

Kathmandu University

Department of Computer Science and Engineering

Dhulikhel, Kavrepalanchowk



A Project Report

on

“Career Navigator”

(For partial fulfilment of 02 Year/01 Semester in Bachelor of Information Technology)

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Submission Date: 05/08/2025

Bonafide Certificate

The project report on

Career Navigator

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Date: Monday 5th August 2025

Acknowledgement

We would like to sincerely express our heartfelt gratitude to our project supervisor, Mr. Suman Shrestha, whose expert guidance, invaluable insights, and steadfast support have been instrumental throughout the entire development of the *Career Navigator* project. His profound knowledge in computer science and patient encouragement empowered us to navigate through numerous technical challenges and continuously refine our strategies and implementations.

We are deeply thankful to the Department of Computer Science and Engineering at Kathmandu University for providing us with an excellent academic environment, diverse resources, and the opportunity to pursue this innovative project. The department's commitment to fostering research and development has greatly contributed to the successful realization of our goals.

Our sincere appreciation goes to our dedicated team members whose collaborative spirit, creativity, and relentless efforts were vital in bringing this project to fruition. Their innovative ideas and willingness to tackle complex problems undoubtedly enhanced the quality and functionality of the system. Additionally, we acknowledge our peers and fellow students for their constructive criticism, helpful suggestions, and active participation during brainstorming sessions and testing phases, which significantly helped in improving both the design and usability of the application.

Finally, we would like to extend our special thanks to our families and friends for their unwavering encouragement, patience, and emotional support. Their belief in our abilities and continuous motivation were a driving force that sustained us through the challenges encountered during this endeavour.

This report stands as a testament to the collective dedication, expertise, and support of all individuals involved. We are truly grateful to everyone who contributed, directly or indirectly, to the successful completion of the *Career Navigator* project.

Abstract

The *Career Navigator* represents a significant advancement in AI-powered digital career guidance, purpose-built to address the growing complexity students face when navigating their academic and professional futures. In an era defined by abundant opportunities, global competition, and rapidly shifting workforce needs, students are often confronted with uncertainty and confusion regarding which career trajectory best aligns with their abilities and aspirations. This web-based platform systematically bridges that gap by offering a comprehensive, data-driven approach to personalized career planning.

Engineered using the MERN stack. MongoDB, Express.js, React.js, and Node.js—the *Career Navigator* seamlessly integrates sophisticated open-source AI models, including those from Hugging Face, to interpret and assess each user’s unique blend of skills, interests, and academic achievements. The result is a dynamically generated, individualized career roadmap designed to maximize a student’s potential and align with real-world opportunities.

The platform’s frontend, meticulously crafted with HTML, CSS, and Tailwind CSS, ensures a visually engaging, interactive, and fully responsive user experience across varying devices and screen sizes. On the backend, Node.js and MongoDB provide secure, efficient data storage and real-time analysis, enabling the system to rapidly deliver recommendations while safeguarding sensitive information.

A key focus throughout development was on scalability, data security, and usability ensuring the platform could reliably serve an expanding user base while protecting their data and remaining easy to use. Rigorous testing confirmed the solution’s performance under diverse conditions, and feedback-informed iterations were applied to optimize both technical robustness and user satisfaction.

The *Career Navigator* empowers students by offering a suite of actionable features: tailored career insights, identification of skill gaps with corresponding development recommendations, curated learning pathways, and real-time job and internship suggestions matched to emerging trends. It provides a proactive support system that moves beyond static advice, enabling students to make informed, confident career decisions that reflect their personal strengths and ambitions.

Looking ahead, the platform envisions several forward-thinking enhancements, such as the integration of immersive virtual reality modules for experiential career exploration and the adoption of advanced, AI-driven analytics for predictive modelling of future labour market trends. These developments will further strengthen the *Career Navigator*’s role as a comprehensive, future-ready tool that supports individuals at every stage of their career journey.

