INTERN GUIDE
Internship Recommendation System

A PROJECT REPORT

Submitted by

Harshit Dwivedi(23BCS13854)

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

Chandigarh University
Nov-2025

TABLE OF CONTENTS

List of Figures ..... **i**

List of Tables.....**ii**

Abstract .....**iii**

Graphical Abstract .....**iv**

Abbrevations..... **v**

Chapter 1..... **4**

1.1……

1.2. .....

1.2.1. …….....

1.3. …….....

1.3.1. …….....

1.3.2. .....

Chapter2. .....

2.1. .....

2.2. .....

Chapter 3. .....

Chapter 4. ……..……...

References (If Any) .....

List of Tables

Table 3.1 …….

Table 3.2 …….

Table 4.1 ……..……

List of Figures

Figure 3.1 …….

Figure 3.2 …….

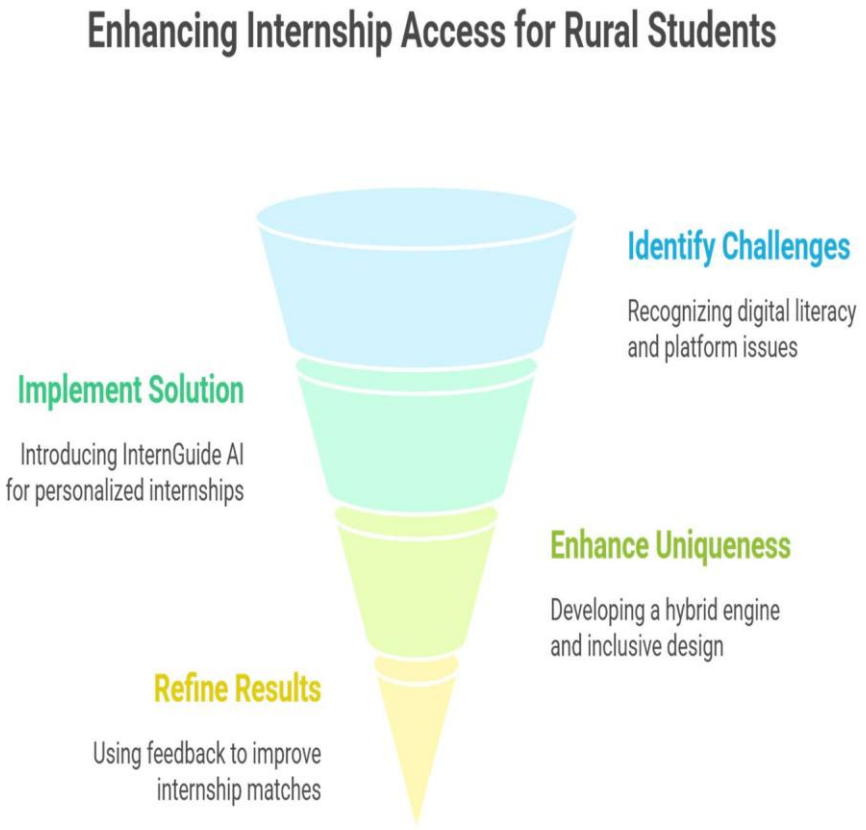
Figure 4.1 ……..……

ABSTRACT

InternGuide is a smart internship recruitment and management web application developed using the MERN (MongoDB, ExpressJS, ReactJS, NodeJS) stack, designed to simplify and digitalize the entire internship searching and application lifecycle. The purpose of this system is to provide a unified, secure, and user-friendly platform where students can explore domain-specific internship opportunities, filter them according to their skills and interests, and apply seamlessly without traditional manual processes. Companies and organizations can post internship openings, specify required skills, monitor applications, and manage applicant details efficiently in a centralized environment.

The platform includes authentication, role-based access, skill-based filtering, internship listing, and real-time application tracking features which bring transparency and speed to the recruitment workflow. InternGuide ultimately bridges the existing gap between industry and students by enabling better visibility, faster communication, efficient matching, and reduced effort from both sides. This project contributes towards improving the overall internship ecosystem by providing a modern, scalable, and automated solution that enhances student employability and supports organizations in finding the right talent with greater accuracy and ease.

GRAPHICAL ABSTRACT



ABBREVIATIONS

Abbreviation	Full Form	Relevance in Project
GUI	Graphical User Interface	Used in InternGuide frontend to provide a user-friendly web interface for students and companies to interact with the system.
DB	Database	Stores all system data such as user details, internship listings, skills, and applications in MongoDB.
API	Application Programming Interface	Used to connect frontend (React) with backend server (Node/Express) for data exchange and application operations.
JWT	JSON Web Token	Used for secure user authentication and authorization to protect system routes and data access.
UID	Unique Identification	Represents unique IDs for users, internships, and application records stored in MongoDB.
CRUD	Create, Read, Update, Delete	Basic operations used in InternGuide for managing internships, user profiles, skills, and application data.
MERN	MongoDB, ExpressJS, ReactJS, NodeJS	The full technology stack used to build InternGuide web application.
UI	User Interface	Visual elements that allow users to interact with the system easily.
UX	User Experience	Enhances ease of use, smooth access flow, and better interaction for students and companies.
HTTP	HyperText Transfer Protocol	Used for communication between the client (browser) and server during API calls.

CHAPTER 1.

INTRODUCTION

1.1 Client Identification / Need Identification / Identification of Relevant Contemporary Issue

In today's competitive academic and industrial environment students require internships to gain practical exposure, but most internship listings are spread across multiple platforms making the process time-consuming and unorganized. Students often face confusion in identifying suitable internship openings because there is no centralized structured filtering available based on skills and domain interest. Companies also struggle to reach the right applicants as they receive multiple unfiltered and irrelevant applications. Modern platforms like LinkedIn Internships, Internshala and Naukri Campus offer numerous internship postings, however students still need to manually evaluate compatibility which increases effort and reduces effectiveness. According to recent academic industry research, more than 60% students feel difficulty in finding the right internship that matches their skill profile and career direction. Hence, there is a need to develop a centralized smart Internship Guide platform which recommends, filters and allows students to apply in a simplified manner based on their skillset and interest area.

