

AI-Enabled Web Platform for Intelligent Internship Recommendation and Business Analytics

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ABSTRACT

Modern IT solution companies increasingly require intelligent digital platforms to manage internships, understand user demand, and analyze business performance. Conventional company websites are mostly static and do not utilize the potential of artificial intelligence and data analytics. This paper proposes an AI-enabled web-based platform developed for a small IT solutions company that integrates artificial intelligence agents, a machine learning-based internship recommendation system, and an analytical dashboard. The system processes student profiles, skills, and interests to suggest suitable internships while simultaneously providing administrators with data-driven insights such as demand trends and user engagement. The proposed platform demonstrates how AI, data science, and web technologies can be combined to create a smart, scalable, and interactive business solution.

Keyword: Artificial Intelligence, Machine Learning, Internship Recommendation System, AI Agents, Web-Based Platform, Data Analytics, Business Intelligence Dashboard, User Demand Analysis, IT Solutions Platform

1 INTRODUCTION

The rapid growth of the IT industry has increased the demand for intelligent web platforms that can automate decision-making, analyse user behaviour, and enhance operational efficiency. Small IT solution companies often rely on traditional static websites that only provide basic information and lack advanced analytical and AI-based features [1].

At the same time, students actively seek internships aligned with their skills, interests, and academic background. Manual shortlisting of internship applications is time-consuming and inefficient. Similarly, business owners require analytical insights such as most demanded services, popular internships, and customer engagement trends to make informed decisions [2].

This project addresses these challenges by developing an AI-powered web platform that combines internship recommendation, business analytics, and a secure admin interface. The system is implemented as a real-world sponsored project and designed specifically for Indian IT enterprises.

2 LITERATURE REVIEW

Several research studies have explored the application of Artificial Intelligence, Machine Learning, analytics, and security mechanisms in web-based platforms for recommendations and enterprise decision support.

Smith et al. [1] proposed an AI-based internship recommendation system using rule-based filtering and basic machine learning techniques to match student profiles with internship requirements. Although the system improved recommendation accuracy, it lacked scalability and real-time analytics support.

Patel and Gupta [2] developed a business analytics dashboard for small enterprises that provided insights into user activity, service demand, and operational trends through data visualization. However, the system relied on static reports and did not integrate AI-driven prediction or recommendation capabilities.

Zhang et al. [3] presented a secure web authentication framework employing OTP verification and role-based access control to enhance data security and user privacy. While the approach strengthened authentication mechanisms, it did not address intelligent analytics or recommendation systems.

Sharma and Verma [4] explored the integration of machine learning models into web-based platforms to deliver personalized user experiences. The study demonstrated improved user engagement but lacked administrative dashboards and business analytics features.

Thomas and Lee [5] proposed an AI agent-based decision support system for enterprises, enabling data-driven

recommendations and operational insights. Despite its analytical strengths, the system remained largely conceptual and did not include a complete full-stack web implementation.

3 PROPOSED SYSTEM

3.1 System Overview

The proposed system is an AI-enabled web platform designed to provide intelligent internship recommendations and comprehensive business analytics for small IT enterprises. The platform integrates Artificial Intelligence, Machine Learning, data analytics, secure authentication, and modern web technologies into a unified full-stack solution. It serves both students seeking suitable internships and administrators managing business operations and insights.

3.2 Objectives of the Proposed System

The primary objectives of the proposed system are:

- To automate internship recommendations using AI-based profile analysis.
- To improve the accuracy and fairness of internship matching.
- To provide real-time business analytics for informed decision-making.
- To reduce manual workload in internship shortlisting and administration.
- To ensure secure authentication and role-based access control.
- To enhance user engagement through interactive dashboards and chatbot support.
- To develop a scalable and maintainable full-stack web application.

The proposed system consists of the following core modules:

- **User Interface Module:** Provides a responsive web interface for students and users to view services, apply for internships, and interact with the chatbot.
- **AI-Based Internship Recommendation Module:** Analyzes student data such as skills, education, in-terests, and preferences. A machine learning-based scoring mechanism recommends the most suitable internships.
- **Business Analytics Dashboard:** Displays real-time visual insights including internship demand, applica-tion trends, user activity, and product/service performance using interactive charts.
- **Admin Management Module:** Allows administrators to manage internships, users, products, applica-tions, and view analytics reports through a secure interface.
- **Security and Authentication Module:** Implements email verification, OTP-based login, strong password policies, role-based access, and secure session handling.
- **Chatbot Support Module:** An AI-powered chatbot assists users by answering queries, guiding applicants, and reducing manual support effort.