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List of Abbreviations

- AI: Artificial Intelligence
- MERN: MongoDB, Express.js, React.js, Node.js
- JWT: JSON Web Token
- UI: User Interface
- UX: User Experience
- HTML: Hypertext Markup Language
- CSS: Cascading Style Sheets
- VR: Virtual Reality
- RAM: Random Access Memory
- AWS: Amazon Web Services
- VSC: Visual Studio Code

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1 Introduction

1.1 Background

Deciding on a suitable career path is one of the most crucial journeys students undertake, frequently marked by uncertainty and anxiety due to the vast array of available opportunities and mounting societal expectations. Factors such as growing trends towards foreign studies and international employment further complicate this decision-making process, exposing students to overwhelming choices and unfamiliar environments. Traditional career counselling, which commonly relies on generalized advice or one-size-fits-all assessments, often overlooks the subtle nuances of individual passions, evolving industry needs, and market dynamics. With the advent of artificial intelligence (AI), there is now the potential to revolutionize career guidance by delivering precise, data-driven, and personalized recommendations. The Career Navigator project is designed to address these limitations by offering a sophisticated web-based platform that leverages AI to generate tailored career pathways, skill-gap evaluations, and curated job and internship opportunities—empowering students with the practical insights needed for informed decision-making.

1.2 Problem Statement

Students transitioning at pivotal educational milestones from high school to university or from academia into the professional world frequently experience significant mental and emotional pressure when confronting their future. The lack of highly personalized, actionable career guidance, combined with the complexity of today's dynamic global labour market, can result in decisions that are misaligned with the individual's true strengths, goals, or interests. While current digital career tools may offer information, many lack real-time data integration and an individualized approach, leaving users without clear, actionable guidance to confidently chart their next steps.

1.3 Objectives

The overarching aim of the Career Navigator is to deliver a robust AI-powered career guidance platform utilizing the MERN stack (MongoDB, Express.js, React.js, Node.js). The specific objectives include:

- Efficiently process user inputs—such as skills, interests, and academic backgrounds—to generate highly personalized career suggestions.
- Implement intelligent, AI-driven recommendations that are finely tailored to each user's individual profile.
- Provide in-depth skill-gap analyses and compile targeted learning resources to support ongoing professional development.
- Integrate a real-time job and internship portal, connecting users with current market opportunities aligned with their interests and skillsets.
- Ensure the overall platform is secure, easily scalable, and offers an intuitive, user-friendly experience.

1.4 Motivation and Significance

The impetus for developing this project originates from the team's own experiences with career indecision during critical academic transitions, highlighting the widespread need for adaptive, student-centric support. The increasing pursuit of international educational and professional opportunities by students introduces additional complexities, such as weighing local prospects against global alternatives. The Career Navigator is specifically engineered to alleviate these challenges by seamlessly combining AI-powered insights with a clear, accessible digital interface. Its broader significance lies in helping to ease the psychological burden of decision-making for students, delivering customized career pathways, and ensuring that timely, relevant guidance is accessible to learners from all backgrounds.

1.5 Expected Outcomes

The completion of the Career Navigator is anticipated to result in:

- Delivery of highly individualized career roadmaps based on comprehensive user input.
- Effective identification of skill gaps and suggestion of tailored learning opportunities for upskilling.
- Provision of real-time, targeted recommendations for jobs and internships.
- Guidance to help users compare international study and work options with local opportunities, enabling more holistic decision-making.
- A secure, efficient, and scalable platform that prioritizes usability and accessibility for students at varying academic levels.

2 Related Works

Numerous digital platforms have ventured into AI-driven career guidance, each bringing unique strengths and distinct limitations. The following analysis reviews significant existing systems and clarifies how the Career Navigator improves upon current solutions.

2.1 LinkedIn Career Explorer

LinkedIn Career Explorer employs sophisticated data analytics to connect user skills and competencies to a diverse array of job roles, offering valuable insights for career transitions and professional growth (Hirlekar, 2022). Its key strength lies in leveraging the vast professional networking resources of LinkedIn while enabling nuanced, skill-based job matching. However, its heavy reliance on detailed user profiles and professional experience means it is better suited for established professionals rather than students or early-career individuals who may lack a comprehensive work history or connections.

2.2 My Next Move

My Next Move, developed and maintained by the U.S. Department of Labor, provides broad-based career exploration tools through its interactive interest-based assessments and comprehensive job descriptions (Labour, 2002). The platform is notable for the breadth of information it offers, including job responsibilities, skill requirements, and salary data. Nonetheless, My Next Move does not utilize advanced AI for deep personalization, nor does it provide real-time job market analysis, which limits its responsiveness to evolving industry demands and personalized student needs.