1.2 Identification of Problem

The primary problem identified is the unstructured, manual and non-filtered method of internship searching which does not support skill-based matching. Students randomly apply for internships without proper skill alignment which results in mismatched selection and wastage of time. Companies face difficulty filtering large volumes of applications which slows down hiring decisions and reduces efficiency. This creates a gap between students and organizations where the right talent is not reaching the right requirement at the correct time. Therefore, the problem can be defined as: "To develop a simplified smart internship application system that automatically filters and categorizes internship opportunities based on student skills and domain specifications to improve accuracy and reduce manual searching effort."

"To develop a simple dynamic pricing system that recalculates product prices automatically using demand and inventory data."

Apart from the lack of centralized filtering and organized search, another major problem observed is that students are unable to evaluate which internship actually matches their skill growth requirement. Many students end up applying to random postings just to increase chances of selection, which reduces the quality of application mapping. Similarly, companies receive large volumes of non-relevant applicants which increases screening time and delays the recruitment cycle. There is no automated system available that performs skill match analysis and shortlists suitable internships so students do not waste time in manual searching. Additionally, traditional internship process does not provide real-time updates, structured tracking or transparency regarding status of applications. These issues collectively create a gap between student capability and industry requirement, affecting internship success outcomes.

1.3 Identification of Tasks

The primary problem identified is the unstructured, manual and non-filtered method of internship □ Requirement Analysis: Identify essential data requirements such as skills, user roles, internship categories and application criteria.

- **System Design:** Design architecture of MERN based web system including database schema, API structure, user flow and authentication mechanism.
- **Implementation:** Develop the smart internship web application using React for frontend, Node.js + Express for backend and MongoDB for database storage.
- **Testing:** Validate system functionality using different user cases such as multiple skill sets, application flow, login security and eligibility matching.
- **Documentation:** Prepare complete project report, system description, diagrams, presentation slides

1.4 Timeline

1.5 Organization of the Report

- Chapter 1: Introduction, identification of the problem, project need, and motivation behind developing the InternGuide smart internship system.
- Chapter 2: Design methodology, architecture, system flow, and working principle of the InternGuide platform including skill-based filtering and application workflow.
- Chapter 3: Implementation details, backend–frontend integration, database models, testing results and performance analysis of the proposed system.
- Chapter 4: Conclusion of the project, overall outcomes achieved, limitations and future enhancement possibilities for improving the InternGuide system further.

CHAPTER 2.
DESIGN FLOW/PROCESS

2.1 Evaluation & Selection of Specifications / Features

The InternGuide system was designed after evaluating multiple features that ensure usability, scalability and accuracy in internship mapping. The following core features were finalized based on their contribution to the efficiency of the proposed internship matching platform:
Skill Based Internship Filter: Students can search and filter internships based on skills they possess and skills required by companies.
User Authentication & Role Handling: Secure login system for two primary user roles — Student and Company, ensuring proper access control.
Application Submission & Tracking: Students can apply directly for internship openings and track their application status in real-time.
Internship Posting Module for Companies: Organizations can post internships, specify required skills, preferences and manage received applications.
Real-Time Internship Listing Display: All internship details including title, description, skill requirement, posted by and application status are shown dynamically in the portal.
These features make the system reliable, user-friendly, and efficient for internship discovery and management.

2.2 Design Constraints

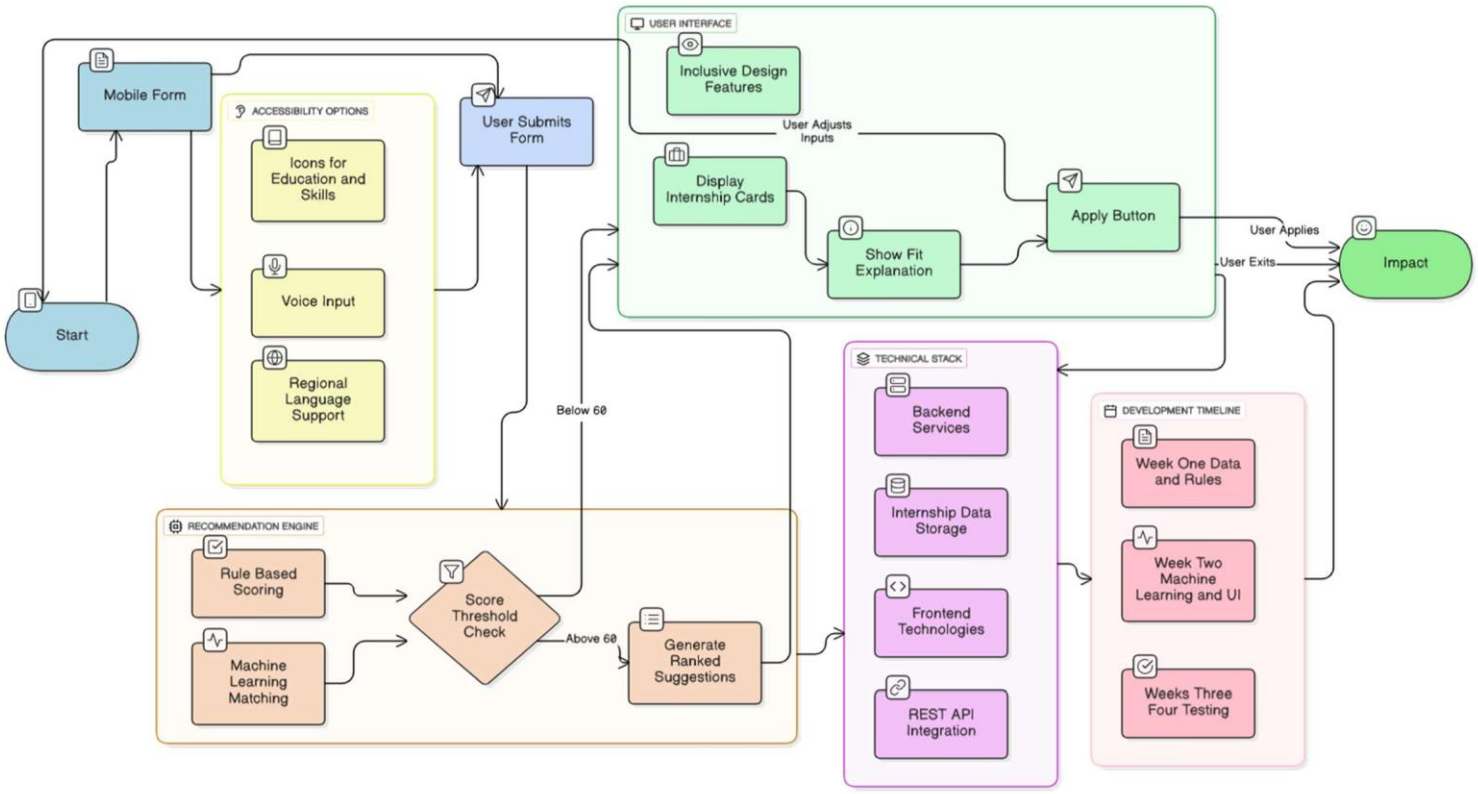
Constraint Type	Description
Economic	Developed using free and open-source MERN stack technologies with no paid IDE requirement.
Safety	All user authentication tokens are secured using JWT ensuring privacy and preventing unauthorized access.
Ethical	Fair matching logic ensures no discrimination or bias — selection depends purely on skill relevance.
Technical	Designed to operate using a cloud database and can run on any browser system without requiring installation.