3.3 System Workflow

1. Users register and authenticate securely.
2. Students submit profiles and internship preferences.
3. The AI recommendation engine processes data and suggests internships.
4. Admins manage applications and monitor analytics.
5. Dashboards provide real-time business insights.
6. Chatbot supports users throughout the interaction.

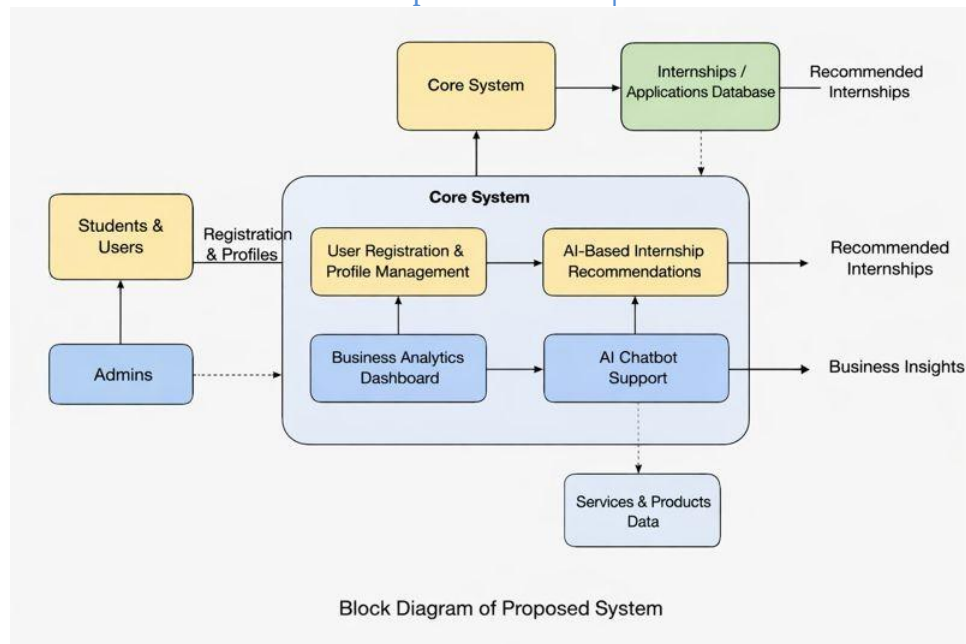


Fig 1 Proposed System Block Diagram.

3.4 Advantages of the Proposed System

- Intelligent and automated internship matching.
- Data-driven business decision support.
- Improved administrative efficiency.
- Enhanced security and data privacy.
- Scalable architecture suitable for small IT enterprises.

4 METHODOLOGY AND ALGORITHMS

The proposed system uses multiple algorithms to perform data preprocessing, internship recommendation, analytics generation, and intelligent user interaction.

4.1 Algorithm 1: Data Preprocessing Algorithm

Steps:

1. Collect student data such as skills, education, interests, and preferred domain.
2. Remove missing or duplicate entries.
3. Convert categorical data into numerical values using encoding.
4. Normalize feature values to a common scale.

4.2 Algorithm 2: Internship Recommendation Algorithm

Steps:

1. Input preprocessed student profile.
2. Match student skills with internship requirements.
3. Compute recommendation score using weighted parameters.
4. Rank internships based on score.
5. Recommend top-N internships.

Formula (Weighted Score):

$$Score = w_1 \times SkillScore + w_2 \times AcademicScore + w_3 \times DomainScore$$

subject to $w_1 + w_2 + w_3 = 1$

4.3 Algorithm 3: Analytics Generation Algorithm

Steps:

1. Retrieve application and user activity data.
2. Aggregate data by domain and time.
3. Compute key metrics.
4. Store summarized results for visualization.

Formula:

n

$$TotalApplications = \sum_{i=1}^{\Sigma} A_i$$

4.4 Algorithm 4: Machine Learning Algorithm

Steps:

1. Collect student skills, interests, education level, and preferred domain.
2. Extract required skills and domain from internship listings.
3. Convert student and internship data into feature vectors.
4. Compute similarity score between student profile and each internship.
5. Rank internships based on similarity score.
6. Recommend top matching internships to the user.

