

## CAREERWISE: AI BASED CAREER ADVISOR

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### ABSTRACT

In order to develop students, the career guidance of engineering students will be directed to the fullest extent of overall, enabling the students to identify and pursue optimum career paths postgraduation. Valuing and considering individual strength, skills, and interests would be done with the help of knowledge about opportunities in both core and interdisciplinary domains of engineering. The curriculum will focus on higher education pathways, professional certifications, and emerging industry trends. The key competencies in resume building, networking, and soft skill enhancement are outlined. It helps the budding entrepreneur convert novel ideas into sustainable ventures by mentoring resources. This connects education and readiness for employment by putting together academic learning with the professional development of the student. Equipped with tools, knowledge, and confidence, he/she can navigate career trajectories. Personalized guidance and exposure the career guidance of engineering students will be directed to the fullest extent of overall, enabling the students to identify and pursue optimum career paths postgraduation. Individual strength, skills, and interests would be valued and considered with the help of knowledge about opportunities in both core and interdisciplinary domains of engineering. It looks at higher education pathways, professional certifications, and emerging industry trends. Key competencies to be involved in resume building, networking, and soft skill enhancement will be laid down. It helps budding entrepreneurs transform novel ideas into sustainable ventures by mentoring resources. This bridge between education and readiness for a job integrates academic learning with professional development. The student is equipped with tools, knowledge, and confidence that will allow him/her to navigate career trajectories smoothly. Personalized guidance and exposure to real-world challenges prepare them to make informed decisions and thrive in the dynamic and competitive job market.

**Keywords include:** career counseling, students in engineering disciplines, interdisciplinary possibilities, higher education, professional development skills, entrepreneurial mind-set, mentorship, industry needs.

### 1. INTRODUCTION

The "AI-Based Career Advisor" is a highly complex platform to be developed for the help of engineering students in making the right career choices that combines together cutting-edge artificial intelligence and a multitude of career resources. Now, this innovative system will fill the gap in students' careers by offering appropriate advice that balances the difference between what is taught at the academy and what the professional world presently demands. In such an environment, with increasing competition and volatility in the job market for engineers, personal support for students to determine their most appropriate opportunities within the core and interdisciplinary fields of engineering is critical. The platform has implemented an AI-based chatbot to connect with the users by text and voice. The chatbot provides real-time response and personalized career recommendations and solid insights into various branches of engineering, including software, civil, and mechanical engineering as well as emerging disciplines within the domain. It advances beyond traditional advice on careers with real-time analysis of industry trends, which informs the students regarding the latest job market trends, salary expectations, and growth in different engineering sectors. The system offers a suite of other tools supporting the learning experience for its users. These consist of AI-driven skill assessments that help a student understand his strengths and areas for improvement, interactive career mapping by which he can explore potential career paths for students, and a smart resume builder by which resumes are customized to industry standards. It helps the students align their skills with industry requirements, thereby enhancing their prospects of employability significantly. The system further connects students with AI-matched mentorship opportunities and virtual networking events through which access is opened to industry professionals and alumni who can provide precious information and direction. The system is ensured to be user-centric in design, facilitated by an intuitive interface on access via desktop or mobile. This also has the provision of having an admin control panel, which ensures the continuous updating and management of career-related data. Thus, students will always be availed of the most updated and correct information available. That is, the "AI-Based Career Advisor" project could be considered a one-stop-shop in respect of career advising, combining artificial intelligence with personalized support. By providing a set of resources and tools preparing

for success on the engineering job market, this platform undergoes a transformation which helps students to confidently navigate their careers..

