover, the SUS provides a high-level measurement of subjective usability even with a sample size as low as 12 users (Tullis & Stetson, 2004).

Phase 3: Survey

In the third phase, the participants completed the System Usability Scale (SUS) survey. We sent the participants a link to the SUS survey developed in Qualtrics. Prior to taking the survey, they were asked to answer demographic questions.

Data Analysis

Data analysis of both quantitative (survey responses) and qualitative data (responses to open-ended questions) were conducted concurrently during the data collection process. In any research, the process of data collection, data analysis, and report writing are not distinct steps; they can occur simultaneously throughout the research process (Creswell & Plano-Clark, 2007).

Quantitative data was analysed in relation to research questions. Qualitative data was done using thematic analysis. Before we started coding the responses to open-ended questions, we read them several times to elicit responses related to effectiveness, efficiency of the website, and user satisfaction with the website. After subsequent rounds of coding, we separately identified emerging themes. Then we met as a team on a weekly basis via Zoom during January of 2024 to compare our emerging themes and discuss the findings.

Results of Quantitative Data

The task completion success rate (effectiveness), task completion time (efficiency), and the survey on satisfaction/dissatisfaction yielded quantitative data. Responses to the post-task interview questions yielded qualitative data. The data were analysed in relation to each research question (RQ) and the pertinent results are presented accordingly.

RQ1: To what extent do the participants effectively complete predefined tasks on Indeed.com?

To measure the effectiveness of the system, the success scores of the participants on task completion were assessed using a "1" and "0" scale, where 1 indicated success and 0 indicated failure (see Table 3.4.1).

Student #	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	Mean Completion Rate (%)
S1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	71
S2	1	1	1	1	1	1	1	1	0	1	0	1	1	1	85
S3	1	1	1	0	1	1	1	1	1	1	1	1	1	1	93
S4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
S5	1	0	0	1	1	1	1	1	0	0	0	0	1	1	57
S6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
S7	1	1	1	1	1	1	1	1	1	1	0	1	1	1	93
S8	1	0	0	1	1	1	1	1	1	1	1	1	1	1	86
S9	1	1	1	0	1	1	0	1	1	1	0	1	1	1	85
S10	1	1	1	1	1	1	0	1	1	1	1	1	1	1	93
S11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
S12	1	1	1	1	0	1	0	1	1	1	0	1	1	0	71
Mean Total Score	12	10	10	10	11	12	9	12	9	10	6	10	12	11	86

Table 3.4.1 System Effectiveness

Note. 1 indicates success; 0 indicates failure.

As it is seen in the findings, the success rate of all tasks was overall high (86%). However, some tasks, such as T2 (sign-in to Indeed.com), created confusion for some users (11 out of 12) as they struggled to locate information. Specifically, seeing only the email address and password spaces, the users mistakenly assumed that they could sign in by entering the password associated with their Gmail accounts. They failed to see the text "*New to Indeed?"* and "Create an account" because that information was

below all other prompts for the sign-in process. Due to their confusion with the sign-in process, they recommended placing that information after the “sign-in” tab.

RQ2: To what extent do the participants efficiently complete the predefined tasks on Indeed.com?

The participants were given unlimited time to complete each task. To measure the efficiency scores, the researchers used cell phones to keep the time from beginning of the task to the end. This method helped measure the exact time spent completing each task. Table 3.4.1 presents the amount of time spent by each participant.

RQ3: To what extent are the participants satisfied with Indeed.com? The total score of the SUS was calculated through the formula developed by Brooke (1996). To calculate the SUS scores, statistical analysis was performed in an Excel spreadsheet. The calculated values through the built-in formula yielded the SUS, usability, and learnability scores for each participant as well as the overall mean for all participants (in bold). The obtained scores are presented in Table 3.4.2. In our study, the satisfaction score for Indeed.com was (M=75), meaning the Indeed.com website was assessed as over the industry average of 68 (Demir et al., 2012). Since our study reported the mean SUS score of 75, it corresponds to letter grade B, a curved grading scale for the SUS that was developed by Sauro (2011) where the highest and lowest 15 percentile points correspond to the A and F ranges, respectively.

In addition to calculating the SUS score with Brooke’s (1996) formula, we also calculated Cronbach's alpha to test the reliability of the 10 items of the survey in assessing the usability of the Indeed.com website. Before obtaining the Cronbach’s alpha of the test items, the negatively worded items of the SUS (items 2, 4, 6, 8, and 10) were recorded. After that, we ran the test and the Cronbach’s alpha value obtained for SUS was ($\alpha = 0.89$).

Student #	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	Total time
S1	0:30	0:30	1:17	2:06	0:26	0:30	0:27	0:40	3:36	5:04	2:05	2:00	0:48	1:22	21:21
S2	0:30	0:31	2:09	2:33	0:29	0:20	2:02	2:11	1:58	0:33	4:26	2:04	0:28	3:02	23:16
S3	0:11	0:00	1:00	2:19	2:07	0:14	2:09	0:06	1:09	1:01	0:18	3:30	1:08	0:44	15:56
S4	0:10	0:00	1:36	0:12	0:06	0:12	1:00	0:10	0:25	0:40	0:53	0:42	0:10	0:32	6:48
S5	0:10	0:20	4:00	1:10	0:10	0:08	2:30	0:10	2:10	4:00	1:25	2:00	1:00	1:00	20:13
S6	0:05	2:00	0:00	0:32	0:04	0:07	0:18	0:03	0:20	0:05	0:03	0:20	0:15	0:36	4:48
S7	0:05	0:25	0:00	1:20	0:07	0:05	0:06	0:11	0:55	0:30	1:33	0:42	0:17	0:03	6:19
S8	0:10	2:00	2:10	0:22	0:05	0:17	0:05	0:05	0:18	0:33	0:50	1:16	0:25	0:03	8:39
S9	0:12	0:10	1:05	3:00	0:34	0:14	0:50	0:10	0:30	0:20	2:00	1:15	0:25	2:00	12:45
S10	0:12	0:10	1:09	0:49	0:11	0:32	0:37	0:10	0:40	0:19	0:30	0:28	1:43	0:15	7:45
S11	0:20	0:10	0:05	1:04	0:20	0:30	0:21	0:35	0:09	0:22	0:18	1:00	1:10	0:10	6:34
S12	0:30	0:45	1:37	2:05	1:31	2:00	1:55	1:07	1:10	0	1:12	0:50	1:13	1:47	17:42
Average	0:15	0:35	1:20	1:27	0:30	0:25	1:01	0:28	1:06	1:07	1:17	1:20	0:45	0:57	12:40

Note. Task Completion Time, mm:ss.