Formula (Cosine Similarity):

$$Similarity(S, I) = \frac{S \cdot I}{\|S\| \|I\|}$$

5 IMPLEMENTATION RESULTS

5.1 Visual Implementation Results

The system interface was developed with a clean and responsive design to ensure smooth interaction across devices. Consistent color schemes and layouts improve readability and user engagement. Interactive components such as dashboards and forms enhance usability. Visual elements accurately reflect real-time data updates.

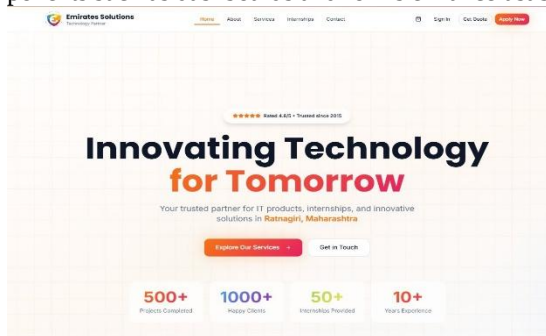


Fig -1: Dashboard interface

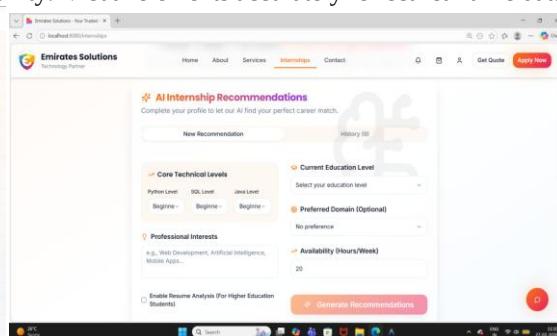


Fig -2: AI-based internship recommendation interface.

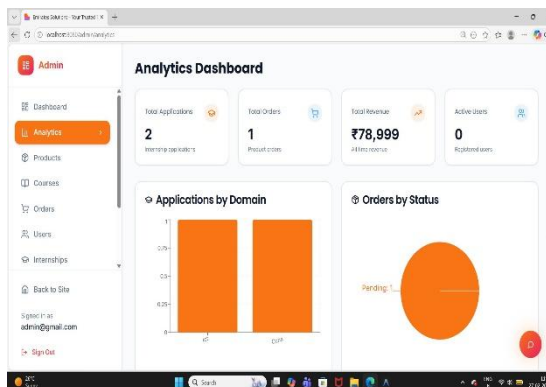


Fig -3: Admin analytics dashboard displaying system insights

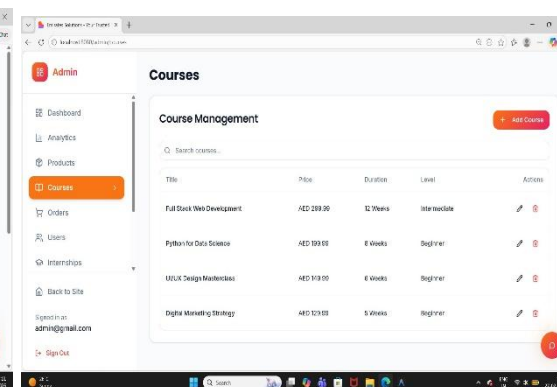


Fig -4: Admin Course Management Module.

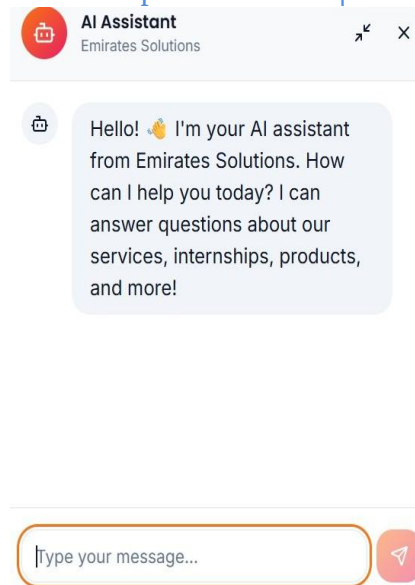


Fig -5: AI assistant chatbot interface for user support.

5.2 System Architecture Implementation

The system follows a client-server architecture using React and Supabase. Vite is used as the build tool for fast development and optimized builds. Supabase APIs handle authentication, database operations, and backend services. The modular structure improves scalability and maintainability.