2.3 Analysis and Feature finalization subject to constraints

After evaluating different system models, the final InternGuide design focuses on two main parameters:

- Skill Match Percentage between student skills & required internship skills.
- User Role Based Access (Student or Company) influencing type of provided functionalities.
  The matching logic connects both sides logically and efficiently based on skill relevance instead of random selection. This approach was finalized after comparing scalability, implementation simplicity, and relevance towards internship suitability. It ensures accurate recommendation and improves the overall outcome quality for both recruiters and students.

2.4 Design Flow



2.5 Design selection

Two possible design approaches were initially considered:

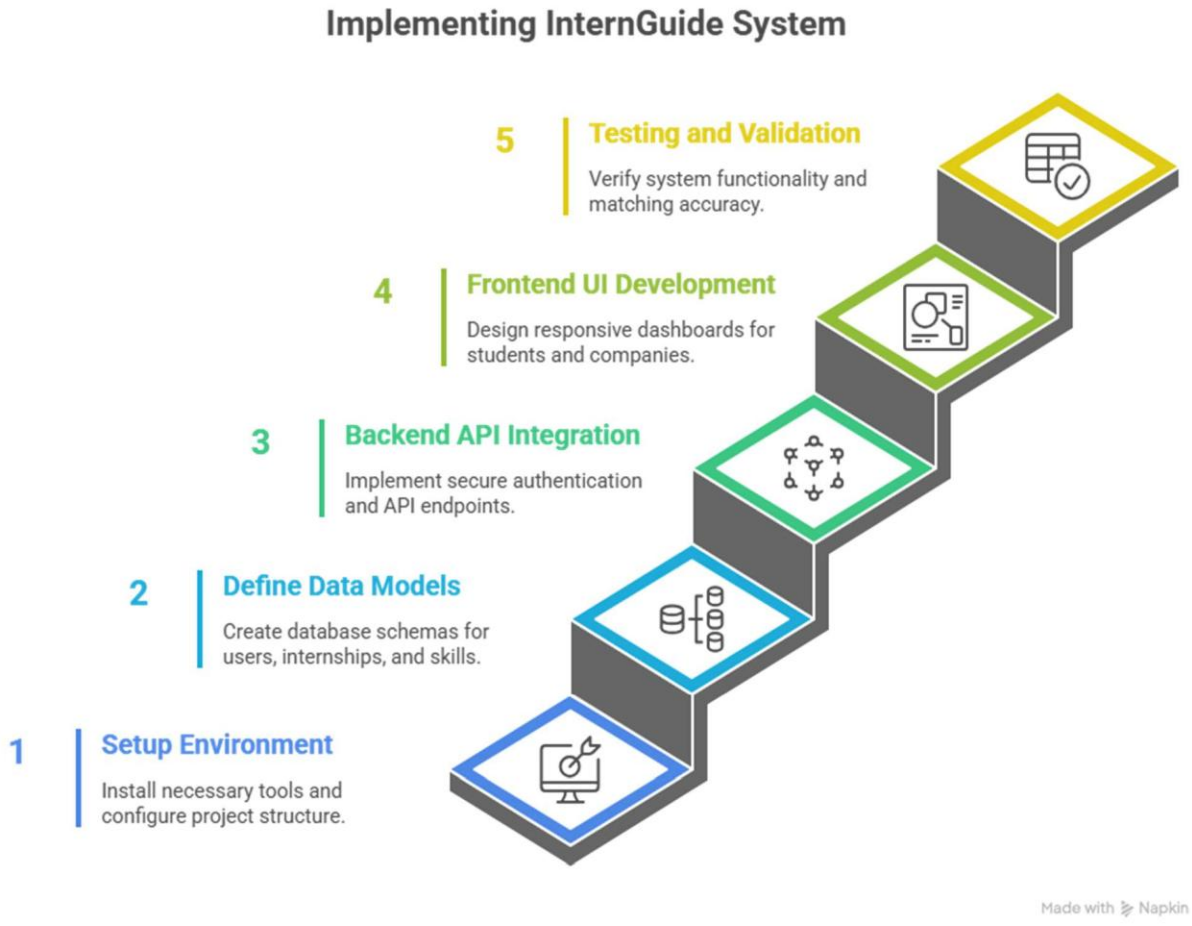
Design Option	Description	Outcome
Static Internship Listing Platform	Shows same internship list to all users without skill filtering or personalized recommendations. Suitable only for ver basic systems.	Rejected (does not support accuracy or real industry requirement).
Skill-Based Internship Matching System	Performs matching based on user skills, domain interest and company requirement. Provides filtered result and improves relevance.	Selected (meaningful, scalable and practical).