Table 3.4.2 System Efficiency

SUS	Usability	Learnability
75.0	**73.2**	**82.3**
60.0	62.5	50.0
97.5	96.9	100
70.0	75.0	50.0
40.0	25.0	100.0
97.5	96.9	10.0
90.0	87.5	100.0
72.5	71.9	75.0
75.0	75.0	75.0
70.0	68.8	75.0
77.5	75.0	87.5
100.0	100.0	100.0
50.0	43.8	75.0

Table 3.4.3 SUS Score

4. Implementation

4.1 Functionality:

4.1.1. Planning and Definition:

- **Market Research:** Research your target audience (job seekers and employers) to understand their needs, pain points, and functionalities they value most. Analyse existing job portals to identify competitive advantages and potential niche opportunities.
- **Feature Planning:** Define the core functionalities of your job portal. Consider:
    - User Management (registration, login)
    - Job Management (posting, searching, applying, application management)
    - Search and Recommendations (advanced filtering, skills matching)
    - Optional: Skill Assessments (quizzes for employers to evaluate candidates)
- **Monetization Strategy:** Determine how you'll generate revenue. This could include:
    - Charging employers for job postings
    - Offering premium memberships with additional features
    - Integrating targeted advertising

4.1.2 Tech Stack Selection:

- **MERN Stack:** MERN stack is a popular choice due to its efficiency and JavaScript focus. It offers a robust foundation for building a web application.
- **Alternatives:** Consider alternatives like MEAN Stack (MongoDB, Express.js, Angular, Node.js) or LAMP Stack (Linux, Apache, MySQL, PHP) depending on your team's preferences and project requirements. Evaluate factors like

learning curve, scalability, and available resources.

4.1.3 Development Process:

Project Setup:

- Development Environment: Set up your development environment. Install Node.js and npm (Node Package Manager).
- React Project: Initialize a React project using tools like Create React App:

Bash

- npx create-react-app job-portal
- cd job-portal
- Node.js Packages: Install necessary Node.js packages:

Bash

- npm install express mongoose cors body-parser bcryptjs dotenv
- npm install react-router-dom

Database Connection: Establish a secure connection to your MongoDB database using Mongoose. Consider using environment variables to store sensitive credentials (e.g., database connection string).

4.1.4 Front-end (UI) Development:

- **User Interface Design:** Design a clean, intuitive, and responsive user interface using React.js. Focus on creating a pleasant user experience across different devices (desktop, mobile, tablets). Consider using a UI framework like Material-UI or Bootstrap for a head start.
- **React Components:** Develop React components for various sections of the application (homepage, job listings, job detail page, user dashboards).
- **Data Fetching and Display:** Implement logic to fetch data from the backend API using methods like fetch or Axios and display it in the UI components.
- **Form Handling:** Create user-friendly forms for user registration, login, job search, and application submission. Handle form submissions and send data to the backend API.
- **State Management:** Consider using a state management library like Redux or Context API to manage application state, especially if dealing with complex data flow.

4.1.5 Back-end (API) Development:

- **API Design**: Design and document API endpoints for user management, job management, search functionalities, and any additional features requiring server-side processing.
- **User Authentication**: Implement secure user authentication and authorization with techniques like:
    - Password hashing (e.g., bcrypt)
    - Role-based access control (RBAC) to restrict access based on user roles (Job Seeker, Employer, Admin)
- **Data Storage and Retrieval**: Connect the API to the MongoDB database using Mongoose for data storage and retrieval.
- **Error Handling**: Implement robust error handling to catch and handle potential errors gracefully.

4.1.6 Authentication and Authorization:

- Implement user registration and login functionality.
- Use Firebase for authentication.
- Implement authorization to restrict access to certain routes or actions based on user roles.

4.1.6.1 Integration and Testing:

- **API Integration:** Integrate the front-end application with the back-end API to enable communication for data retrieval and actions.
- **Testing:** Conduct thorough testing of your application for functionality, usability, performance, and security. This involves:
    - Manual Testing: Simulate user actions and test expected behaviour
    - Automated Testing: Use tools like Jest or Postman to automate testing routines
    - Security Testing: Scan for vulnerabilities and implement security best practices

4.1.6.2 Deployment:

- Deploy your MongoDB database to a cloud service like MongoDB Atlas.
- Deploy your backend server to a platform like Heroku, AWS, or DigitalOcean.
- Deploy your frontend React.js application to a static hosting service like Netlify or Vercel.

4.1.6.3 Monitoring and Maintenance:

- Set up logging and monitoring for your application to track errors and performance issues.
- Regularly update dependencies and security patches.
- Continuously improve and add new features based on user feedback.

4.2 Attributes:

4.2.1 Job Listings:

- Title: The title of the job.
- Description: A description of the job responsibilities, qualifications, etc.
- Company: The company offering the job.
- Location: The location where the job is based.
- Type: Whether the job is full-time, part-time, contract, etc.
- Salary: The salary or salary range for the job.
- Skills: Required skills for the job.
- Experience: Required experience level.
- Date Posted: The date the job was posted.
- Deadline: Application deadline, if applicable.
- Category: The category or industry of the job (e.g., IT, Finance, Healthcare).
- Remote: Indicates if the job can be done remotely.
- Job Posted by: Email of Recruiter
- Minimum Salary: Least amount offered
- Maximum Salary: Highest amount offered

4.2.2 Companies (Optional, if you're including company profiles):

- Name: Name of the company.
- Description: Description of the company.
- Location: Company's location.
- Industry: Industry in which the company operates.
- Website: Company's website URL.
- Logo: Company's logo.