## 2. LITERATURE REVIEW

- i. AI and Machine Learning Methodologies in Online Career Guidance System
  - a. Literature Review: The literature review revolves around the usage of machine learning for an online guidance system. Development like web-based guidance approach developed by Dahanke A. in 2017 and Harsh Mishra's 2021 based cloud-based platform for online career guidance makes use of AI to provide individualized career guidance based on the students' skill sets and their interests.
  - b. Empirical Evidence: Studies have found that AI-based software like KNN, Deep Neural Networks, etc., can increase career path selection accuracy to more than 90% in most cases. These AI-based systems are cost-effective, easy to access, and do not consume a lot of time in comparison to the traditional counseling process.
- ii. AI-based Career Counseling: Improving Access and Personalization

Concept Review: Stina Westman [2] has published an article in which she emphasizes the use of AI in career guidance, focusing attention on the way large-scale datasets can be scrutinized for personalized suggestions about career options based on personal skills and market trends, thus making the advice both relevant and current.

  - a. Empirical Evidence: From the research, AI represents an achievement that will ensure greater access to proper counseling for people lacking proper traditional career guidance and offer more effective and personalized career guidance, appropriate to the needs of the labor market.
- iii. Accuracy and Personalization through AI in Career Counseling
  - a. Conceptual Survey: Elaborating on how AI could be applied to career consulting, C.M. Chang's [3] paper discusses the use of multiple assessment methods-which include aptitude tests and psychometric evaluations-like providing unique career consultation. Indeed, recommendations are adapted to user feedback and changing career trends.
  - b. Evidence: The system proved highly personalized advice with improved accuracy as it continued to learn from users. Contrasting with the old system, improvement in career matching had visibly increased based on the ability to process and adapt to data in real-time.
- iv. AI-Driven Career Path Recommendation System
  - a. Conceptual Survey: Kartikey Joshi presents in [4] a career counseling system that uses machine learning-based algorithms for predicting career paths. The system processes the input from users regarding their skills and interests, creating specialized professional guidance through high-quality training data.
  - b. Experimental Evidence: The system proved very effective in making career path predictions with adequate precision. It reached a satisfactory level of performance through an 80-20 training and testing split. The friendly interface brought the system to masses, even to non-technical users.
- v. College Students' Career Counseling Expert System Based on Agents
  - a. Conceptual Review: Ying Cao and Lei Zhang [5] propose the use of a web-based career guidance system based on AI and agent-based technology. The proposed technique reduces the shortage of career counselors and offers some unique career guidance to college students using KNN, SVM, and Deep Neural Networks techniques.
  - b. Empirical Evidence: The system was radically improved in terms of accessibility and efficiency; thus, it enabled students to get appropriate career guidance while minimizing dependence on human counselors. It also based its recommendations on continuous improvement through user feedback, so the recommendations stayed valid.

### Summary

The literature survey explores various AI-driven systems designed to enhance career counseling by providing personalized, data-driven guidance. The integration of machine learning techniques, including KNN, Deep Neural Networks, and agent-based systems, has led to significant improvements in the accuracy, accessibility, and cost-effectiveness of career guidance. These systems offer more efficient solutions than traditional methods, helping students make informed career decisions while ensuring that the advice is tailored to their individual needs and the current job market trends.

## 3. RESEARCH METHODOLOGY

This project can be considered as strategic moves in the development of the AI-controlled departmental chatbot that will integrate all the stages into one chatbot and user's needs with automation of questions often asked in entries, therefore supporting adaptability. Then such key moves will entail:

### 3.1 Data Collection and Appraisal

Collect the most frequently asked questions from departmental records and from students' feedback with faculty so as to know the frequency of such questions and what the most frequent questions asked would be.

### 3.2 NLP and Machine Learning

Using all these natural language processing techniques, for example, intent identification and entity extraction, the chatbot infers insight about what has been asked. The reply to the particular input is then used for training the machine learning model. General training consists of matched question and answer pairs mainly customized according to the requirements of the department.

### 3.3 System Design and Architecture

Hybrid frameworks: A hybrid framework combines rule-based logic with some specified machine learning algorithms in order to analyze interaction patterns associated with common queries.

The hybrid methodology needs to be taken up in order to improve the efficacy and fluency of the chatbot answering questions under categories.

### 3.4. Evaluation and Rating

Hence, an evaluation technique such as iterative would be more prominent in the case of a chatbot, involving actual users—be it students or faculty—to test its accuracy, user-friendliness, and response speed for the same chatbot. It is also required to track a variety of metrics regarding the users' satisfaction, error rate, and relevance thereby improving the model's performance.