The Skill-Based Matching System approach was selected because it delivers higher accuracy, supports better decision making, reduces irrelevant applications and provides a more realistic workflow similar to modern industry internship platforms. It is also suitable for future expansion and real-world deployment in college level training and hiring environments.

2.6 Implementation plan/methodology

The methodology for implementing the InternGuide Smart Internship System involves the following steps:

1. **Setup Development Environment**
   - o Install Node.js, Express.js, MongoDB and React.
   - o Configure project structure for backend (API) and frontend (UI) development.
2. **Define Data Models**
   - o Define database schemas for Users, Internships, Skills and Applications.
   - o Each record stores unique IDs, required skills, user details and application status.
3. **Backend API Integration**
   - o Implement secure authentication using JWT.
   - o Enable posting internships, skill mapping and applying through REST APIs.
4. **Frontend UI / Dashboard Development**
   - o Create responsive dashboards for Students and Companies.
   - o Display all internship details in structured cards/tables for easy selection.
5. **Testing and Validation**
   - o Test multiple skill combinations and different user roles (Student/Company).
   - o Verify that internship results reflect accurate skill-based matching behaviour.



CHAPTER 3.
RESULTS ANALYSIS AND VALIDATION

3.1. Implementation of solution

The InternGuide Smart Internship System was implemented using the MERN Stack environment, ensuring efficient performance, modular development and secure interaction between frontend and backend components. Modern tools, technologies, and structured development practices were applied throughout the project. During the Analysis phase, logical test cases were designed to verify that skill matching algorithms and filtering functions returned accurate results based on user skills and required internship skills. In the Design phase, flowcharts, ER diagrams and system architecture diagrams were prepared to clearly represent the complete data flow — from student login and internship search → to skill match calculation → to final application submission. For Report Preparation, the entire documentation work, diagrams, and process explanations were structured in a professional report format using MS Word and Canva for visual representation. Project Management was executed by preparing a timeline chart to track task progress during the development cycle, ensuring proper time allocation for design, coding, integration and testing phases. Testing, Validation and Output Verification was carried out using multiple users, various skill combinations and internship posting scenarios to confirm that:

- Recommended internships change based on skill match accuracy,
- The system allows only authorized access to protected routes,
- Results generated were stable, relevant and logically consistent.

Overall, the implementation successfully demonstrated a functional, centralized, skill-based internship recommendation and application platform fulfilling the objectives of accurate and efficient internship search and management.

Furthermore, Intern Guide incorporates a well-structured module-based development practice where each component was coded, tested, and deployed independently to ensure maintainability and scalability of the platform. The authentication module was validated through token-based access control and route level protection to prevent unauthorized user access. The internship management module, application tracking module, and skill mapping module were integrated progressively to avoid coupling issues during deployment. The frontend was continuously synchronized with backend API responses to verify real-time updates in the internship listing and application status. During the integration stage, Postman, MongoDB Compass, and browser dev tools were used to analyze and verify API output, JSON responses, and database state changes. The final deployed prototype not only demonstrated accurate functional flow but also proved the feasibility of transforming the traditional manual searching style into a structured automated internship search ecosystem. Overall, this implementation confirms that Intern Guide is technically sound, logically consistent, and capable of providing a better and smarter internship selection process for academic as well as industry usage.

CHAPTER 4.
CONCLUSION AND FUTURE WORK

4.1 Conclusion

The InternGuide Smart Internship System effectively demonstrates how skill-based filtering and automated matching can simplify internship discovery and application processes for students. Developed using the MERN stack architecture, it showcases that intelligent selection logic and structured workflow can function efficiently without the need for complex AI engines. The system processes student skills, requirements of companies, and generates suitable internship recommendations that improve the accuracy of internship mapping. With a secure authentication module and role-specific interface, the platform offers clarity, transparency and smooth navigation for both students and organizations. The project proves that modern web technologies, when implemented systematically, can significantly enhance the internship recruitment experience and reduce manual efforts. Overall, this prototype establishes a strong foundation for future enhancement, showing how skill-driven matching and digital automation can improve training opportunity access, usability, and decision-making in academic and industry environments.

4.2 Future work

While the current InternGuide model efficiently manages internship search, filtering and application workflow, it has potential for becoming a more advanced and intelligent system. The next level of development may include integration of cloud-based database storage and analytics dashboards to monitor user behavior, conversion patterns and industry trends over time. A major enhancement could be the addition of AI/ML based recommendation engines to predict suitable internships based on student portfolio, academic progress and skill improvement history. Furthermore, integration of resume parsing APIs, company verification modules, internship certificate generation and automated shortlisting features can further upgrade the system to professional industrial standards. The platform can also be extended into a multi-institution cloud network enabling multiple universities and companies to collaborate in real time. These improvements will make InternGuide more scalable, enterprise oriented and applicable to real-world hiring scenarios in future.