4.2.3 Applications (if tracking job applications):

- Job ID: ID of the job the application is for.
- User ID: ID of the user who applied.
- Resume: Resume or CV submitted with the application.
- Cover Letter: Cover letter submitted with the application.
- Status: Status of the application (e.g., submitted, under review, accepted, rejected).
- Date Applied: Date the application was submitted.

4.2.4 Scalability:

- Cloud infrastructure (e.g., AWS, Google Cloud Platform) to handle increasing user base and data volume.
- Database optimization techniques for efficient data retrieval and updates.
- Caching mechanisms to reduce server load and improve response times.
- Performance monitoring to identify areas for optimization.

4.3 Experimental Screenshots

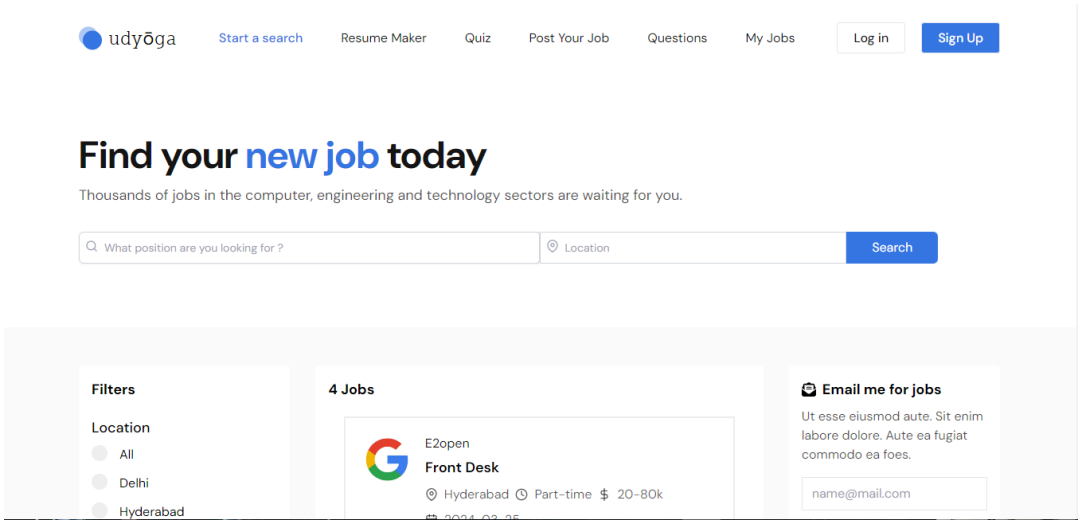


Figure 4.3.1 Home Page

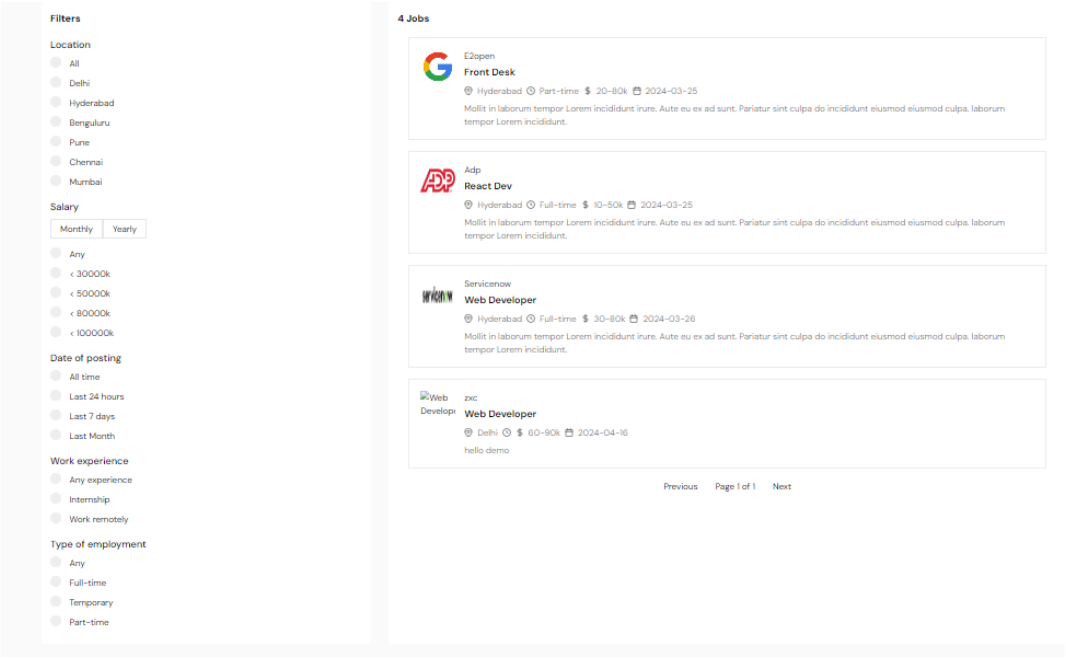


Figure 4.3.2 Filters

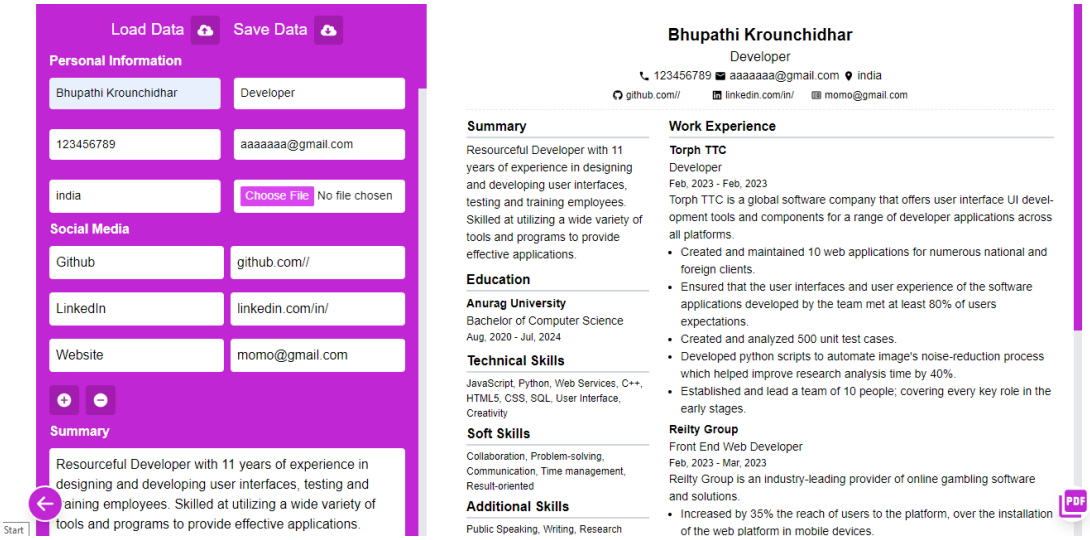


Figure 4.3.3 Resume Builder

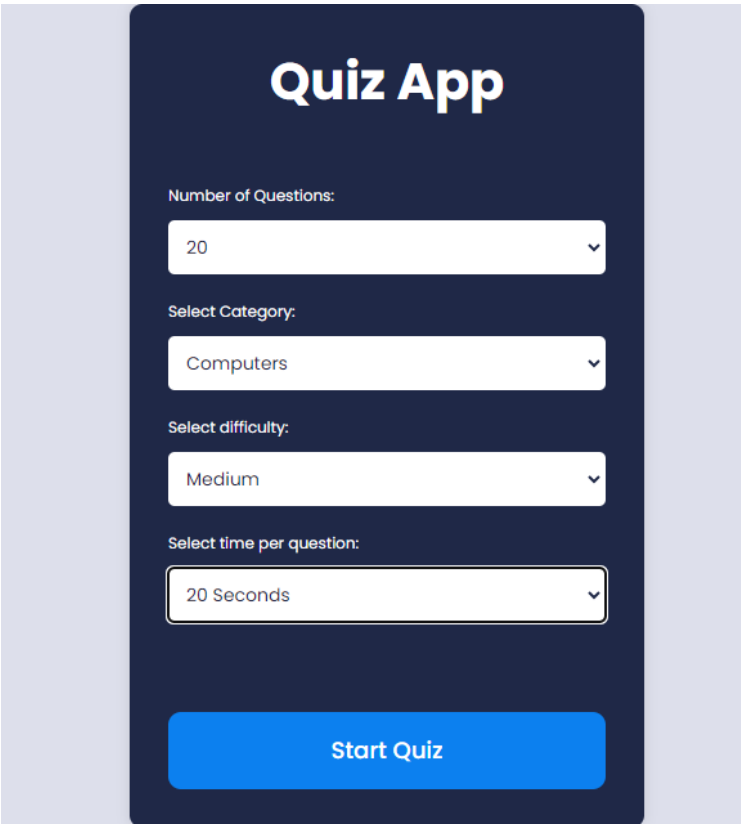


Figure 4.3.4 Quiz Practice

Figure 4.3.5 Questions

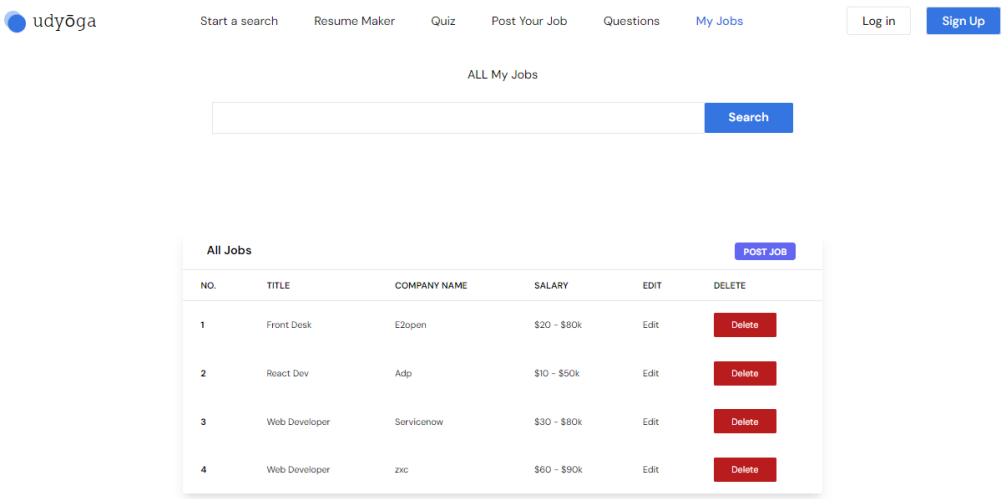


Figure 4.3.6 My Jobs

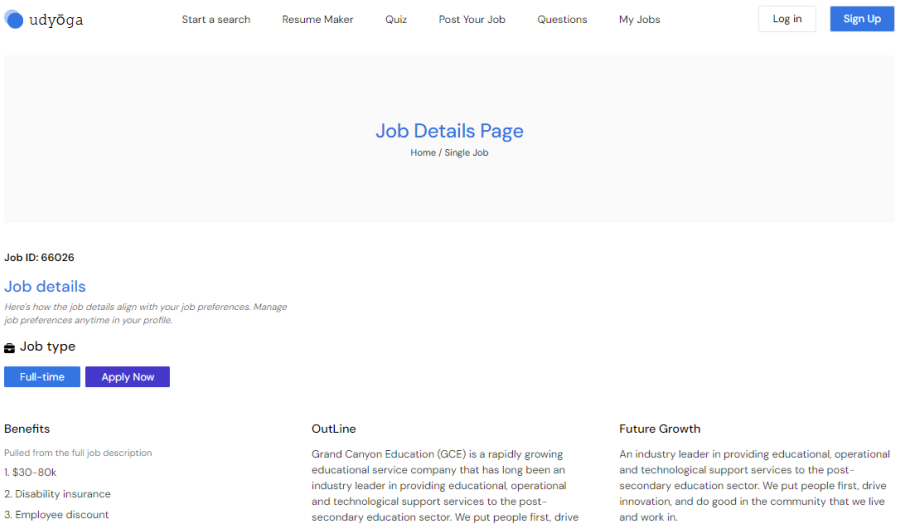


Figure 4.3.7 Job Page

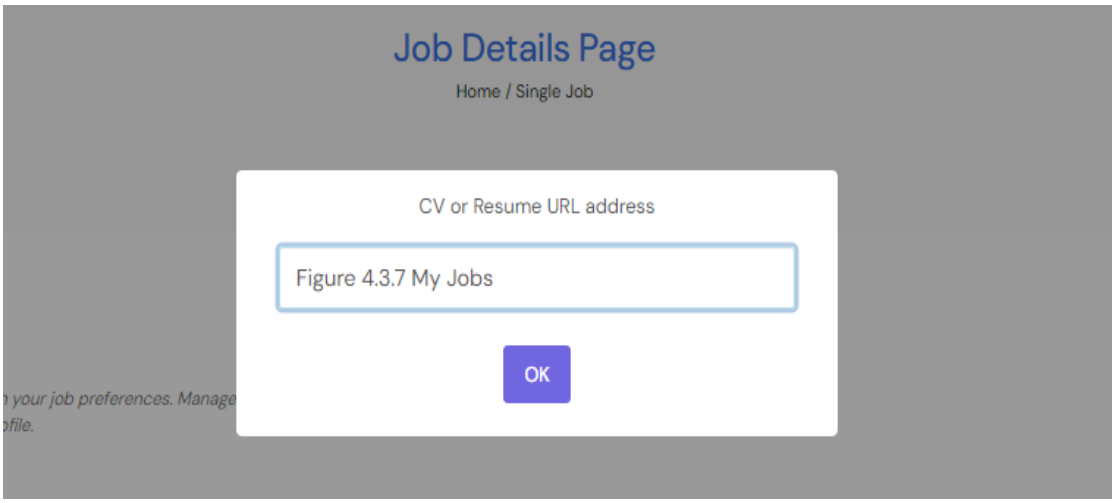


Figure 4.3.8 Paste resume link

4.4 Datasets

4.4.1 General Job Posting Datasets:

While dedicated JSON datasets specifically for job portals might be less common, you can leverage the following resources to find suitable data and convert it to JSON format:

- **Kaggle:**
  - **https://www.kaggle.com/datasets/ravindrasinghrana/job-description-dataset (19,000 job postings from Armenia) - This CSV dataset can be converted to JSON using tools like Python's json module or online converters.**
  - **https://www.kaggle.com/datasets/ravindrasinghrana/job-description-dataset (Synthetic job postings for research) - Similar considerations for JSON conversion apply.**
- **Data.gov:**
  - **https://data.gov/ (Search for "job") - Look for datasets relevant to your job portal's focus and convert them to JSON format. Be mindful of licensing terms.**

4.4.2 APIs for Job Postings:

- **Indeed API (Paid): https://www.indeed.com/m/jobs?q=Developer&l=Las+Vegas%2C+NV - Offers access to a vast database of job postings (subscription required). Their response format is JSON.**
- **Glassdoor API (Limited Access): https://www.kaggle.com/datasets/andresionek/data-jobs-listings-glassdoor - Provides limited access to job postings. Explore their documentation for information on JSON responses.**
- **Dice API (Developer Program): http://www.dice.com/common/content/documentation/api.html?CMPID=AF_PG_UP_JS_AV_CC__&utm_source=Programmr&utm_medium=Partner&utm_content=&utm_campaign=Advocacy_CodingChallenge - Consider joining their developer program to access job data that might be available in JSON format.**

4.5 Parameters:

4.5.1 User Engagement Rate (UER):

- Formula: (Number of Active Users / Total Registered Users) * 100
- Description: Measures the percentage of registered users actively engaging with the website.

4.5.2 Job Listing CTR (Click-Through Rate):

- Formula: (Number of Clicks on Job Listings / Number of Job Listing Views) * 100
- Description: Measures the percentage of users who click on job listings after viewing them**.**

4.5.3 Average Time Spent on Site (ATSS):

- Formula: Total Time Spent on Site / Number of Sessions
- Description: Indicates the average duration users spend on the website per session.

4.5.4 User Satisfaction Score (USS):

- Formula: (Sum of User Ratings) / (Number of Ratings)
- Description: Represents the average satisfaction rating provided by users for the website's features and services.

5. Experimental Setup

5.1 Environment Setup:

- **Development Tools:** Install Node.js and npm (Node Package Manager).
- **Version Control:** Set up a version control system like Git for code management and collaboration.
- **Database:** Create a dedicated MongoDB database instance (local or cloud-based) for testing purposes.
- **Project Structure:** Organize your project logically with separate directories for the front-end (React app), back-end (Express.js API), and shared configuration files.

5.2. Front-end (React.js):

- **Basic UI:** Develop a minimalist user interface (UI) with essential components for users to interact with:
    - Landing page with a brief introduction to the job portal.