(figure 1)

2.3 Other Platforms

Several other notable platforms exist in the field of digital career guidance. Resources such as CareerOne Stop and O*NET supply detailed static content and basic exploration features but are often hindered by limited interactivity and adaptability. Emerging open-source AI models from repositories like Hugging Face present powerful customization opportunities but typically demand advanced technical skills for effective deployment. Additionally, while there are various GitHub-based career guidance projects, these frequently lack refined user interfaces and the scalability required for mainstream adoption.

2.4 Comparison with Career Navigator

The Career Navigator stands out by marrying AI-driven, individualized career recommendations with a platform intentionally designed for students. Its interface, built with the MERN stack, prioritizes usability even for those with limited technical experience. Unlike LinkedIn Career Explorer, the system does not require an extensive professional track record or profile. In contrast to My Next Move, it actively integrates real-time labour market trends to maintain current and relevant suggestions. Through its modular system architecture and seamless use of open-source AI, the Career Navigator achieves both scalability and ease of adaptation, directly addressing the shortcomings found in many existing platforms.

3 Design and Implementation

3.1 Development Methodology

For the successful execution of the Career Navigator project, an iterative-waterfall development methodology was adopted. This approach was divided into eight structured weekly sprints, which promoted systematic progress and ongoing improvements. Each sprint had a distinct focus, enabling rapid identification of issues and the flexibility to refine features as development advanced:

- **Sprint 1:** Conducted requirement analysis, established system goals, and formulated the preliminary design blueprint.
- **Sprint 2:** Focused on crafting the user interface and user experience (UI/UX) designs and constructed the foundational MongoDB database schema.
- **Sprints 3-4:** Developed the backend, emphasizing secure authentication (using JWT) and the integration of AI models to power personalized recommendations.
- **Sprint 5:** Connected the frontend application to backend APIs, ensuring seamless data transfer and interactive features.
- **Sprints 6-7:** Carried out comprehensive unit testing, gathered user feedback through usability testing, and iteratively debugged the system.
- **Sprint 8:** Compiled documentation produced the final project report and prepared the system for optional deployment.

This methodology combined the rigor and clarity of waterfall planning with the adaptability of iterative feedback, allowing for continuous enhancement throughout the project lifecycle.

3.2 System Requirement Specifications

3.2.1 Software Specifications

The Career Navigator utilizes the following software components:

Table 1: Software Specifications	
Component	Details
Programming Languages	JavaScript, Python
Framework	MERN Stack (MongoDB, Express.js, React.js, Node.js)
Frontend	HTML5, CSS3, Tailwind CSS
Database	MongoDB
Development Environment	Visual Studio Code
Version Control	Git, GitHub
AI Integration	Open-source models (e.g., Hugging Face)

Functional Requirements:

- Robust user authentication implemented with JWT for secure access.
- An AI-powered career recommendation engine that analyses individual user inputs to produce tailored guidance.
- Skill-gap analysis tools with curated suggestions for relevant courses and learning resources.
- A job and internship portal integrating real-time market data to provide actionable opportunities.

- Personalized user dashboards enabling users to monitor and manage their career progress effectively.

Non-Functional Requirements:

- **Scalability:** The system is designed to reliably scale, ensuring consistent performance as the user base grows.
- **Security:** All user data is protected through encrypted authentication processes and secure storage mechanisms.
- **Performance:** System response times are optimized, targeting under 3 seconds for delivering AI-generated recommendations.
- **Usability:** The platform features an intuitive and accessible design, delivering a seamless experience for users at various levels of digital proficiency.

3.2.2 Hardware Specifications

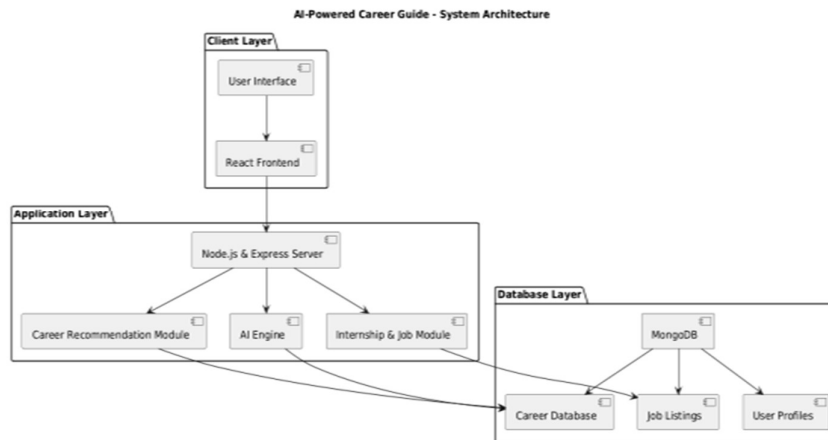
Table 2: Hardware Specifications

Component	Minimum Requirements
Processor	Intel Core i3 or higher
RAM	4GB or higher
Storage	256GB SSD
Display	1024x768 resolution or higher