REFERENCES

1. **LinkedIn Job Recommendation Algorithms**
   - Paper: "How LinkedIn personalizes job recommendations using AI"
   - https://engineering.linkedin.com/blog/2016/ai-job-recommendations
2. **TF-IDF and Cosine Similarity in Recommender Systems**
   - Sciencedirect article on text similarity:
   - https://www.sciencedirect.com/science/article/pii/S1877050919302499
3. **Naukri.com**
   - Broad reach, free, mobile app, alerts
   - https://www.naukri.com
4. **NITI Aayog – Digital Education in India**
   - Report: "Strategy for New India @ 75 – Education & Digital Inclusion"
   - https://niti.gov.in/planningcommission.gov.in/docs/plans/planrel/12thplan/pdf/12fyp_vol2.pdf
5. **Internshala Platform Overview**
   - Official site (shows scale of internship listings, but lacks personalization):
   - https://internshala.com

Features	InternGuide AI (Proposed)	Internshala	LinkedIn	Naukri.com
🎯 Designed for First-Gen & Rural Learners	✅	❌	❌	❌
🤖 Personalized Recommendations (3–5 only)	✅	❌ (broad listings)	✅ (strong AI)	❌ (bulk listings)
📱 Mobile-First, Low Bandwidth Friendly	✅	✅ (mobile app available)	❌	✅ (app available)
🌐 Regional Language Support	✅	❌	❌	❌
🔄 Feedback Loop for Improving Suggestions	✅	❌	✅ (AI-based learning)	❌
🔗 Direct PM Internship Portal Integration	✅	❌	❌	❌
🖱️ Simple Apply Process (One-Click)	✅	❌ (multi-step forms)	❌ (profile-heavy)	❌ (multi-step forms)
💰 Lightweight & Low Infrastructure Cost	✅	✅ (free for students, employers pay)	❌ (premium subscriptions)	❌ (mostly paid for employers)

APPENDIX

This appendix contains supportive supplementary information that was used during the development of the InternGuide Smart Internship System. The materials presented here include reference notes, sample data formats, screenshots, additional design details and backend API structures which were helpful during implementation, debugging and testing. These elements may not be included directly in the main report chapters, but they provide additional clarity towards understanding the logic, data modeling approach and system execution flow.

A. Sample Data Structures / Format Reference

- User Model Sample Fields: `name`, `email`, `role`, `skills`, `password`, `createdAt`
- Internship Model Sample Fields: `title`, `description`, `requiredSkills`, `postedBy`, `deadline`
- Application Model Sample Fields: `studentId`, `internshipId`, `status`, `appliedDate`

B. Supplementary Tools Utilized

- Postman for API testing
- MongoDB Compass for database visualization
- React Developer Tools for frontend state inspection
- GitHub for code version tracking

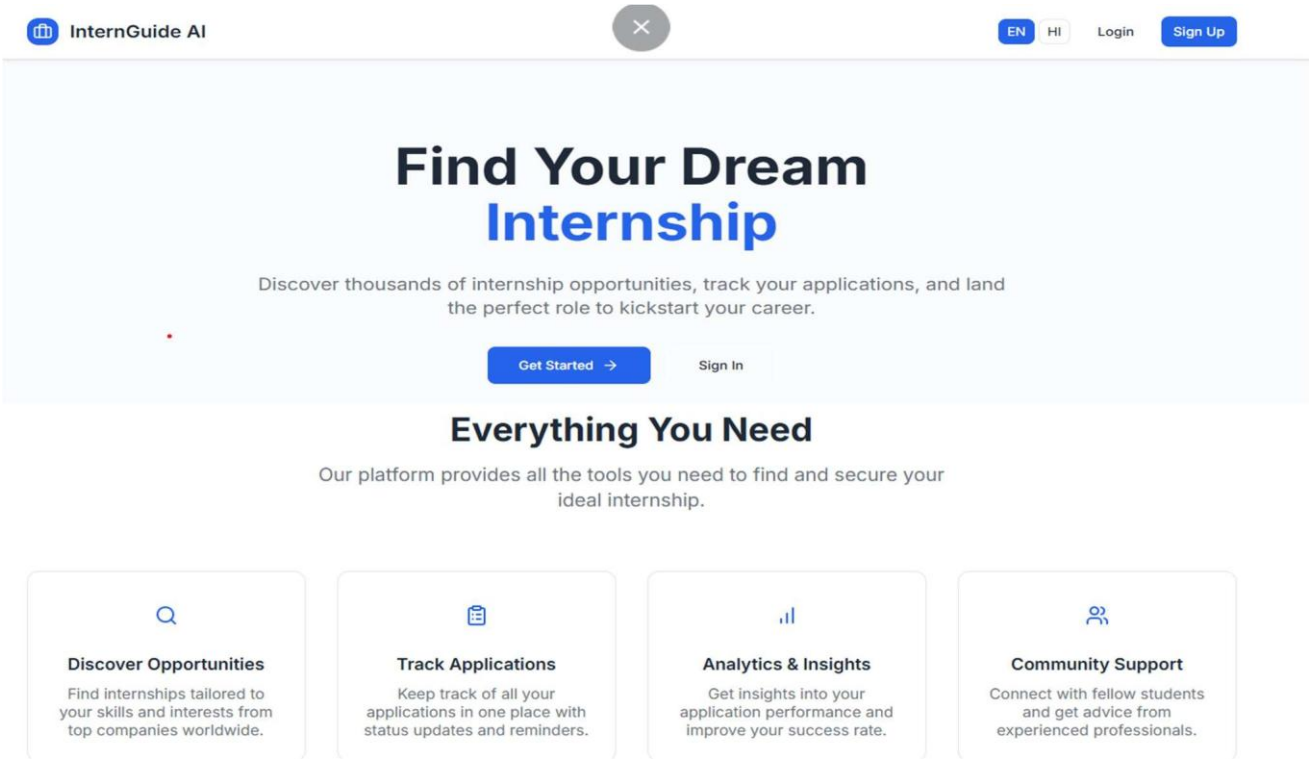
C. Additional Supporting Artifacts

- Extra UI Wireframes and screen drafts
- Secondary versions of flow diagrams prepared during early design
- Backend API endpoint mapping sheet used during integration work