    - Registration/Login forms for users (job seekers and employers).
    - Separate dashboards for job seekers and employers.
    - Job search functionality with basic filters (e.g., location, keywords).
    - Job details page displaying information for each job posting.
- **Data Fetching and Display:** Implement logic to fetch data (job listings, user profiles) from the back-end API using methods like fetch or Axios and display it in the UI components.
- **State Management (Optional):** Consider using a state management library like Redux or Context API if dealing with complex data flow or user interaction.

5.3. Back-end (Express.js and Node.js):

- **API Endpoints:** Create RESTful API endpoints for essential functionalities:
    - User management (registration, login, profile updates)
    - Job management (posting, searching, applying, application management)
    - Authentication and authorization (secure access to user information based on roles)

- **Data Storage and Retrieval:** Connect the API to the MongoDB database using Mongoose for data storage and retrieval operations.
- **Testing Framework:** Use a framework like Jest or Postman to write unit and integration tests for your back-end API endpoints. This ensures basic functionality works as expected.
- **Error Handling:** Implement robust error handling to catch database errors, invalid requests, and handle exceptions gracefully.

5.4. Experimental Design:

- **Scenarios:** Define user scenarios to test the job portal's functionalities from different perspectives:
    - Job Seeker successfully registers, searches for jobs, and applies for relevant positions.
    - The employer posts a job opening, manages applications, and communicates with potential candidates (simulated scenario).
- **Load Testing:** Utilize tools like JMeter or LoadRunner to simulate user traffic and test the application's scalability. Monitor performance metrics (response times, resource utilization) to identify potential bottlenecks.
- **Security Testing:** Conduct basic security testing using tools like OWASP ZAP or Acunetix to identify potential vulnerabilities (consider exploring security options like helmet for Express.js).