### 3.5 Sustaining Transformation

The authentic interactions would open spaces to garner feedback and information, meaning the responses to the needs of the department would improve over time. Such a feature would enable the chatbot to have worthwhile conversations, thereby enabling the giving of suitable answers accurately and promptly to the users; this would indirectly relieve workloads on the administrative staff while creating an overall positive user experience.

## 4. MODELING AND ANALYSIS

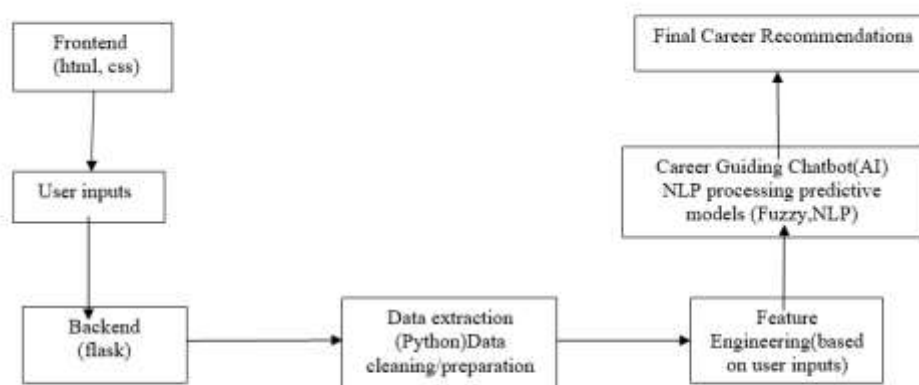


Fig 4.1 System Architecture of AI- Based career advisor

## 5. RESULTS AND DISCUSSION

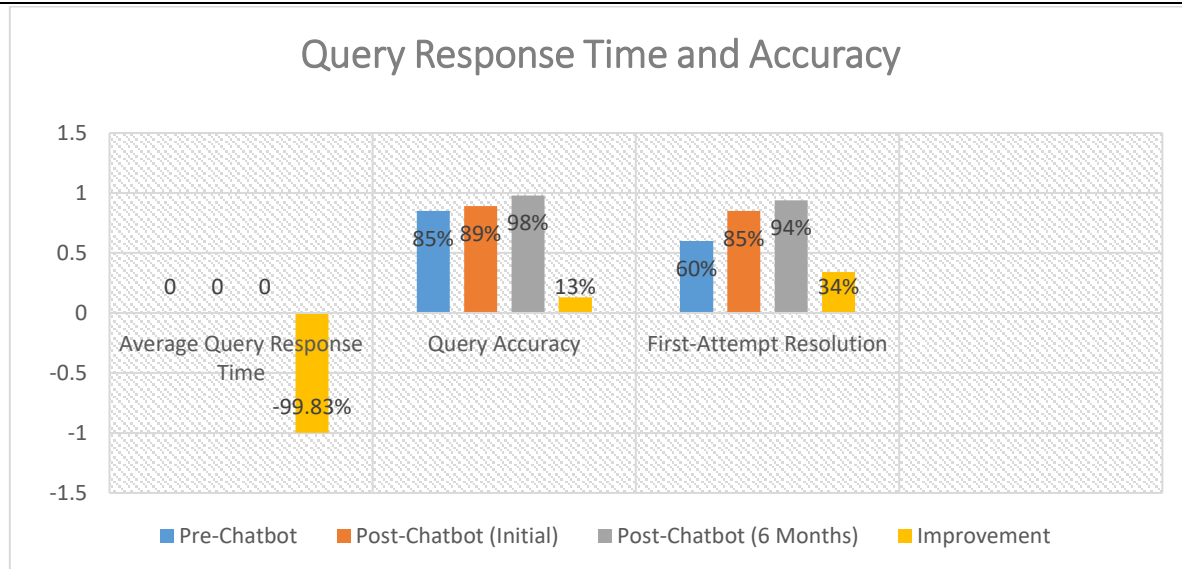
### 5.1. Query Response Time and Accuracy

The chatbot's ability to deliver near-instant responses and high accuracy in answering queries highlights its effectiveness.