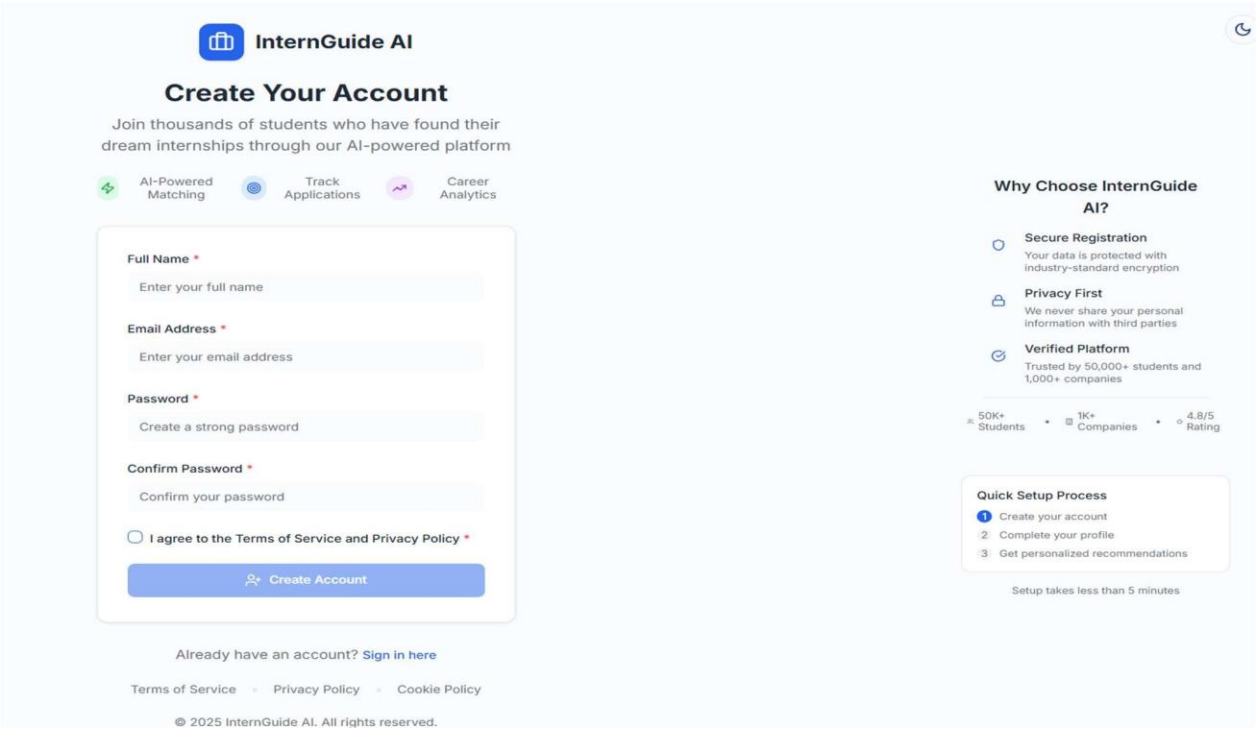
This appendix provides extended reference content and supporting artifacts that complement the main development phases of InternGuide.