5.5. Monitoring and Analysis:

- **Logs:** Implement logging mechanisms in both front-end and back-end to track user actions, errors, and system performance.
- **Database Monitoring:** Monitor your MongoDB database for performance and resource usage. This can help identify potential optimizations.
- **Analytics Tools (Optional):** Integrate analytics tools like Google Analytics (for front-end) or application performance monitoring (APM) tools (for back-end) to gain deeper insights into user behaviour and application health.

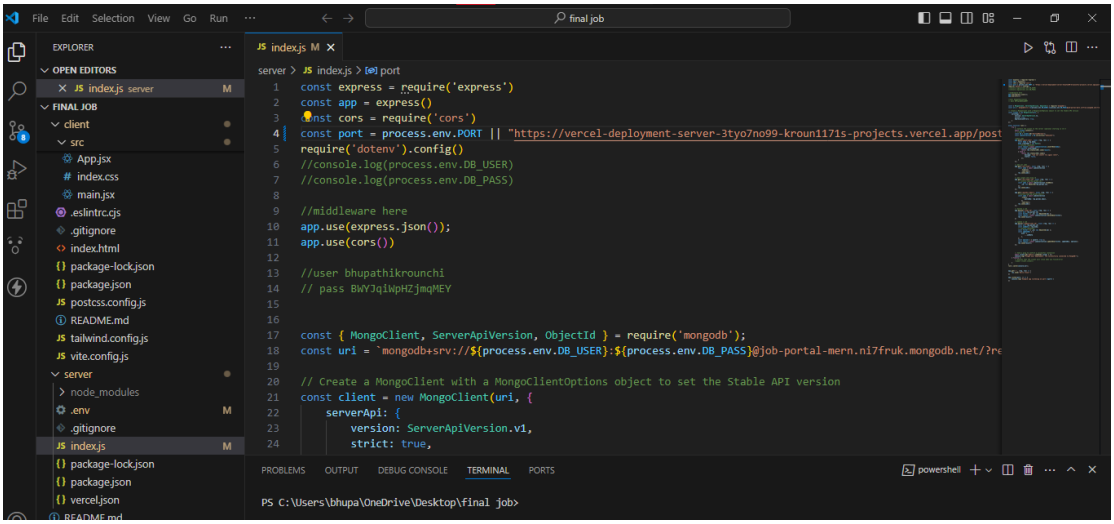


Figure. 5.1.1. Coding environment screenshot

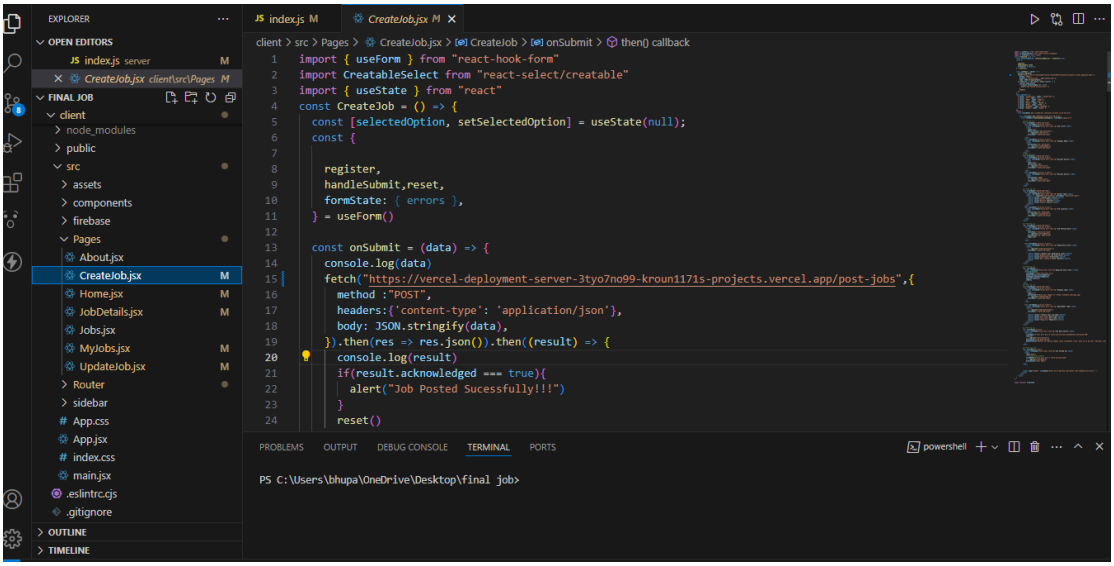


Figure. 5.2.1. Frontend Coding environment screenshot

6. Discussion of Results

6.1 Findings from Qualitative Data

At the end of the SUS survey, the participants were given an opportunity to add any suggestions or concerns about Indeed.com by answering item 11, an open-ended question. Only seven students answered the open-ended question, and six of the seven stated they were able to find what they are looking for on the website. We thematically analysed the open-ended responses to item 11 together with participants' responses to the post-task interview questions that sought participants' opinions about their experiences when interacting with Indeed.com. Three major themes emerged: (1) wealth of information, (2) navigation, and (3) learnability.

Wealth of Information

The major findings from the data revealed that novice users of Indeed.com liked the wealth of information when searching for jobs because the website generated jobs most relevant to their field. Typical comments were positive; for example, Jessica shared, "The website has adequate information because I was able to find information I am looking for." The participants also liked the availability of additional information such as annual salary for the jobs and best companies in their fields as well as finding information about the highest paying cities for their professions.

Navigation Problems

Although the participants liked the wealth of information on the website, they did not like the limited number of tabs on the main menu of the website. They would have preferred more tabs to search for specific information, such as annual salary. The participants also noted that the website was not user-friendly enough because some tasks made them think for at least 3-5 minutes. Therefore, they made several recommendations for improving the usability of the website. For example, Jasmin stated, "Adding a virtual chat assistant would be better." Navigation problems were observed during the think-aloud process as well because the participants frequently expressed their frustration during the task completion session. Particularly, they

expressed their anxiety with the sign-in process (Task 2). Completing Task 4 was difficult as well because at least eight participants struggled to locate the salary tab on the website.