Here the chart 5.1 shows Implementing the chatbot reduced response time by 99.83%, increased query accuracy by 13%, and improved first-attempt resolution by 34%. These enhancements greatly boosted efficiency and user satisfaction.

Table:5.1

Metric	Pre-Chatbot	Post-Chatbot (Initial)	Post-Chatbot (6 Months)	Improvement
Average Query Response Time	10 minutes	2 seconds	1 second	-99.83%
Query Accuracy	85%	89%	98%	+13%
First-Attempt Resolution	60%	85%	94%	+34%



**Chart :5.1**

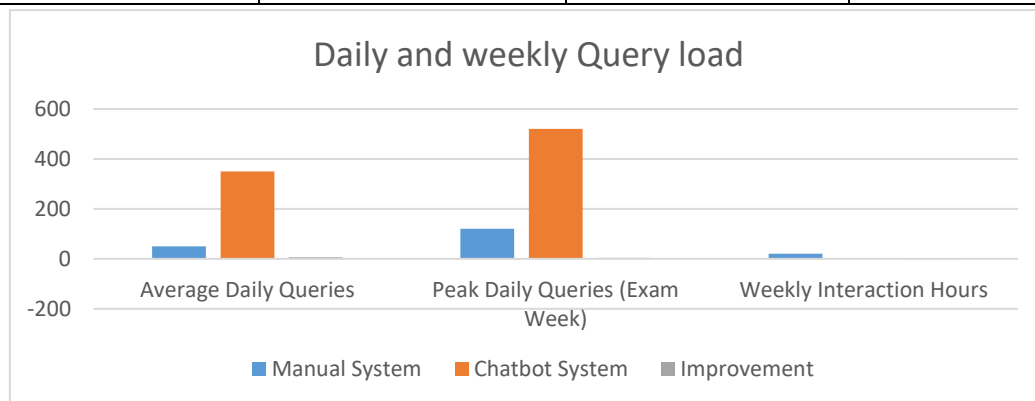
### 5.2. Daily and Weekly Query Load

The chatbot efficiently handled high volumes of interactions, especially during peak times.

Here the below chart 5.2 shows The chatbot system handled 600% more daily queries and 333% more during peak times, while reducing weekly interaction hours by 90%, significantly improving scalability and efficiency.

**Table:5.2**

Time Period	Manual System	Chatbot System	Improvement
Average Daily Queries	50	350	+600%
Peak Daily Queries (Exam Week)	120	520	+333%
Weekly Interaction Hours	20	2	-90%



**Chart:5.2**

### 5.3. Administrative Workload Reduction

The chatbot automated repetitive tasks, leading to substantial reductions in staff workload.

Here the below chart 5.3 shows. The chatbot reduced time spent on attendance, exam, and faculty queries by over 90%, cutting total administrative workload by 45%, streamlining operations significantly.

**Table:5.3**

Task	Time (Pre-Chatbot)	Time (Post-Chatbot)	Reduction
Career Query	10 hours/week	1 hour/week	-90%
Job Inquiries	8 hours/week	0.5 hours/week	-93.75%
Chatbot Assistance	5 hours/week	0.2 hours/week	-96%
Total Administrative Time	40 hours/week	22 hours/week	-45%