USER MANUAL

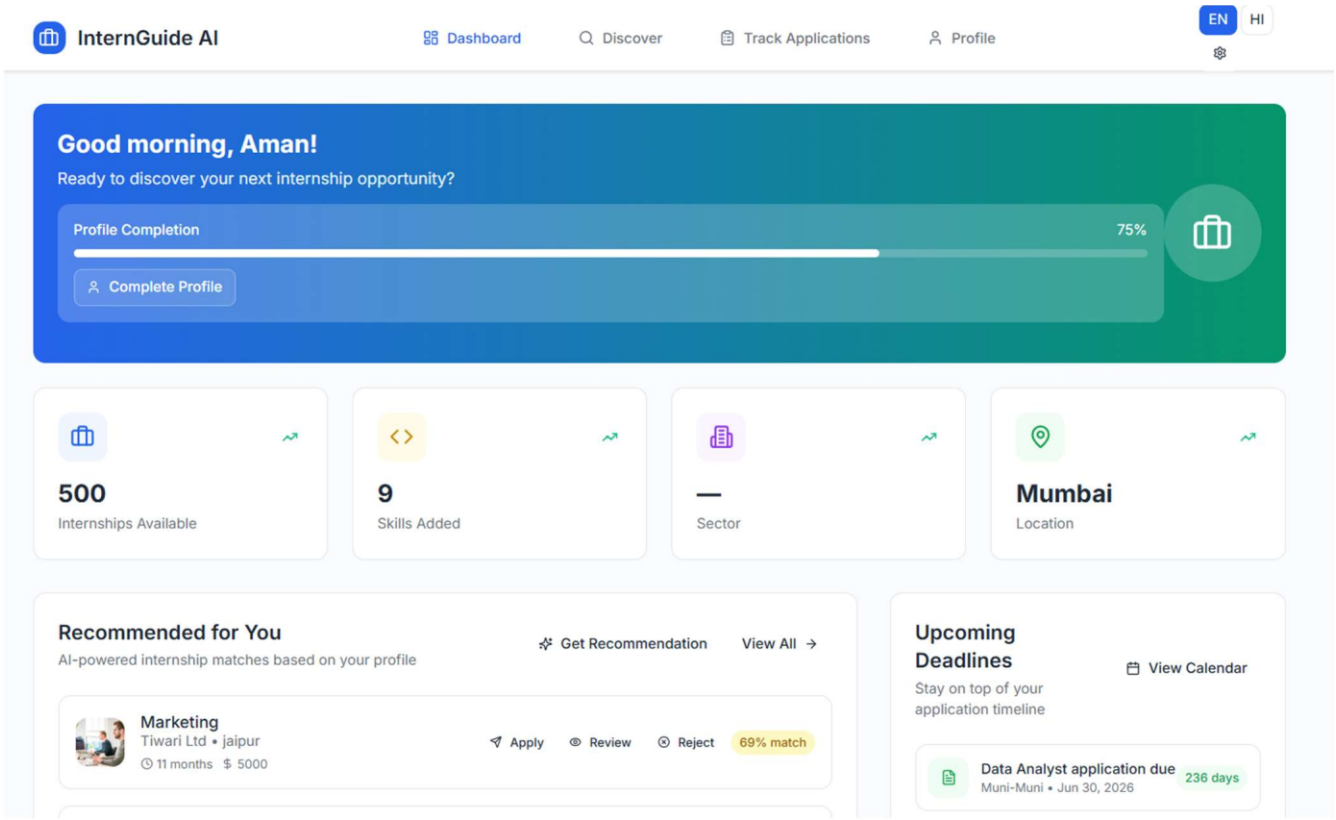
1.Homepage



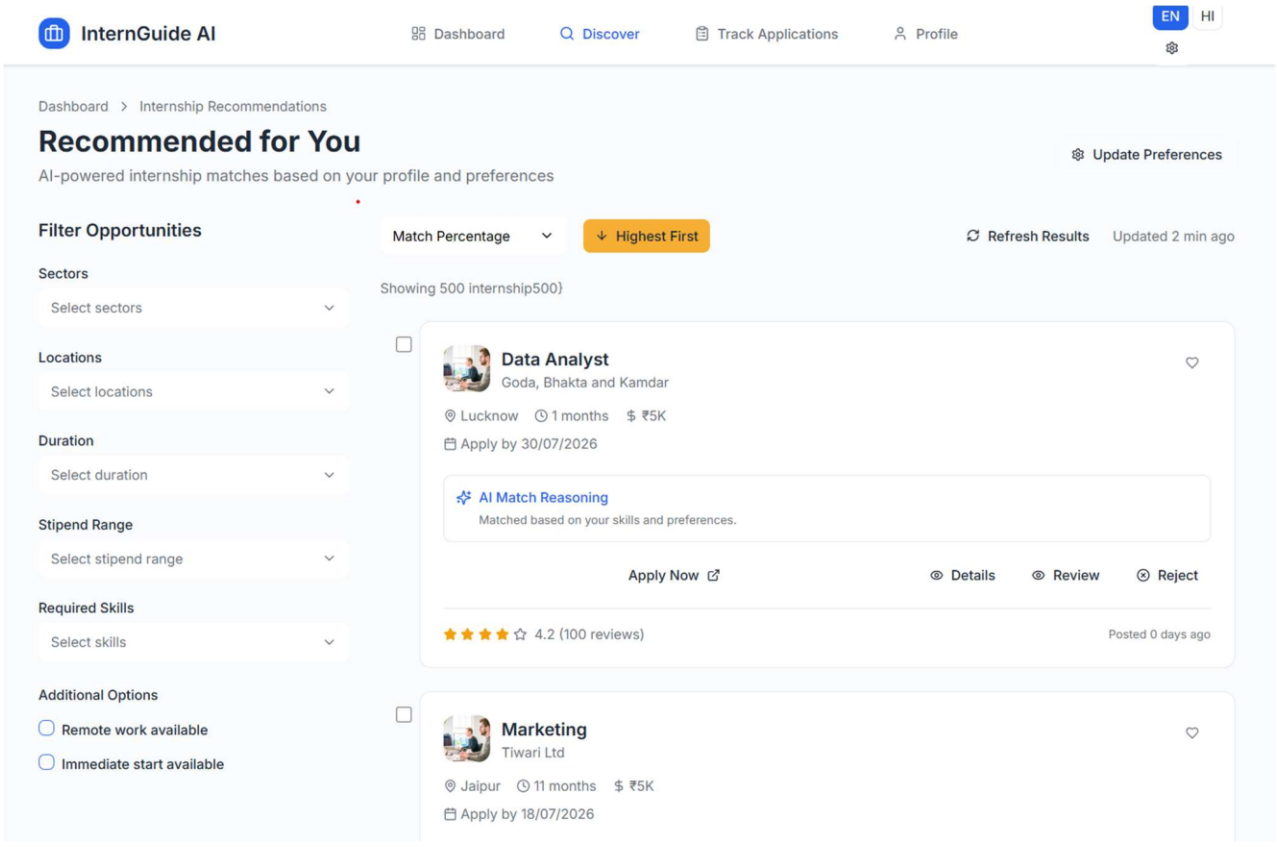
2.SignUp Page