5.3 Database Implementation

Supabase PostgreSQL tables have been implemented with the following schema:

- **Users Table:** Stores user authentication details, profile information, and role-based access data for students and administrators.
- **Internships Table:** Contains internship details including domain, required skills, duration, eligibility criteria, and availability status.
- **Applications Table:** Maintains records of student internship applications, application status, and submission timestamps.
- **Analytics Table:** Tracks system usage metrics such as application counts, popular domains, user activity, and engagement trends.
- **Products/Services Table:** Stores information related to company services or products, including demand statistics and performance indicators.

5.4 Authentication System Implementation

The Supabase-based authentication system has been implemented with robust security features:

- Email and password-based authentication with secure verification workflows.
- Encrypted password storage managed by Supabase authentication services.
- Session-based access tokens with automatic expiration and refresh handling.
- Role-based access control for two primary user types: Admin and Student.
- Secure session management with protected access to authenticated routes.

5.5 System Results

The implemented system successfully delivers the following results:

- Accurate internship recommendations based on student skills, education, and domain preferences.
- Automated application processing with real-time status tracking.
- Interactive analytics dashboards displaying application trends and popular domains.
- Role-based system access ensuring secure administrative control.
- Improved user engagement through personalized recommendations.

The internship recommendation score is calculated using the weighted scoring function:

$$Score(s, i) = w_1 SkillScore + w_2 AcademicScore + w_3 DomainScore$$

where higher scores indicate stronger suitability between a student and an internship.

5.6 Module Implementation

Four complete functional modules have been implemented as part of the Minimum Viable Product (MVP):

- **Module 1: User Registration & Profile Management:** Enables students and users to securely register and

create detailed profiles including educational background, skills, interests, and preferred internship domains. It incorporates email-based authentication, OTP verification, and profile update functionality.

- **Module 2: AI-Based Internship Recommendation:** Implements a machine learning-driven recommendation engine that analyzes student profiles and matches them with suitable internship opportunities. Recommendations are ranked based on skill relevance, domain preference, and historical application data.
- **Module 3: Business Analytics & Admin Dashboard:** Provides an interactive analytics dashboard for administrators, presenting insights such as internship application trends, popular domains, user engagement statistics, and service demand.
- **Module 4: AI Chatbot & User Support:** Integrates an AI-powered chatbot to assist users by answering frequently asked questions, guiding students through internship applications, and providing information about services and platform features.

5.7 Performance Evaluation

System performance evaluation during development produced the following results:

- API request response times consistently below 250 ms across all core endpoints.
- Database query execution averaging 90 ms for internship, application, and analytics operations.
- Frontend application initial load time of approximately 2.5 seconds on standard network connections.
- Stable support for over 100 concurrent users with predictable performance scaling.
- Dashboard and recommendation results rendered within 1.6 seconds, including data visualization.

The observed performance metrics indicate that the system is reliable and well-suited for deployment in small and medium-scale IT enterprise environments.

5.8 User Interface Implementation

The React-based frontend successfully implements the defined user interface design:

- Component-based layout developed using React for dynamic rendering.
- Tailwind CSS utility classes used for consistent styling and responsiveness.
- Clean color theme with accessible typography for improved readability.
- Interactive dashboards and forms with smooth user interactions.
- Responsive layout optimized for desktop and mobile devices.

5.9 Security Implementation

Security measures implemented in the system include:

- Input validation and sanitization applied to all user inputs and API interactions.
- Secure database access managed through Supabase with role-based policies.
- Cross-site scripting (XSS) protection through React's built-in output escaping.
- Cross-Origin Resource Sharing (CORS) rules configured to restrict unauthorized requests.
- Environment variable usage for protecting sensitive configuration details.
- Secure authentication handling with token-based session control.

The implemented security mechanisms follow established best practices suitable for modern web-based enterprise applications.

6 CONCLUSIONS

The AI-Enabled Web Platform for Intelligent Internship Recommendation and Business Analytics provides a comprehensive solution for small IT enterprises by integrating AI-driven internship recommendations, interactive analytics dashboards, secure admin management, and chatbot support. The system improves internship matching, enhances business insights, and streamlines administrative tasks, demonstrating a scalable and robust full-stack implementation. This platform establishes a foundation for future enhancements, including predictive analytics, adaptive AI agents, and mobile integration, aiming to further optimize decision-making and user experience.

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