3.3 System Architecture

The Career Navigator system is architected into three discrete layers, each optimized for a specific role within the overall platform (see Figure 3):

- **Client Layer:** Developed with React.js and styled using Tailwind CSS, this layer delivers a modern, responsive, and easy-to-navigate user interface across devices.
- **Application Layer:** Built on Node.js with Express.js, the application logic handles critical operations such as authentication, AI recommendation processing, and all client API requests.
- **Database Layer:** Powered by MongoDB, this layer manages persistent storage of user profiles, curated career tracks, job listings, and dynamic learning resources, supporting fast queries and real-time access.

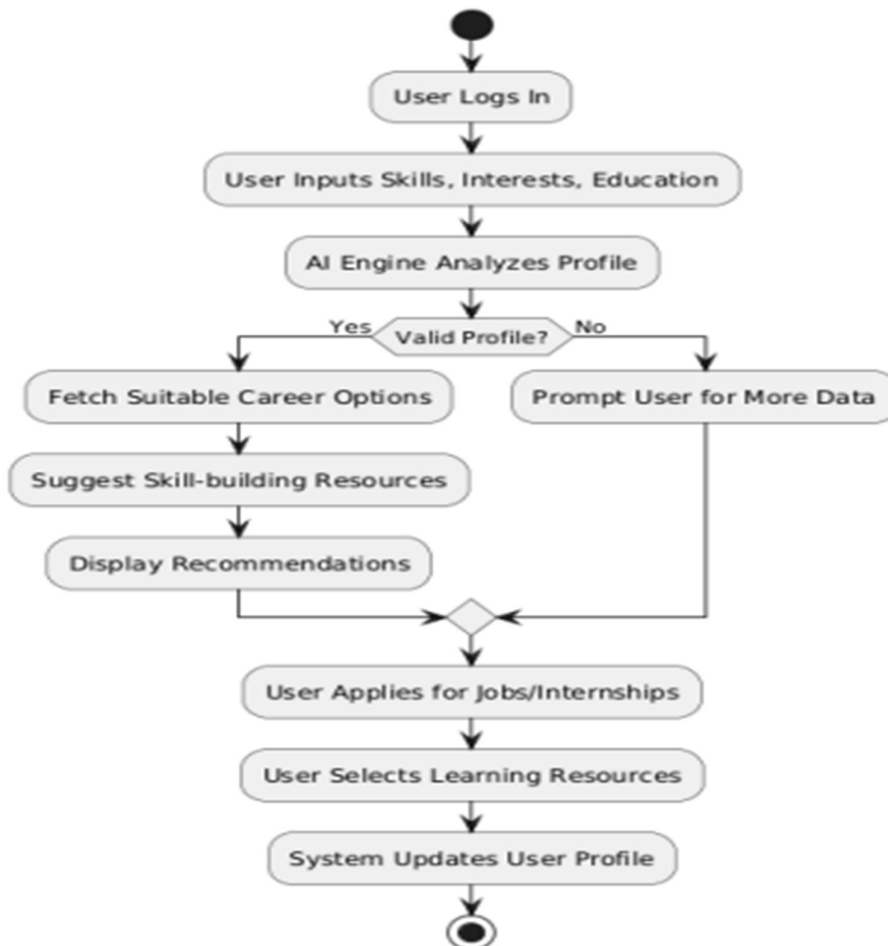


(Figure 2)

3.4 System Diagrams

3.4.1 Flowchart

The user journey is mapped as follows—account registration, skill and interest input, AI-driven data analysis, and the delivery of individualized career roadmaps coupled with job/internship suggestions (see Figure 4).



(Figure 3)

3.4.2 Use Case Diagram

Visualizes user-system interactions, including registering on the platform, creating and updating profiles, receiving career recommendations, performing skill analyses, and applying for job postings.