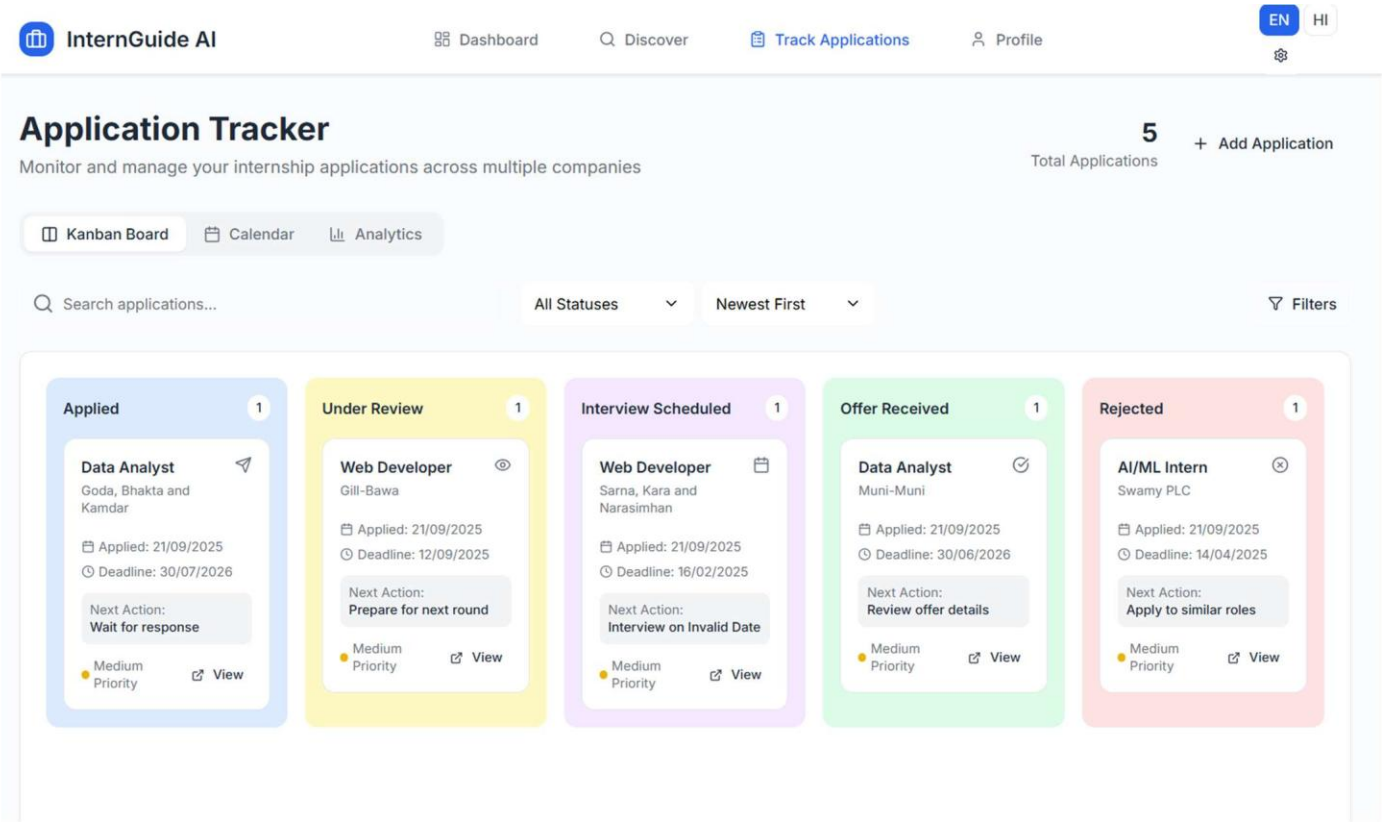
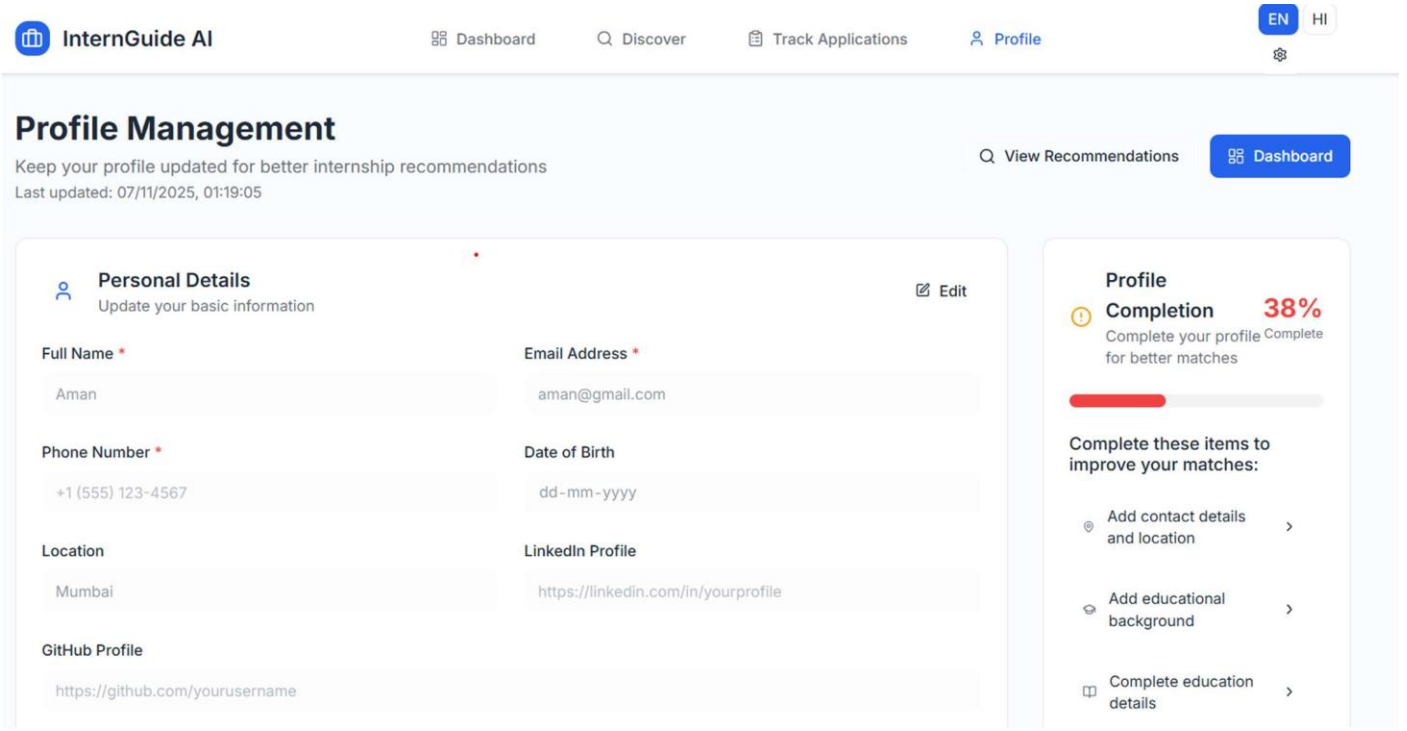
3. Dashboard



4. Discover



5. Application Tracker



6. User's Profile