Learnability and Other Issues

Some participants noted the Indeed.com website had an intuitive interface and features, which meant it was not easily learned by novice users. For example, Atiya noted, "This website was somewhat difficult for novice users. They need a long time to be able to use and find information." One of the experienced users noted, "A very ineffective recruitment website. I also use it as an employer and the turn-out is very low quality despite its popularity."

Trustworthiness

To increase trustworthiness of the data, we utilized data triangulation and investigator triangulation (Guion et al., 2011). For data triangulation, we compared the findings from qualitative and quantitative data. First, we extracted the responses from post-task interview questions that were related to learnability and usability of the website and then compared them to the mean scores, the average time spent to complete the task, and the overall SUS score. This process helped us support the findings from qualitative data where participants reported that the Indeed.com website had learnability issues.

As for the investigator triangulation, each of the researchers carefully examined the textual data from interviews. Developing a procedure for conducting thematic analysis helped us to meet the trustworthiness criteria (Lincoln & Guba, 1985). This process helped us develop a deeper understanding of the data and reach consensus on analysing the data. Thus, both types of triangulations helped enhance the trustworthiness of this research.

Reliability and Validity of SUS

The standard questionnaires differ from other surveys due to the scientific validation that has been applied to them (Gronier & Baudet, 2021). This validation is mainly based on two psychometric measurements: validity and reliability (Drost, 2011). Reliability refers to the overall consistency of a measurement tool (Gronier & Baudet, 2021). Calculating the coefficient alpha of the SUS is an accepted method for measuring reliability of this survey (Sauro & Lewis, 2016)[10]. Extant research (e.g., Sauro, 2011; Sauro & Lewis, 2016)[4] on SUS reports that Cronbach's alpha values should be at least 0.80 to be reliable. In our study, Cronbach's alpha value was at a high level, 0.89. An acceptable level of reliability of SUS showed consistency with previous research reliability (Sauro & Lewis, 2016; Tullis & Stetson, 2004) that utilized SUS to assess website or system usability. This score also supports Sauro's (2011) study results, which reported that the reliability of the SUS scale items could be 0.80 or higher even with a smaller sample size.

"Validity refers to the meaning of the research components" (Drost, 2011, p.114)[12]. In our study, the items of SUS were valid because the items of the survey measured what they purported to measure, i.e., the survey items assessed the learnability and usability of the Indeed.com website. The overall SUS score in this study was 75, supporting the validity of the SUS items in collecting subjective usability ratings. This result is consistent with relevant research (e.g., Bangor et al., 2008; Lewis & Sauro, 2018) that provided evidence of the validity of the SUS's 7-point objective rating questions for an overall rating of "user friendliness."

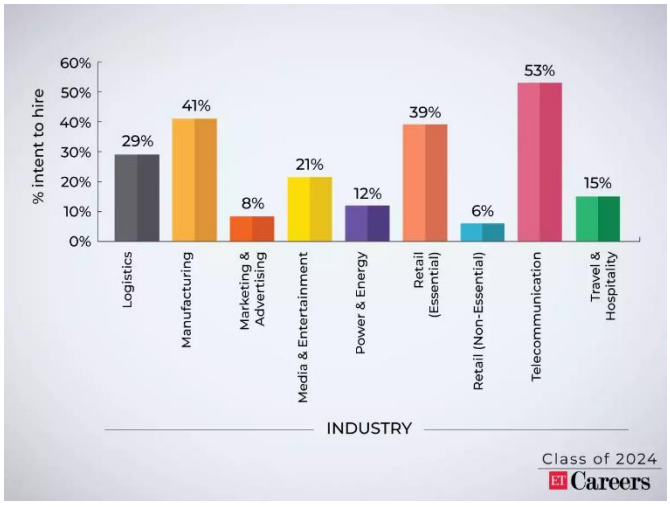
Student #	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	Total time
S1	0:30	0:30	1:17	2:06	0:26	0:30	0:27	0:40	3:36	5:04	2:05	2:00	0:48	1:22	21:21
S2	0:30	0:31	2:09	2:33	0:29	0:20	2:02	2:11	1:58	0:33	4:26	2:04	0:28	3:02	23:16
S3	0:11	0:00	1:00	2:19	2:07	0:14	2:09	0:06	1:09	1:01	0:18	3:30	1:08	0:44	15:56
S4	0:10	0:00	1:36	0:12	0:06	0:12	1:00	0:10	0:25	0:40	0:53	0:42	0:10	0:32	6:48
S5	0:10	0:20	4:00	1:10	0:10	0:08	2:30	0:10	2:10	4:00	1:25	2:00	1:00	1:00	20:13
S6	0:05	2:00	0:00	0:32	0:04	0:07	0:18	0:03	0:20	0:05	0:03	0:20	0:15	0:36	4:48
S7	0:05	0:25	0:00	1:20	0:07	0:05	0:06	0:11	0:55	0:30	1:33	0:42	0:17	0:03	6:19
S8	0:10	2:00	2:10	0:22	0:05	0:17	0:05	0:05	0:18	0:33	0:50	1:16	0:25	0:03	8:39
S9	0:12	0:10	1:05	3:00	0:34	0:14	0:50	0:10	0:30	0:20	2:00	1:15	0:25	2:00	12:45
S10	0:12	0:10	1:09	0:49	0:11	0:32	0:37	0:10	0:40	0:19	0:30	0:28	1:43	0:15	7:45
S11	0:20	0:10	0:05	1:04	0:20	0:30	0:21	0:35	0:09	0:22	0:18	1:00	1:10	0:10	6:34
S12	0:30	0:45	1:37	2:05	1:31	2:00	1:55	1:07	1:10	0	1:12	0:50	1:13	1:47	17:42
Average	0:15	0:35	1:20	1:27	0:30	0:25	1:01	0:28	1:06	1:07	1:17	1:20	0:45	0:57	12:40

Note. Task Completion Time, mm:ss.