3.4.3 Sequence Diagram

Outlines the system process flow: user login, data entry, the backends' interaction with AI models, and the secure storage of recommendations in MongoDB, ensuring data consistency and personalization.

3.5 Implementation Details

The implementation strategy leveraged modern development tools and frameworks, ensuring modularity, scalability, and ease of maintenance:

- **Frontend:** Utilized React.js components for dynamic and interactive user experiences. Tailwind CSS was adopted for rapid, responsive design and consistent styling throughout the application.
- **Backend:** Constructed using Node.js and Express.js to provide a robust API framework. Integrated AI models from Hugging Face to deliver intelligent, data-driven career recommendations.
- **Database:** MongoDB was employed to manage application data, with carefully designed schemas for user records, curated career paths, and real-time job listings.
- **Testing:** Covered both code integrity (unit tests for API endpoints) and user-centered validation (usability tests and feedback-driven UI/UX improvements) to ensure overall system reliability and user satisfaction.

This thorough design and systematic implementation underpin the robust, scalable, and innovative nature of the Career Navigator platform.

4 Discussion on Achievements

The Career Navigator system was successfully designed, developed, and validated in a controlled, simulated environment, fully accomplishing the objectives established at the start of the project. This intelligent platform efficiently delivers highly personalized career recommendations, comprehensive skill-gap analyses, and dynamic job or internship suggestions—each provided within a secure, intuitive, and student-focused user interface.

4.1 Challenges and Solutions

Throughout the development lifecycle, several significant challenges were encountered and systematically addressed:

- **Integrating AI models with the MERN stack for real-time processing:**
Achieving seamless interaction between AI-based recommendations and the core MERN architecture posed initial complexity. This was resolved by utilizing lightweight Hugging Face models tailored for real-time inference and by streamlining API calls to ensure minimal latency and optimal efficiency.
- **Ensuring scalability for a growing user base:**
Anticipating growth, the team implemented MongoDB sharding for distributed database management and deployed load-balanced Node.js servers. This approach guarantees that the system can accommodate spikes in user activity without compromising performance.
- **Designing an intuitive UI suitable for non-technical users:**
Crafting a universally accessible and engaging interface was prioritized. The adoption of Tailwind CSS enabled rapid prototyping, while iterative user testing provided actionable feedback, ensuring that the platform remains approachable for users of all technical backgrounds.

4.2 Outcomes Compared to Objectives

All targeted objectives have been successfully achieved:

- The platform reliably generates personalized and actionable career roadmaps customized to each user's skills and interests.
- It offers job and internship recommendations in real time, leveraging integration with live market data for optimal relevance.
- Security is ensured through robust JWT-based authentication and encrypted data management within MongoDB.
- The system's underlying architecture is designed for scalability, supporting ongoing growth and future enhancements.

When benchmarked against platforms like LinkedIn Career Explorer, the Career Navigator stands out by focusing on a student-first interface, deeper personalization, and greater accessibility—particularly for users earlier in their career journey.

4.3 Features

Key features that distinguish the Career Navigator system include:

- Secure user authentication utilizing JWT standards.
- AI-driven recommendations for both career pathways and necessary skill development.
- A real-time, integrated job and internship portal tailored to user profiles.
- Responsive, modern UI built with Tailwind CSS for seamless cross-device use.
- A modular, maintainable codebase, structured to facilitate ongoing improvements and future feature expansion.

These achievements collectively demonstrate the platform's effectiveness in empowering students to make well-informed, confident decisions regarding their academic and professional futures.

5 Conclusion and Recommendation

5.1 Conclusion

The Career Navigator platform effectively tackles the persistent challenge of career indecision among students by offering a robust technological solution that combines scalability, security, and user-centric design. Through its intelligent, AI-driven system, the platform empowers students to discover and pursue tailored career pathways that align with their unique skills, interests, and academic backgrounds. By providing actionable roadmaps for skill development, curated learning resources, and real-time job and internship opportunities, Career Navigator streamlines the often overwhelming process of career planning. The successful implementation and testing of this platform underscore its reliability, relevance, and capacity to enhance confidence and clarity in career decision-making for its users.