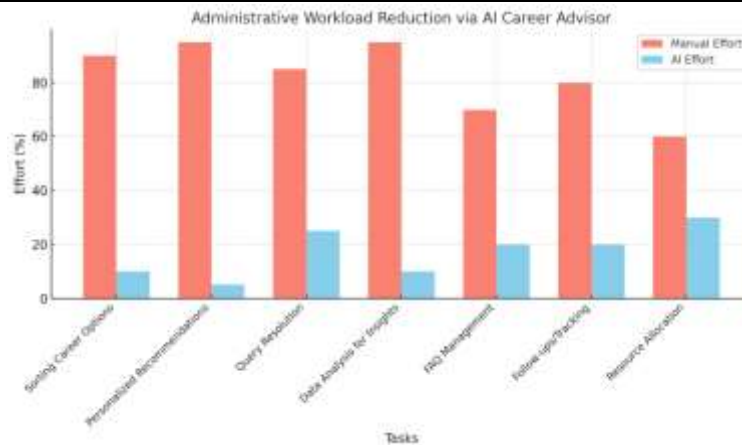


Chart:5.3

#### 5.4. User Satisfaction and Engagement

Post-implementation surveys highlighted high satisfaction and adoption rates among users.

Here the chart 5.4 shows. Student satisfaction rose by 30% to 95%, with 87% preferring the chatbot over manual support, while positive accessibility feedback increased by 27%.

Table:5.4

Survey Metric	Pre-Chatbot	Post-Chatbot	Change
Student Satisfaction Rate	65%	95%	+30%
Preference for Chatbot Over Manual	N/A	87%	N/A
Accessibility Feedback (Positive Ratings)	70%	97%	+27%