Figure 6.1.1. System Efficiency

SUS	Usability	Learnability
75.0	**73.2**	**82.3**
60.0	62.5	50.0
97.5	96.9	100
70.0	75.0	50.0
40.0	25.0	100.0
97.5	96.9	10.0
90.0	87.5	100.0
72.5	71.9	75.0
75.0	75.0	75.0
70.0	68.8	75.0
77.5	75.0	87.5
100.0	100.0	100.0
50.0	43.8	75.0

Figure 6.1.2. SUS Score



6.1.3. Job Trend Graph

6.2. Advantages and Applications

Advantages for Job Seekers:

- **Access to Diverse Job Opportunities:** Job portals provide access to a wide range of job opportunities across different industries, locations, and experience levels, allowing job seekers to explore a variety of options.
- **Convenience:** Job seekers can search for jobs, apply online, and manage their job applications from the comfort of their own homes, eliminating the need for physical visits to multiple companies or recruitment agencies.
- **Time Efficiency:** Job portals streamline the job search process by allowing users to search for jobs based on specific criteria, such as job title, location, salary range, and required skills, saving time compared to traditional job search methods.
- **Customization:** Many job portals offer features such as saved searches, job alerts, and recommended job listings based on user preferences, allowing job seekers to tailor their job search experience to their individual needs and preferences.
- **Information Transparency:** Job portals provide detailed information about job listings, including job descriptions, required qualifications, company profiles, and application deadlines, enabling job seekers to make informed decisions about which jobs to apply for.

Advantages for Employers:

- **Access to a Large Pool of Talent:** Job portals attract a large number of job seekers from diverse backgrounds, allowing employers to reach a broader audience and attract qualified candidates for their job vacancies.
- **Cost-Effective Recruitment:** Posting job vacancies on job portals is often more cost-effective than traditional recruitment methods such as newspaper advertisements or hiring agencies, saving employers money on recruitment expenses.
- **Efficient Screening and Selection:** Job portals typically offer tools for

screening and filtering job applications based on specific criteria, such as skills, experience, and education, making it easier for employers to identify and shortlist suitable candidates.

- **Branding and Visibility:** Employers can use job portals to enhance their brand visibility and attract top talent by showcasing their company culture, values, and career opportunities through company profiles and job listings.
- **Streamlined Hiring Process:** Job portals streamline the hiring process by providing tools for scheduling interviews, communicating with candidates, and tracking the status of job applications, improving efficiency and reducing administrative overhead.

Applications of Job Portals:

- **General Job Portals:** General job portals cater to a wide range of industries and job categories, providing opportunities for job seekers and employers across various sectors.
- **Industry-Specific Job Portals:** Industry-specific job portals focus on particular industries or niche markets, such as healthcare, technology, finance, or hospitality, catering to the specific needs of employers and job seekers within those sectors.
- **Freelance and Gig Platforms:** Freelance and gig platforms serve as job portals for freelance professionals and independent contractors, connecting them with clients and projects in need of their services.
- **Internship and Entry-Level Job Portals:** Internship and entry-level job portals target students, recent graduates, and individuals seeking entry-level positions, providing opportunities for gaining work experience and launching their careers.
- **Remote Job Portals:** Remote job portals specialize in remote and telecommuting opportunities, allowing job seekers to find jobs that offer flexibility in terms of location and work schedule.

7. Conclusion

In conclusion, job portals play a pivotal role in modern recruitment processes, offering a wide range of features and functionalities to both job seekers and employers. Through this study, we have gained valuable insights into the usage patterns, satisfaction levels, and preferences of users regarding job portals. The findings highlight the importance of job portals in facilitating efficient job searches, connecting candidates with suitable opportunities, and streamlining the hiring process for employers. While job portals have made significant strides in enhancing accessibility and usability, there are still areas for improvement, including addressing data privacy concerns, improving algorithmic matching accuracy, and enhancing user experience. In summary, we conducted a usability study that assessed the Indeed.com website, a leading job search portal. We used a mixed-method research method using both qualitative and quantitative data.

It has been a great pleasure for me to work on this exciting and challenging project. This project proved good for me as it provided practical knowledge of not only programming in MERN Stack web-based application and to some extent Windows Application and MongoDb Server, but also about all handling procedures related with online job portals. It also provides knowledge about the latest technology used in developing web enabled applications and client server technology that will be in great demand in future. This will provide better opportunities and guidance in future in developing projects independently.

8. Future Research

Enhancing Functionality:

- **Advanced Search and Filtering:** Implement a robust search system with filters based on location, job type, experience level, skills, company size, and salary range. This allows for a more targeted job search for users.
- **Matching Algorithms:** Integrate AI-powered matching algorithms to recommend suitable jobs to applicants and qualified candidates to employers. This can personalize the job search experience and improve hiring efficiency.
- **Communication Tools:** Build in-app messaging features for job seekers and employers to facilitate communication during the application process. This streamlines communication and avoids email back-and-forth.
- **Company Reviews and Ratings:** Allow job seekers to leave reviews and ratings for companies they've interviewed with. This can provide valuable insights to other applicants and promote transparency

.

Improving User Experience:

- **Mobile App Development:** Create a mobile application alongside your web portal to cater to users searching for jobs or posting them on the go. This increases accessibility and convenience.
- **Applicant Tracking System (ATS) Integration:** Integrate with existing Applicant Tracking Systems (ATS) used by companies. This allows them to seamlessly manage applications within their existing workflow.
- **Personalized Job Feeds:** Based on user profiles and interests, curate personalized job feeds showcasing relevant opportunities. This enhances user engagement and streamlines the job search process.
- **Data Visualization Tools:** Incorporate data visualization tools like charts and graphs to display job trends, salary ranges for different positions, and in-demand skills. This provides valuable insights to both job seekers and employers.

Additional Features:

- **Interview Preparation Resources:** Offer interview preparation resources, including mock interview simulations and common interview questions for different industries.
- **Career Coaching Tools:** Provide career coaching tools or connect users with career coaches for personalized guidance and advice.
- **Social Media Integration:** Enable social media login and job sharing options to leverage existing networks and broaden reach.

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