5.2 Limitations

While the project delivered on core objectives, several constraints remain:

- The current version features limited integration with real-time job APIs, which may restrict the breadth and immediacy of employment recommendations.
- Continued reliance on open-source AI models from platforms like Hugging Face means the system requires ongoing updates and maintenance to ensure accuracy and relevance as these models evolve.
- The absence of a dedicated mobile application limits accessibility and usability for users on smartphones and smaller form-factor devices.

5.3 Future Enhancements

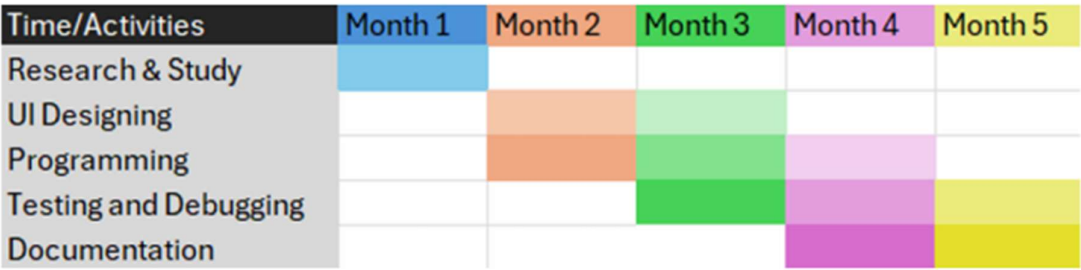
To further improve functionality, reach, and user experience, the following enhancements are recommended:

- **Integration with Virtual Reality (VR):** Adding immersive VR-based career simulations can offer users a hands-on preview of various career environments, further aiding informed decision-making.
- **Advanced AI Analytics:** Incorporating predictive analytics through state-of-the-art AI models can provide trend forecasting, helping users identify emerging career opportunities and remain competitive in a rapidly evolving job market.
- **Development of a Mobile App:** Launching a native mobile application would broaden accessibility, enabling seamless platform interaction for users on the go and expanding the platform's reach.
- **Global Job Platform Integration:** Extending and integrating with international job and internship portals will enhance the quality, diversity, and relevance of opportunities presented to users, further strengthening the value of the platform in a global context.

These strategic recommendations will ensure Career Navigator remains a future-ready, comprehensive guidance tool that responds to the dynamic needs of students navigating their professional journeys.

6 Project Planning and Scheduling

The project timeline for the Career Navigator spans a total of five months and is meticulously structured to ensure efficient progress and optimal resource utilization. The overall schedule is organized into several key activities, each corresponding to distinct phases of the project lifecycle, as depicted in the accompanying Gantt chart.



(Figure 4)

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Appendix

I want to be a politician (7/10)

Pursue a career in i want to be a politician by developing relevant skills and experience.

Required Skills: Communication, Problem Solving, Learning Agility

Growth Projection: Good growth potential with skill development

Learning Resources:

[Coursera \(platform\)](#)

[LinkedIn Learning \(platform\)](#)

Skill Gaps

- Communication
- Problem Solving
- Learning Agility

Action Plan

Short Term:

- Learn Communication through online courses
- Build 2-3 projects related to i want to be a politician
- Update resume and LinkedIn profile

Mid Term:

- Apply for i want to be a politician positions
- Network with professionals in your target industry
- Gain experience in Problem Solving

Software Developer (9/10)

Build applications and software solutions using your programming skills.

Required Skills: Programming, Problem Solving, Debugging

Growth Projection: High demand with 22% growth expected

Learning Resources:

[FreeCodeCamp \(course\)](#)

[JavaScript: The Good Parts \(book\)](#)

UX/UI Designer (8/10)

Create user-friendly interfaces and experiences.

Required Skills: Design, User Research, Prototyping

Growth Projection: Steady growth in digital products

Learning Resources:

[Figma Academy \(course\)](#)

Skill Gaps

- Advanced JavaScript
- System Design
- Database Management

Action Plan

Short Term:

- Complete online JavaScript course
- Build 2-3 portfolio projects

Mid Term:

- Apply for junior developer positions
- Contribute to open source

Long Term:

- Specialize in a framework
- Lead development projects

AI Career Guide

Yakendra

yakendrabudha37@gmail.com

Skills:

Programming Design Marketing Writing Data Analysis
Leadership

Hobbies:

Add hobby

Add

reading books ✕ Politics ✕

politician



Get Recommendations

I want to be a politician (7/10)

Pursue a career in i want to be a politician by developing relevant skills and experience.

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