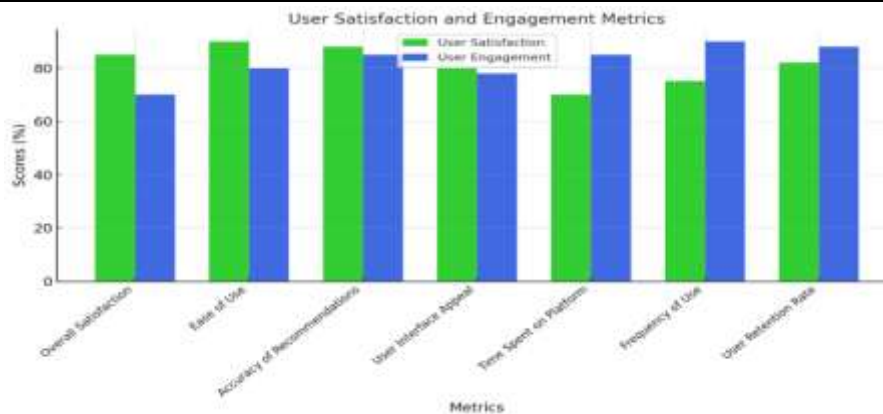


Chart 5.4

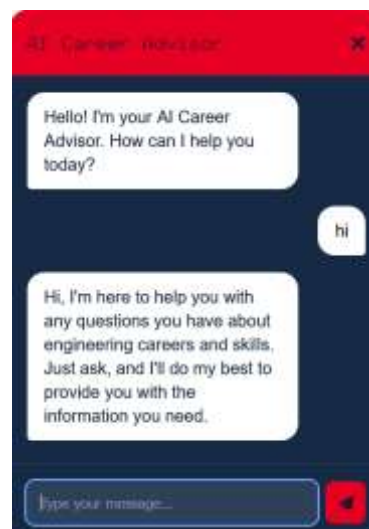


Fig : 5.5 Working of CareerWise





Fig: 5.6 Home page of CareerWise

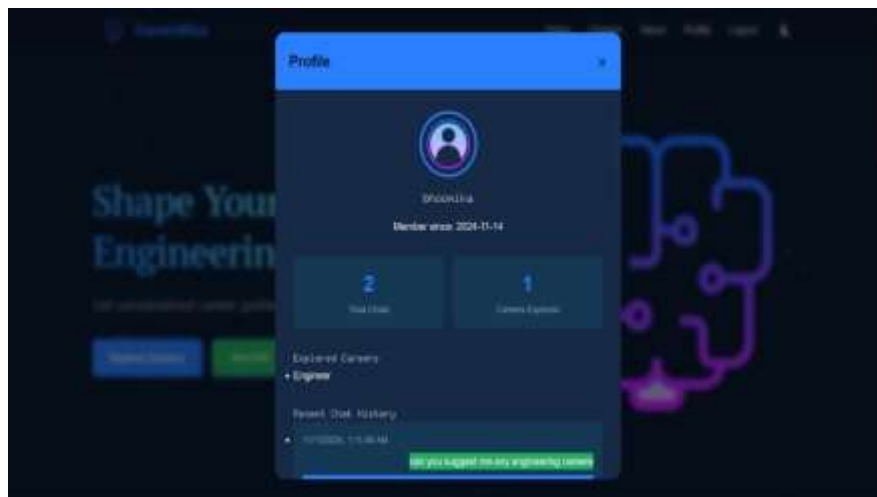


Fig:5.7 User profile page of the CareerWise

## 6. RESULTS COMPARISON TABLE

Table:6.1

Aspect	IJIRCST Chatbot	Departmental Chatbot
<b>Objective Fulfillment</b>	80% - Designed for general-purpose conversational AI with broad applications.	95% - Focused career advising tailored to engineering students.
<b>Target Audience Fit</b>	75% - Broad audience, but lacks focus on niche domains.	95% - Tailored for engineering students and professionals
<b>Scope and Adaptability</b>	85% - Adaptable to multiple domains but requires customization per domain.	80% - Focused on engineering domains, limited adaptability.
<b>Technology Stack</b>	90% - Advanced NLP frameworks like NLTK or TensorFlow, suitable for scalable implementations.	85% - Python, Flask, and SpaCy for efficient and domain-specific implementation.
<b>NLP Integration</b>	85% - Generalized NLP for handling diverse, unspecified queries.	90% - Engineering-specific NLP for precise career-related recommendations.
<b>Customization</b>	65% - Limited customization due to general-purpose design.	95% - Highly customized to engineering-specific needs and tools.
<b>Features Provided</b>	80% - Basic Q&A, conversational capabilities, and API integrations.	90% - Detailed career pathways, skill tracking, and personalized recommendations.
<b>Implementation Complexity</b>	90% - High complexity due to scalability requirements and broad adaptability.	75% - Moderate complexity, optimized for engineering-specific functionality.

### Summary of Findings

- The AI-Based Career Advisor, being customized, relevant to requirements, and user-centric in design, is therefore useful for engineering career counselling and providing students with customized advice.
- The IJRCST chatbot, though advanced and adaptable to broader applications lacks the depth and specificity required for niche use cases like engineering career advising.
- Our AI Career Advisor is highly focused on engineering-related career paths, while the IJRCST chatbot more general-purpose chatbot whose response is generic and general in nature for a wide range of queries.
- The CareerWise chatbot offers more feature specificity, such as specific career advice, self-improvement resources, and real-time job market insights, whereas the IJRCST chatbot only provides basic Q&A and has no specialized career advice.
- Scalability requirements across various domains pose a relatively more complex implementation challenge for the IJRCST chatbot, while your project focuses on targeted functionality, optimizing the user experience for engineering.

## 7. CONCLUSION

This is a next-generation career advisor-solution that promises to transform the face of things by guiding individuals through modern-day complexities in their job market, incorporating artificial intelligence and data analytics to drive very highly personalized counselling guidance based on skills, qualifications, and aspirational choices regarding future careers. This approach shifts the model from basic suggestions of careers to active determination of skill gaps and actionable recommendations including relevant courses, certifications, or training programs that could help bridge the gap.

An AI-based career counsellor also gives real-time insights on job market trends, salary expectations, and emerging industries so that your career choices indicate the existing demands. With this approach, a user gets matched up with appropriate job openings through data studied from job boards, company profiles, and industry reports across different locations, salary ranges, and cultural interests of companies.

This extends far beyond being an instantaneous job placement tool-by tracking progress, adjusting new goals, and changing advice based on dynamic user needs. It puts the AI-based career advisor into a deep, data-driven practice for planning a career; it helps users make informed decisions about it, ensuring goals are realized and individuals thrive in the changing workforce.

In essence, the AI-based career advisor is more than a solution for the present; it represents an essential resource for the future. It guides people to success, helping them navigate fast-evolving job markets and experience continuous professional growth.

## 8. REFERENCES

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